Abstract Book for

6th International Conference HITASA-2024

"HOLISTIC INNOVATIONS AND TECHNOLOGICAL ADVANCES FOR SUSTAINABLE AGRICULTURE"

Organized by

SR University, Warangal

Sri Konda Laxman Telangana State Horticultural University, Hyderabad

Just Agriculture Education Group

on 04-06 March, 2024

At SR University, Warangal

Editors:

Dr. Paresh P. Baviskar

Dr. Mohit Bharadwaj

Dr. DPS Badwal

Dr. Utkarsha P. Gaware

Dr. G. Bhupal Raj

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Holistic Innovation and Technological Advances for Sustainable Agriculture (HITASA-2024)

6th International Conference
Book of Abstracts

Organized by

Indian Society of Agriculture & Horticulture Research Development, (ISAHRD) Chandigarh
School of Agriculture (SOA), SR University, Warangal and
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BOOK OF ABSTRACTS

6th International Conference on Holistic Innovations and Technological Advances for Sustainable Agriculture (HITASA-2024)

04th- 06th March, 2024

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MESSAGE

I am pleased to note that Just Agriculture Education Group, SR University, Warangal and Indian Society of Agriculture and Horticulture Research Development (ISAHRD), Chandigarh succesfully organized 6th International Conference on Holistic Innovations and Technological Advances for Sustainable Agriculture from March 04-06, 2024.

Like other sectors of the economy, disruptive transformation through innovations is occurring in agriculture also. Innovations in agriculture are crucial to improve efficiency, food security, sustainability, economic growth, and climate adaptation. Hence, organizing a conference on Innovations approaches is the need of the hour. This conference acted as a platform for researchers, scientists, scholars, and industry leaders to present their research findings, innovative ideas, and novel technologies to a broader audience. The deliberations during the confernece will be helpful in chalking out latest technological interventions & to promote new innovations and modern technologies in Agriculture. Conferences are the extraordinary mediums for dissemination of technologies, sharing information & innovatives ideas.

I congratulate the convener and committee members for the succesful organization of this event. Also, I would like to congratulate all the participants of this International Conference. I wish that you all will be benefitted from the knowledge, skill and experience gained during this conference and will be useful for your future endeavors.

(Himanshu Pathak)

20th March, 2024

New Delhi

Shri A. Varada Reddy
Chancellor, SR University

MESSAGE

It is with great pleasure and anticipation that I extend a warm welcome to all participants of the International Conference on "Holistic Innovations and Technological Advances for Sustainable Agriculture" (HITASA-2024), organized by the School of Agriculture (SOA), SR University, Warangal in association with Sri Konda Laxman Telangana State Horticultural University (SKLTSHU), Hyderabad & Just Agriculture Education Group.

This conference serves as a pivotal platform for exploring and advancing the myriad facets of agricultural sustainability, with a focus on innovative approaches in Soil Health, Land Resources, Land Use Planning & Management, and Precision Agriculture, Soil and Water Conservation for a sustainable agricultural system. By harnessing cutting-edge technologies and embracing holistic approaches, we aim to foster a more sustainable and resilient agricultural ecosystem.

I am deeply impressed by the remarkable lineup of experts and scholars who have converged to share their insights and expertise in these critical areas. Your contributions and dedication exemplify the collaborative spirit essential for addressing the complex challenges facing agriculture and food production.

I extend my heartfelt appreciation to Dr. G. Bhupal Raj, Dean, SoA for taking the leadership for organising this conference successfully in association with SKLTSHU and Just Agriculture Group. I also appreciate the efforts of the convenors, Mr. G. Sriker Reddy, Assistant Professor of Agricultural Extension, Dr. V. Nagendram, Assistant Professor of Agricultural Engineering, Mr. Ch. Suchith Kumar, Assistant Professor in Agronomy and other organizing committee members for planning the conference, and other faculty, and staff for their dedication in making this event possible.

In conclusion, I am confident that the discussions and collaborations forged during this conference will pave the way for innovative solutions and transformative change in agricultural practices worldwide.

Date: 04.03.2024

(A.Varada Reddy)

Chancellor, SR University

Dr. B. Neeraja Prabhakar
M.Sc. (Ag) Horti., Ph.D.
Vice - Chancellor
Chairman, RAC, ICAR-IIOPR.

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Foreword

There is dire need to adapt the latest developments and innovations in the agricultural and horticultural sector to fulfill the vision of a self-reliant India as India is generally referred as a Krishi Pradhan Desh" wherein around 70 per cent of the population depend on agriculture and allied sectors. With 65% area of food crops, it contributes about 18 per cent of the GDP in the country. While, Horticulture sector with 18% area, contributes about 33% of the gross value added in the agricultural GDP.

To attain Atmanirbhar Bharath, Sustainable Agriculture/ Horticulture plays a pivotal role that aims to meet the current and future needs of the population while protecting natural resources, minimizing environmental impact by ensuring economic viability to farmers. Several innovative technologies such as development of climate resilient varieties, sensor based technologies, adoption of natural farming, organic farming, biogas and waste management practices, precision farming are the key areas which we need to focus for sustainable agriculture and maintenance of natural ecosystem. In addition to this, recent advances in Horticulture Sector *viz*., biotechnology, nanotechnology and digital agriculture (artificial intelligence, IoT, drone technology) hydroponics, aeroponics, vertical farming, block chain technology, post harvest management, value addition and branding are the need of the hour which have to be strengthened.

Furthermore, the significance of sustainable agriculture extends beyond mere production metrics; it encompasses socio-economic equity, rural development, and food security. As we deliberate on technological innovations and best practices, let us remain cognizant of the diverse needs and aspirations of farming communities, empowering them as equal partners in the journey towards sustainability. By fostering partnerships and nurturing talent, we can catalyse transformative change and propel our agriculture and allied sectors towards greater prosperity and resilience.

It gives me pleasure to share that 6th International Conference on "Holistic Innovations and Technological Advances for Sustainable Agriculture," organized by the School of Agriculture (SoA), SR University, Warangal, in conjunction with Sri Konda Laxman Telangana State Horticultural University (SKLTSHU), Hyderabad, and Just Agriculture Education Group at Warangal from 4th to 6th March 2024 provides a common platform for farmers, scientists, processors, entrepreneurs, academicians, development officers, research scholars, students, policy makers, administrators, and other stakeholders at national and international level to discuss upon the challenges and to develop a road map in developing Sustainable Agriculture..

I extend my best compliments to Prof. Deepak Garg, Vice Chancellor, Dr. G. Bhupal Raj, Dean, Dr. R. Archana Reddy, Registrar, School of Agriculture, SR University and team for taking the initiative in organizing this conference.

I appreciate the efforts of all host institutes and participants for their valuable contributions and dedication to the noble cause of sustainable agriculture. May this conference serve as a catalyst for collaborative action and inspire us to redouble our efforts in building Sustainable agriculture and enriches the lives of present and future generations.

"Save Nature - Nature saves us"

22/4/24

(B NEERAJA PRABHAKAR)
Vice-Chancellor, SKLTSHU

Prof. Deepak Garg
Vice-Chancellor, SR University
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MESSAGE FROM VICE CHANCELLOR

It is with great pleasure and excitement that I extend my warmest welcome to the International Conference on "Holistic Innovations and Technological Advances for Sustainable Agriculture" (HITASA-2024). This gathering represents a significant milestone in our shared commitment to advancing agriculture through innovation and sustainability.

In today's rapidly changing world, agriculture stands at the intersection of numerous challenges and opportunities. From climate change and resource scarcity to evolving consumer demands and socio-economic disparities, the need for innovative solutions has never been more pressing. This conference provides a unique platform for researchers, practitioners, policymakers, and industry leaders to come together, share insights, and explore cutting-edge approaches to address these challenges.

The theme of HITASA-2024, "Holistic Innovations and Technological Advances for Sustainable Agriculture," encapsulates the essence of our collective aspirations. It emphasizes the importance of embracing a comprehensive, integrated approach to innovation—one that harnesses the power of technology while also considering the broader socio-economic and environmental dimensions of sustainability.

I would like to express my gratitude to the organizers, sponsors, speakers, and participants whose dedication and support have made this conference possible. Your contributions are instrumental in shaping the dialogue and driving progress towards a more sustainable and resilient agricultural future.

I extend my heartfelt appreciation to Dr. G. Bhupal Raj, Dean of SoA, the convenors, Mr. G. Sriker Reddy, Assistant Professor of Agricultural Extension, Dr. V. Nagendram, Assistant Professor of Agricultural Engineering, Mr. Ch. Suchith Kumar, Assistant Professor in Agronomy and all other organizing members for planning this conference and their dedication for making this event possible and successful.

In closing, I invite all participants to actively engage in the discussions, forge new collaborations, and draw inspiration from the collective expertise gathered here. Together, let us chart a course towards a future where agriculture not only sustains us but thrives in harmony with nature and society.

Thank you, and I wish you all a productive and enriching experience at HITASA-2024.

Dated: 04-03-2024

(Deepak Garg)
Vice Chancellor, SR University

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MESSAGE

It is with great pleasure that I introduce this souvenir commemorating the International Conference on Holistic Innovations and Technological Advances for Sustainable Agriculture (HITASA-2024) organized by the School of Agriculture at SR University, in collaboration with SKLTSHU and the Just Agriculture Education group. As we reflect on the insights and discussions shared during our time together, it becomes evident that Precision Agriculture, particularly leveraging the transformative power of IoT (Internet of Things) and sensors, is a beacon guiding the future of agricultural innovation.

In the pages ahead, you will find a testament to the dedication and enthusiasm with which participants explored the intricate nexus of technology and agriculture. From the integration of IoT devices to the harnessing of real-time data, the conference illuminated pathways towards greater efficiency, sustainability, and productivity in farming practices.

I extend my deepest gratitude to all participants for their invaluable contributions, as well as to our esteemed partners, the Just Agriculture Education group and SKLTSHU, whose unwavering commitment and collaboration have been instrumental in the successful organization of this conference.

I extend my heartfelt gratitude to Hon'ble Chancellor Shri A. Varada Reddy garu, Hon'ble Pro Chancellor Shri A. Madhukar Reddy garu, and Hon'ble Vice Chancellor Prof. Deepak Garg garu, along with Hon'ble Registrar Dr. R. Archana Reddy, for their unwavering support and encouragement in making HITASA-2024 a reality. Their visionary leadership has played a pivotal role in elevating the School of Agriculture to new heights.

Special appreciation goes to our dynamic convenors, Mr. G. Sriker Reddy, Assistant Professor of Agricultural Extension, Dr. V. Nagendram, Assistant Professor of Agricultural Engineering, Mr. Ch. Suchith Kumar, Assistant Professor in Agronomy and other organising committee members, especially Ms. Swathi Yadav, Assistant Professor of Entomology, Mr. Ch. L N Manikanta, Assistant Professor of Crop Physiology and Ms. M. Sravya, Assistant Professor of Agronomy. Their meticulous planning and dedication, along with the entire organizing committee, faculty, and staff, have ensured the seamless execution of this Conference.

I extend my sincere thanks to the distinguished speakers who graced HITASA-2024 with their insightful presentations, contributing to the wealth of knowledge shared during the event.

Dated: 04-03-2024

(G. Bhupal Raj)

Dean, School of Agriculture

MESSAGE FROM CONFERENCE DIRECTOR & ORGANIZING SOCIETY PRESIDENT

The development and adoption of innovative technologies have been instrumental in improving the lives of millions of farmers across the country by increasing their income, reducing their costs, and minimizing losses. As agriculture continues to evolve, the role of innovation will become even more critical in enhancing sustainability, resilience, and competitiveness in the sector. Keeping these facts in mind 6th International Conference on "Holistic Innovation and Technological Advances for Sustainable Agriculture" (HITASA-2024) was planned by Just Agriculture Education Group, & ISAHRD, Chandigarh in collaboration with SR University, Warangal during 04th to 06th March, 2024. The conference was embellished by the presence of Chief Guest, Dr. Neeraja Prabhakar, Vice- Chancellor, Sri Konda Laxman Telengana State Horticultural University, Hyderabad and Guest of honour, Dr. K. Sammi Reddy (Director, ICAR-National Institute of Abiotic Tress Management ICAR-NIASM, Baramati), Archana Reddy (Registrar, SR University, Warangal), Dr. Gunti Bhupal Raj (Dean, SOA, SR University, Warangal), Suchith Kumar G Srikar Reddy, Dr. Nagendram Veerapaga, other faculty members of SR University, Warangal and Team Just Agriculture.

The conference was a great platform for professionals and experts from different industries to come together, exchange ideas, and explore new opportunities. The keynote speakers and panelists provided valuable insights on a range of topics, from the latest developments in technology and innovation to the challenges facing businesses in a rapidly changing world. The success of this conference would not have been possible without the hard work and dedication of our organizing committee and volunteers. We are grateful for their support and contributions towards making this event such a huge success. Thank you to all the attendees for making this a memorable and enriching experience. We look forward to seeing you again at our future events, where we will continue to bring together the best minds in the industry and create valuable opportunities for learning and growth.

Dr. DPS Badwal
President (ISAHRD, Chandigarh)
Founder & CEO, Just Agriculture Education Group

MESSAGE FROM CHIEF ORGANIZING SECRETARY

It gives me immense pleasure to share that **ISAHRD, Chandigarh** and Just Agriculture **Education Group** in collaboration with **SR University, Warangal** have successfully organized the 6th International Conference on **Holistic Innovation and Technological Advances for Sustainable Agriculture (HITASA-2024)** at **SR University, Warangal** during 04th to 06th March, 2024 in a hybrid mode. I believe that this conference has played an important role in bringing together experts, researchers and practitioners from across the world to exchange ideas, share their experiences and contribute towards the development of the agriculture sector. We have witnessed several innovative approaches, emerging technologies and sustainable practices that have the potential to revolutionize the agriculture sector and create a positive impact on our environment and economy.

The conference has also highlighted the significance of collaboration among different stakeholders including government, academia, industry and farmers. Through constructive discussions, we have identified the key challenges faced by the agriculture sector and the possible solutions to address them. In conclusion, I would like to congratulate the organizing team for the successful organization of the 6th International Conference (HITASA- 2024). We look forward to the next edition of this conference and hope to witness more innovative ideas and practices in the field of agriculture. Thank you all for your participation and support.

Dr. Utkarsha P. Gaware
Vice President (Strategy & Partnership)
Just Agriculture Education Group

MESSAGE FROM ORGANIZING SECRETARY

I am delighted to announce that Just Agriculture Education Group and **ISAHRD, Chandigarh** in collaboration with **SR University, Warangal** has successfully organized three days international conference on "**Holistic Innovation and Technological Advances for Sustainable Agriculture" (HITASA-2024)** at **SR University, Warangal** during 04th to 06th March, 2024. The conference witnessed an impressive gathering of delegates, researchers and practitioners from across the globe, actively engaging in diverse discussion and presentations aligned with the conference theme. The keynote speakers delivered outstanding and thought-provoking speeches, inspiring attendees and sparking new ideas. The presentations were both informative and engaging, fostering lively discussions and constructive debates. Delegates had valuable networking opportunities, forging connections with colleagues from diverse geographical backgrounds, exchanging innovative ideas and exploring potential avenues for collaboration.

The organizing committee deserves tremendous praise for orchestrating a flawlessly organized and impactful event. Their exemplary efforts in planning, coordinating, and executing the conference ensured seamless operations from start to finish. In conclusion, the conference achieved remarkable success, leaving us eagerly anticipating the next edition in the future. We extend our heartfelt gratitude to all those who contributed to making this event possible and for their unwavering dedication and enthusiasm, ensuring a resounding triumph.

Dr. Paresh P. Baviskar
Vice- President (Branding & Marketing)
Just Agriculture Education Group

MESSAGE FROM ORGANIZING SECRETARY

I am very glad that Just Agriculture Education Group and **ISAHRD, Chandigarh** in collaboration with **SR University, Warangal** has successfully organized three days international conference on "**Holistic Innovation and Technological Advances for Sustainable Agriculture" (HITASA-2024)** at **SR University, Warangal** during 04th to 06th March, 2024 in a hybrid mode. The efforts made by the organizing committee are truly commendable, and I congratulate all of them on the successful organization of this conference. I am confident that the deliberations held during the conference would pave the way for future growth and prosperity of the agriculture sector.

I would like to extend my sincere gratitude to the organizers and all the stakeholders who had contributed to making this conference a grand success. I hope that the knowledge and insights gained from the conference would empower all of us to contribute more effectively towards the development of sustainable agriculture practices that are environmentally friendly and socially responsible. I once again express my heartfelt appreciation to all the stakeholders who had participated in the conference, and I look forward to seeing the outcomes and recommendations of the conference being put into practice.

Mohit Bharadwaj
Chief Editor, Just Agriculture the Magazine

TABLE OF CONTENT

6th International Conference

HITASA/LP/2024/001

Role of Mobile Application in Animal Husbandry development

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Formerly, extension was only related to extension agent and clients and within boundary of traditional tools, which were not sufficient to reach out each and every corner of the country. The fastest growing mobile phone users overcome this and soon then mobile apps took over the place and are having a major role in progress of rural and urban people. Due to mobile application dissemination of knowledge has became easy for the farmers. Researchers found that due to mobile application the knowledge level of people regarding agricultural practices has been increased. Various application developed for animal husbandry and agriculture contains information like feeding and housing management of animal, problems and solutions related to reproduction, various diseases and their prevention, crop advisory, weather etc. It helps the farmer for improvement in practices and management which is time saving and economical. Mobile application have various advantages like offline access, overcomes language barrier, push notifications etc. which makes mobile apps a more efficient tool to disseminate new technologies and information through text, videos and audios. Farmers are getting benefits of mobile application like better access to extension services, financial services, market link etc.

Keywords : Mobile , Application, Animal husbandry

Role of Mobile Application in Animal Husbandry development

Then the new era starts from telephones to mobile phone which had brought a lot change in society and also farmer development and development in each and every sector. The fastest growing mobile phone industry overcomes the limitations to reach out to the grass root level. Tumbling down in the price of mobiles increases its penetration. Mobile phone use get gradually increased with having multiple advantages like communication at distance, 24*7 availability, independency to get information; Short Message Services (SMS), wide ownership and affordability. Indian Farmers Fertilizer Cooperative and various co-operatives started SMS services to provide information to farmers. RML Farmer (Reuters Market List) a SMS providing service, provide information about weather, mandi prices, crop advisory, general news on governmental schemes and subsidies.

Mobile Application

Mobile application are the advances in mobile phone. Mobile app is computer program or software application design to run on mobile device. Mobile application are generally downloaded from application distribution platform which are operated by the owner of the mobile operating system, such as the app store Google play store or iOS. Mobile application help to get content faster, having push notifications, have offline access, less cluttered, time saving, economical, overcome language barrier, overcomes the limitations of traditional tools.

In India, both public and private sector making their own application, to be utilized by farmer. ICAR also giving emphasis on making such application. There are various application developed for animal husbandry sector. Few of them are -

- IVRI Dairy Manager
- IVRI Animal Reproduction
- IVRI Artificial Insemination
- Journey of Milk
- Pashu Poshan

The application covered wide topics ranging from general management of animal, calf management, adult management, balanced nutrition, estrus, balanced feeding, housing, management, health care, problems related to production and reproduction and solutions related to them and many more.

Role of Mobile Application in Animal Husbandry Development-

As the mobile app are in nascent stage, there are few research conducted on topic they are as follows-

- Mobile phone helped the cattle farmers in Manchester to contact with veterinary officers to get the information about communicable diseases. This in the longer term has increased the income & welfare of the cattle farmers. (Duncombe , 2011)
- Charles in year 2011 developed an app name icow in South Africa found that farmers were satisfied with information about breeding & production pattern.(Business Daily, 2018)
- An app developed in Karnataka on fodder production in Kannada language found that knowledge gain in pre- test was 12.37 which increased to 41.23 in post-test. (Belakeri et al., 2017)
- Livestock health advisory system an app was developed in Kenya. It was found that information received about health, animal nutrition, disease & pest through mobile application was informative & timely. (Kihara & Gichoya , 2018)
- In national capital region of India, an app was developed named "Eco dairy" in Hindi language. Respondents were found to be highly satisfied with user friendliness, arousal of curiosity & also was economically feasible.(Sinha et al., 2018)
- App "Mastitis guide" in Marathi language was developed in Maharashtra which reported that knowledge gain in pre- test was 17.24 which increased to 32.14 in post- test. (Sawant, 2018)

Role of Department of Animal Husbandry, Dairying & Fishery in mobile application *(The Times of India, 2018*

India's 20th Livestock census is conducted using tablets/computers & a mobile app developed by National Informatics Centre (NIC). NIC developed such an app in which breed wise census will be conducted through data tables which will save time in data processing, and lessens the

chances of occurrence of mistake which happened earlier due to more paperwork.

Livestock disease forewarning mobile application (LDF mobile app) by ICAR, New Delhi

App developed by ICAR-National Institute of Veterinary Epidemiology & Disease Informatics, Bengaluru. By this app 13 priority diseases will be identified & it will provide disease alert to the Central and State Animal Husbandry Departments. The app will also provide information about clinical samples for the diagnosis in case of the epidemic so that immediate action in case of the epidemic. App have monthly bulletin system to send out early warning, the complex statistical algorithm also considers both climatic & non-climatic factor and categories list into very high risk, high risk, moderate risk, low risk, very low risk and no risk for a particular disease.

Applicability of Mobile Application in Animal Husbandry-

Mobile application can provide better access to localize information in local language; like market information which will provide higher price as per farmer's demand and also and disease and climate information which could help in better disaster and risk management ultimately giving higher income for small and marginal farmers. Mobile application can provide better access to extension services like good dairy farming practices, which will provide higher production through better advice on management, feeding, breeding etc. which ultimately gives higher production through lower input. Mobile application can provide better access to financial services like credit, insurance and payment methods which increases risk bearing capacity which ultimately creates opportunities for financial institutions. Mobile application can provide better access to linking like bank networking and market linking due to which there will be less exploitation by intermediaries and reduction in administrative cost which will ultimately improve quality standards for buyers and will also help farmer to earn more profit.

Components of good mobile app- There are five essential components for good mobile application (Teza and Sharma, 2013).

1. **Content-**
   An ideal app should contain content or subject matter according to target group knowledge, perception, information needs, understanding, and culture. In the development of mobile app, enough care should be given to the presentation of content by using the appropriate videos and images which suits to the subject.

2. **Attractiveness-**
   In an app there should be bold text and suitable color combination which will elicit the response of audience. Using various animation effects we can make an app more attractive so that people will remember the content seen in app.

3. **Timely Updating**-
   One should timely update the information present in app, because there are chances of deleting the app by its user when he /she does not found anything new in data, so it is become no longer usable for its user. Updating new information, new technologies, new methods holds the interest of app user.

4. **User Interactivity**-
   App should be easy in handling and assessing the information and should not contain complex processing of opening and loading the information. Learner can easily interact for any problem or query. An ideal app should contain feedback section in it, so that developer of that app can improve the lacks and faults.

5. **Visuals-**
   The visuals should be such that they create interest in audience by capturing their attention and should be informative. The visuals should be well sequenced and synchronized with the subject in the text so that the content is easily understood.

Conclusion:

Mobile application will allow self paced, independent learning and change the role of extension agent from “Guide by side” to “Guide behind the screen”. It can also act as Ready Reckoner. Mobile applications are easily assessible; once it is downloaded it doesn’t

need further internet connection to use it, which is time saving and economic also. One can also send mobile application as a APK link through SMS or through email so other user can also download it. Thus user doesn't have to go at special institution or organization to seek the information as he gets the information at the tip of finger. There is increase opportunity to disseminate information to farming community by tapping increased penetration of smart phone in rural areas of the country. Government can also distribute smart phone already feeded with needed information. With all of India going digital; the concept of **Lab to Land** can be made successful.

References -

Belakeri P., Prasad K .C., Bajantri S., Mahantesh M .T., Maruthi S.T., Rudresh G.N**.**(2017). Trends of Mobile Applications in Farming. *International Journal of Current Microbiology and Applied Sciences* **6**(7): 2499-2512.

Duncombe R.(2011). Researching impact on mobile phones for development concepts, methods and lessons for practice. *Information Technology For Society*,**17**(4):268-288.

https://www.businessdailyafrica.com/magazines/mobile-technology-unlocks-dairy-farming-potential/1248928-1220594-br8xncz/index.html. Retrieved on 14.12.18.

https://timesofindia.indiatimes.com/india/indias-new-livestock-census-to-begin-on-october-1-mobile-app-to-be-used-for-collection-and-transfer-of-data-online/articleshow/65996762.cms. Retrieved on 1.12.18.

Kihara T. & Gichoya D.(2018). A model mobile phone based livestock health advisory system. *International Journal of Engineering Science and Computing* **10** (2):16039-16050.

Sawant M N (2018) Mobile application for mastitis management in dairy animals.P.D tesis submitted to ND.R.I., Karnal, Haryana

Sinha S., Sankhala G., Lal S. P.(2018) Exploring the perception of the dairy farmers in relation to different components of the android mobile

app 'Eco-Dairy' *International Journal of Agriculture Sciences* **10**(6):5611-5613.

Teza J., Sharma G.R.K. (2013) Quality of mobile application as an extension service delivery tool to livestock based WSHG members. *International Journal of Science and Research* **5**(3):2141-2143.

HITASA/LP/2024/001

Intercropping system under fertigation and different plant geometry

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Abstract

Reducing competition for resources within and between species can increase the productivity of an intercropping system. Only by picking crops that go well together, using the right planting geometry, and managing nutrients and water properly would this be achievable. Fertigation has acquired significant recognition as an effective and financially feasible approach of managing water and nutrients because of its highly localized application and flexibility in scheduling these applications. Fertigation in intercropping conditions has received relatively little research attention. For vegetable intercropping, input data on the best times to fertigate and microirrigate as well as the planting configurations must be generated. A randomized block design with triple replication was used in the research. Two distinct planting geometries, namely normal row planting and paired row planting, were used in the intercropping system of chili and amaranth. The three nutrient levels (100, 75, and 50 percent of the NPK recommendation for both crops as fertigation) and the two irrigation levels (100 percent Epan and 75 percent Epan) comprised the treatments. The results of comparing crops grown under pure crop and intercropping systems showed that the yield of the former was 41% less than that of the latter. On the other hand, the yield of amaranth during intercropping was 17% higher than that of the pure crop. In order to support additional intercrops, the paired row design was implemented. On the other hand, planting geometry had no appreciable impact on the intercropped amaranth

and chilli production performance. Given that the chilli-amaranth intercropping technique only requires standard row planting.

Keywords: Intercropping, Planting geometry, Paired row, Normal row

1. Introduction

The significance of intercropping was first brought to light in India by Aiyer (1949). An effective way to exploit plant nutrients from various horizons is through intercropping. Without significantly impacting the primary crop's output level, intercropping can also result in higher production per unit area and per unit time. When compared to solitary cropping, intercropping can offer significant yield gains, according to Willey (1979). These advantages are especially important because they are achieved not by means of costly inputs but by the simple expedient of growing crops together. There is advantage of greater stability in yield over different seasons. This is very important for the resource poor farming people. The other form of advantage is the higher production in a given season. A major cause of yield advantages perhaps is attributed to better use of growth resources along with reduced incidence of pests including weeds.

Changes in plant population density may have an impact on the competition of a plant with another crop in an intercrop system or with other plants of the same species in a monocrop system, which can affect a variety of vegetation and yield variables (Fortin et al., 1994). The distribution of light inside the canopy is determined by the geometric features and structure of the plant growth as well as the total amount of leaf area (Geno and Geno, 2001). According to Zahara (1970), the amount of spacing between tomato plants increased the production of sunburn and sunscald cull fruits.

Intensive agriculture through sequential and simultaneous raising of crops on the same piece of land in time may be the possible solution for meeting the ever growing need of the world, since extensive agriculture has limited scope. Cropping systems such as intercropping have major role in enhancing the production per unit area. Input information on optimal schedules for micro-irrigation, fertigation and planting geometry for intercropping needs to be generated.

2. Materials and Methods

2.1. Experiment site

The experiment was conducted at the Water Management Research Unit in Vellanikkara, Thrissur, Kerala, India. The field is located geographically in latitude 13° 32'N and longitude 76° 26'E, with an elevation of 40.3 meters above mean sea level. The experiment's soil had an alluvial origin, a sandy loam texture, a pH of 5.38, 1.67% organic carbon, 214.2 kg ha-1 of available nitrogen, 30.56 kg ha-1 of available phosphorus, and 215.24 kg ha-1 of available potassium (Jackson, 1967). Moreover, the earth has good drainage. For this investigation, the most widely used kind of chilli, Ujwala, which has long pods, a dark green color, and a high level of pungency, was utilized. Kerala Agricultural University created the bacterial wilt-resistant variety known as Ujwala. It can yield more than 8 tons per hectare per year. The experiment made use of the maroon-red, photoinsensitive, high-yielding Arun type of amaranth, which is also excellent for multicutting. It can provide more than 15 tons of yield per hectare.

2.2. Treatments

Three replications of the experiment were set up using randomized block design (RBD). The intercropping approach was used to cultivate amaranth and chilli in a 3.6 m × 3.6 m area.

With amaranth as the intercrop and chili as the base crop, the treatment included two planting geometries, three fertilizer levels, two irrigation levels, and two controls. There are two types of planting geometry: paired row planting and regular row planting. As fertigation, the nutrient levels for both crops are 50% NPK, 75% (NL75), and 100% NPK (NL100). The study examined two different irrigation levels: 75% Epan (IL 75) and 100% Epan (IL 100).

2.3. Cultivation procedure

Chilli and amaranth seedlings were grown in potrays and seed beds, with transplanting at one month and 25 days after sowing. The land was ploughed twice to produce fine soil, and the land was subdivided into 42 plots. FYM

and lime were applied, and transplanting was done after one week. Manures and fertilizers were applied according to KAU's practices, with well rotten FYM applied at a rate of 2.5 tonnes ha-1. Fertigation was applied weekly for chilli and amaranth at weekly intervals of 10 and 5 times, respectively. Drip irrigation was given at 100% and 75% of Epan, with lines laid out in sandy loam soil. Chilli green fruits were picked at 15-day intervals, with the first harvest taken 75 days after transplanting. Amaranth harvests were done 30 days after transplanting, with three more at 15-day intervals.

2.4 Data collection

At 30, 60, and 75 DAS, observations were made about the growth characteristics, yield components, and yield of chilli. Amaranth observations were made between 15 and 30 DAS.

2.5 Statistical analysis

The analysis of variance approach was used to perform statistical analysis on the data.

3. Results and Discussion

5.1 Performance of crops under intercropping system under fertigation

The experiment was conducted to study the bio economic suitability of chilli+amaranth intercropping system under fertigation. A long duration crop, chilli with wider spacing was taken as the base crop and a closer spaced short duration crop amaranth was intercropped with chilli to study the yield performance of intercropping system under different planting geometry, nutrient and water level. From the result it was observed that the performance of crop differ when it was grown as intercrop and pure crop. Here the plant population of chilli under pure and intercrop was same. In this experiment the yield performance of chilli under sole crop was significantly higher compared to the performance of chilli under intercropping system (Fig. 2). This may be due to the better development of growth and yield parameters and nutrient uptake of sole crop of chilli

compared to intercropped chilli. The better development of growth and yield parameters under sole crop system may be due to the lesser competition for growth resource in pure crop system compared to intercropped system. In the case of amaranth, the yield performance of amaranth under intercropping situation was significantly higher compared to pure crop amaranth (Fig. 2). Even though the plant population of amaranth under intercropping system was less compared to pure crop amaranth, the yield of amaranth under intercropping system was higher. This was due to the higher yield obtained from the intercropped amaranth for the second, third and fourth harvest (Fig.3). For pure crop amaranth the yield obtained at first harvest was higher compared to intercropped amaranth. But for intercropped amaranth, the cumulative effect of higher yield obtained from the subsequent harvest leads to higher yield. The yield increase of amaranth under intercropping system was due to the receipt of continuous nutrients through fertigation. For amaranth, the fertigation schedule was for five weeks. But for intercropped amaranth in addition to the fertigation of amaranth, nutrients were received from the fertigation given to chilli crop. This resulted in the higher dry matter production and nutrient uptake of intercropped amaranth and finally higher yield for intercropped amaranth compared to pure crop.

The effect of planting geometry, nutrient levels and irrigation levels on the growth and yield performance of crop under intercropping system and the biological and economic efficiency of the intercropping system are discussed below.

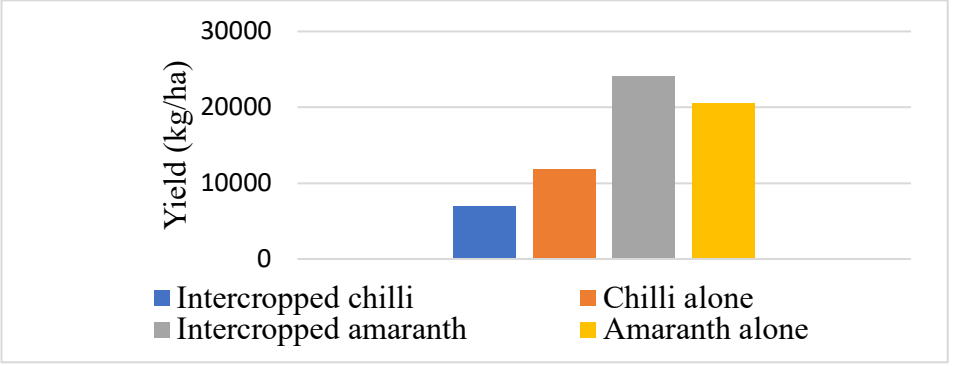


Fig. 2 Performance of crops under intercropping system

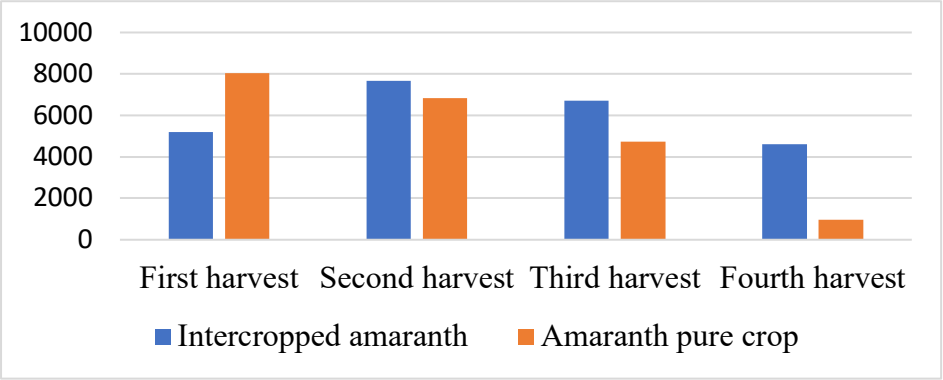


Fig. 3 Yield of amaranth in different harvest

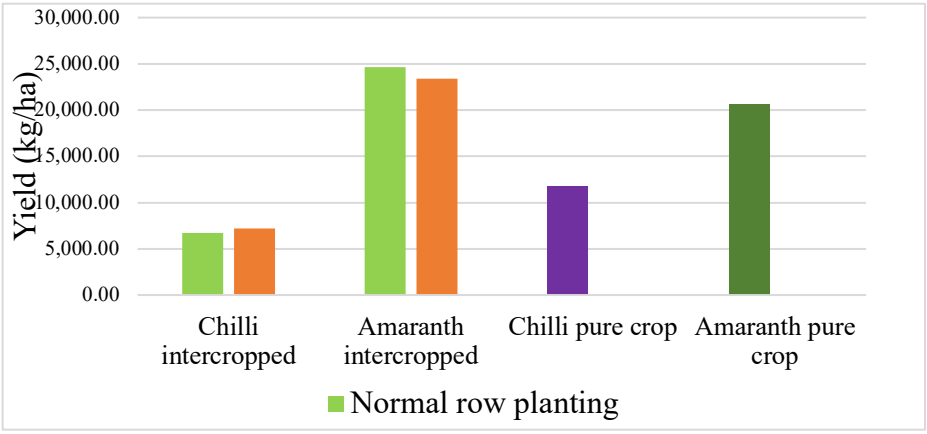


Fig. 4 Influence of planting geometry on yield of intercropping system

5.2 Effect of planting geometry on the performance of intercropping system under fertigation

5.2.1 Effect of planting geometry on intercropped chilli

Intercrops can be accommodated in between the spaces of base crop by modifying the planting pattern. Two type of planting patterns were adopted viz., normal row planting and paired row planting system. In this study, yield of chilli was similar under normal and paired row planting (Fig. 4). That is planting geometry had no significance on yield of chilli under intercropping system. Similar results were obtained by Palaniappan *et al.* (1975). Growth and yield attributing characters were not significantly

influenced by planting geometry in the intercropped chilli. Growth characters like plant height (Fig. 5), number of leaves per plant (Fig. 6), number of branches (Fig. 7), leaf area per plant (Fig. 8), dry matter accumulation (Table 10), and yield attributing characters like days to first flowering, number of fruits per plant, fruit weight and NPK uptake of intercropped chilli were similar under both normal row planting and paired row planting (Fig. 10). In a study conducted on radish based intercropping system, growth and yield characters among different planting pattern in intercropping system is not significant may be due to the reason that utilization of sunshine for photosynthesis is uniform among crops (Brintha and Seran, 2009).

The yield of chilli under pure crop was more than both systems of planting (Fig. 4). Oseni (2010) reported that yield of sorghum was comparatively higher in sole crop system than that in paired or normal row intercropping, presumably due to absence of competition from intercrop (cowpea).

The NPK uptake of chilli under pure crop (64.28, 12.57, 84.85 kg/ha) was more than normal row system and paired row system (Fig. 10). This might be due absence of competition and minimum intercrop density under pure crop system or due to higher competitive ability of intercrop amaranth. Anitha and Geethakumari (2001) noted the poor nutrient uptake of chilli in chilli amaranth intercropping system was due to the aggressive growth nature of amaranth. Kumawat *et al.* (2012) observed that NPK uptake where higher in sole crop of pigeon pea than different planting pattern due to competition free environment under sole crop.

5.2.2 Effect of planting geometry on intercropped amaranth

The yield of amaranth was not significantly influenced by planting geometry (Fig. 4), because planting geometry showed no significant difference on growth and yield attributes like leaf area, number of branches per plant, dry matter accumulation, leaf shoot ratio (Fig. 11) and NPK uptake(Fig. 12). Thus the yield of amaranth was similar under normal and paired row system.

The yield and dry matter accumulation of intercropped amaranth under both planting geometry were more than yield of pure crop amaranth.

Anitha and Geethakumari (2001) observed higher yield of amaranth under chilli- amaranth intercropped system than pure crop due to higher competitive nature of amaranth. The higher plant height, number of leaves per plant, number of branches per plant and leaf shoot ratio produced by amaranth under intercropped system may have resulted in higher yield compared to pure crop amaranth. A similar trend was recorded by Anitha and Geethakumari (2001).

Interaction effect of plant geometry with nutrient level and plant geometry with nutrient and irrigation level had significance on total yield produced by amaranth. Among different treatment combinations between planting geometry and different nutrient levels, normal row planting with 100 per cent of nutrient dose recorded higher yield of 28,162.31 kg/ha. In the case of interaction effect between plant geometry with different nutrient and irrigation level, a higher yield (31,104.93 kg/ha) was registered by normal row planting receiving 100 per cent nutrient dose for both crop and irrigation at 100 per cent of Epan. Kumawat *et al.* (2012) also noticed higher yield and net return of pigeon pea in intercropping system with combination of normal row planting with 100 RDF due to efficient utilization of resources.

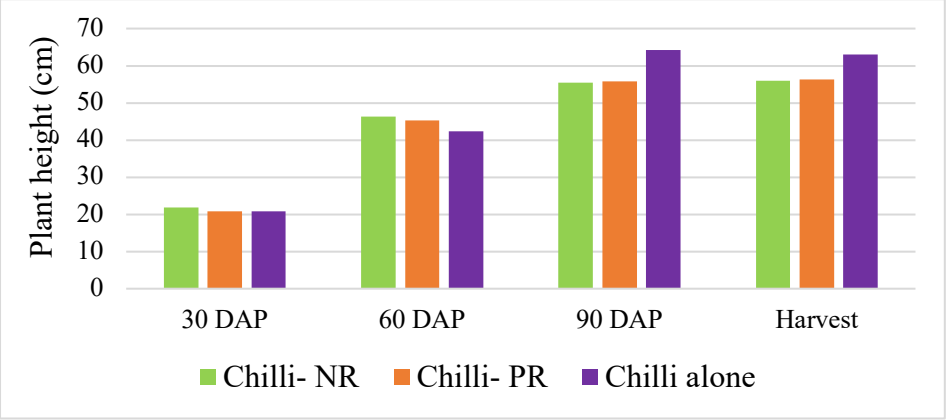


Fig. 5 Effect of planting geometry on plant height of intercropped chilli

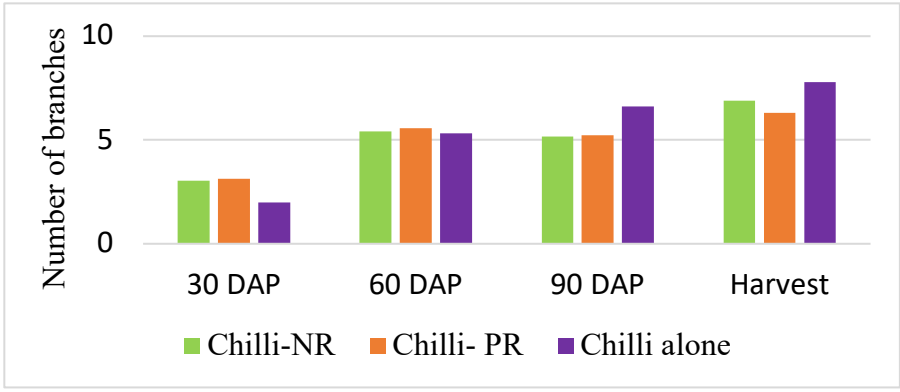


Fig. 6 Effect of planting geometry on number of branches of intercropped chilli

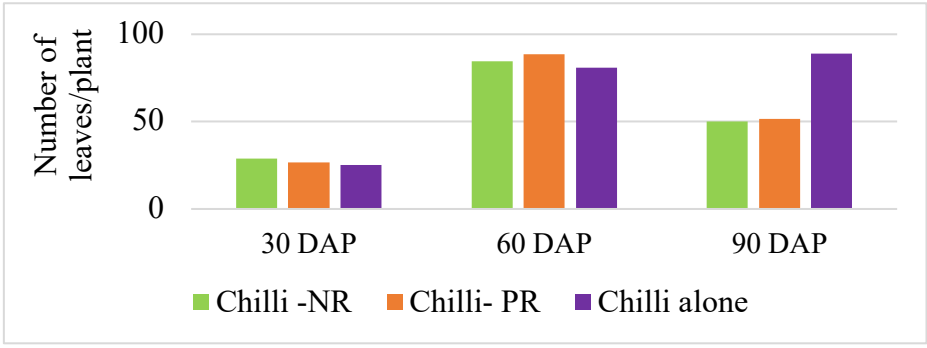


Fig. 7 Effect of planting geometry on leaves number of intercropped chilli

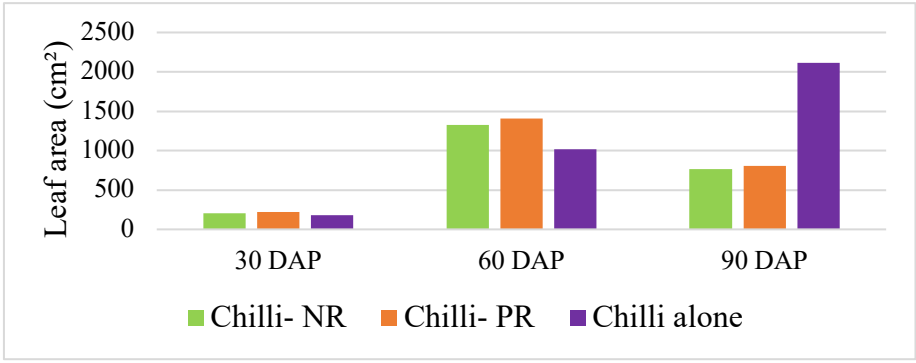


Fig. 8 Effect of planting geometry on leaf area of intercropped chilli

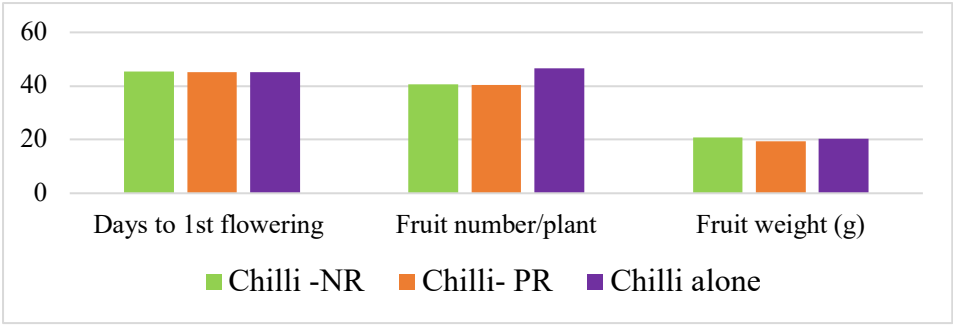


Fig. 8 Effect of planting geometry on yield attributes of intercropped chilli

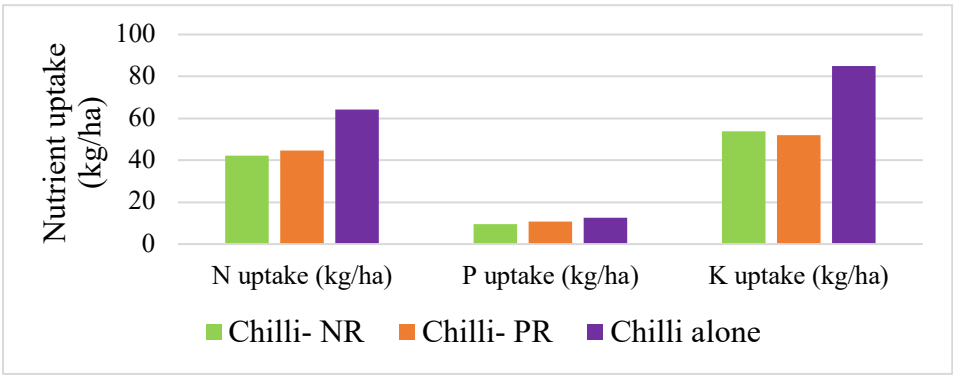
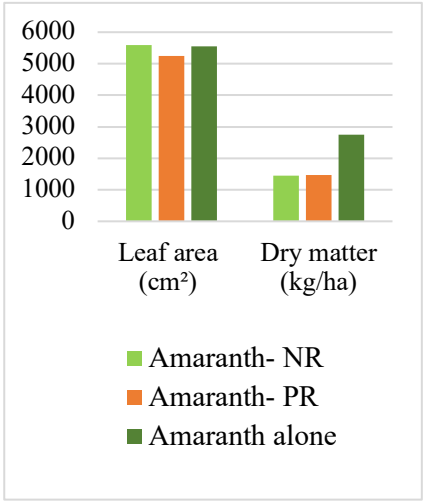


Fig. 10 Effect of planting geometry on NPK uptake of intercropped chilli



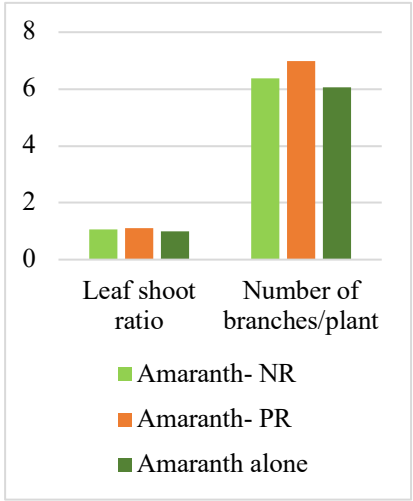


Fig. 11 Effect of planting geometry on growth attributes of intercropped amaranth

4. Conclusions

Performance of crops under intercropping and pure crop system revealed that the yield of intercropped chilli was 41 per cent lower than chilli pure crop. However for amaranth, the yield was 17 per cent higher under intercropping compared to pure crop. Paired row pattern was adopted to accommodate more intercrops. However planting geometry had no significant influence on the yield performance of intercropped chilli and amaranth. Since normal row planting is sufficient for the chilli-amaranth intercropping system.

REFERENCES

Aiyer, A. K. Y. N. 1949. Mixed cropping in India. *Indian J. Agric. Sci*. 19 (4): 454

Anitha, S. and Geethakumari, V. L. 2001. Effect of intercrops on nutrient uptake and productivity of chilli- based cropping system. *J. Trop. Agric.* 39: 60-61.

Brintha, I. and Seran T. H. 2009. Effect of paired row planting of radish (Raphanus sativus L.) intercropped with vegetable amaranthus (Amaranthus tricolor L.) on yield componets of radish in sandy regosol. J. Agric. Sci. 4: 19-28.

Fortin, M.C., J. Culley and M. Edwards, 1994. Soil water, plant growth, and yield of strip-intercropping corn. Journal of Agricultural production, 7:63-69.

Geno, L., and B. Geno, 2001. Polyculture Production: Principle, benefits and risk of multiple cropping. A report for the Rural Industry Research and Development Corporation (RIRDC), Publication, No. 01134.

Jackson, ML (1967). Soil chemical analysis. Prentice Hall of India Pvt. Ltd., New Delhi, pp. 183-347 and 387-08.

Kumawat, N., Singh, R. P., Kumar, R., Kumari, A., and Kumar, P. 2012. Response of intercropping and integrated nutrition on production

potential and profitability on rainfed pigeon pea. *J. Agric. Sci.* 4 (7): 154-162.

Oseni, T. O. 2010. Evaluation of sorghum- cowpea intercrop productivity in savanna agro- ecology using competition indices. J. Agric. Sci. 2 (3): 229-234.

Palaniappan, S. P., Selvaraj, S. and Ramasamy, R. 1975. *Intercropping Studies in Sorghum.* Sorghum Newsletter, 18: 71p.

Willey, R. W. 1979. Intercropping - its importance and research needs Part - 1. Competition and yield advantages. *Field Crop Abst*. 32 (1): 1-10.

Zahara, M., 1970. Influence of plant density on yield of process tomatoes for mechanical harvest. Journal of American Society and Horticultural Science, 95 (4): 510-512.

HITASA/AB/2024/001

Unveiling The Effects of Agro-Chemicals on Soil Micro and Macro- Arthropod Communities in Pomegranate Ecosystem

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This study delves into the intricate relationship between chemicals and soil arthropod communities, aiming to unveil their effects and implications. Through a comprehensive examination of existing literature and empirical data, we explore the diverse ways in which chemicals, both natural and anthropogenic, shape the dynamics of soil arthropod populations and communities. By shedding light on the intricate interplay between chemicals and soil arthropods, this study provides valuable insights for conservation efforts, sustainable land management practices and future research directions. The effect of chemicals on the activity of soil macro and micro-fauna in pomegranate ecosystem reveled that among the different chemical insecticide fipronil 5 SC was found to be most effective chemical in reducing soil macro and micro arthropods in both the season (*Ambe bahar* 2021 and *Hasta bahar* 2021-22) followed by imidacloprid 17.8 SL, thiamethoxam 25 WG, acetamiprid 20 SP, flonicamid 50 WG, clothianidin 50 WDG and dimethoate 30 EC treated plots.

Keywords: Pomegranate, Pesticides, Soil Micro and Macro- arthropods

HITASA/AB/2024/002

In-situ Soil Moisture Conservation measures and Integrated Nutrient Management: A tool to improve Soil Chemical Properties, Growth and Yield in Forestry

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Soil moisture, nutrients and light are the three important factors which influenced the growth and productivity of trees. Among these resources, soil moisture and nutrients are most essential factors for plant growth. Soil moisture conservation measures, application of manure and Vegetative barriers were considered as most viable Physical, Agronomic and Biological methods respectively, helps to conserve soil moisture. It is well known that, conservation of soil moisture along with application of manures and fertilizers has significant impact on the growth of plants. The proper use of soil moisture conservation structures helps to reduce the runoff rate, nutrient losses from soil and improve the soil moisture and nutrient availability for plant growth which in turn, boost the productivity of land and plants. Soil and water conservation measures are one of the most important factors for the improvement of degraded lands. Water conservation technique like *in-situ* soil moisture conservation measures and application of organic manures is to achieve the maximum cultivated soil for the survival and growth of seedlings. Influence of *in situ* moisture conservation methods and application of fertilizers on early growth of Teak (*Tectona grandis*). Among the moisture conservation methods, ring basin method resulted in higher plant survival (83 %), plant height (178 cm) and collar diameter (3.2 cm) after 24 months of planting. Plants grown under chemical fertiliser+ Farmyard manure and Chemical Fertiliser + Vermicompost showed higher survival (85 % and 86 % respectively), plant height (205 cm and 196 cm respectively) and collar diameter (4.0 cm and 3.7 cm respectively) at the end of 24 months. Tree volume increment of *Acacia auriculiformis* plantation was significantly higher in Ring Basin + Recommended dose of fertilizer + Farm Yard Manure when compared with

control treatment. The perusal of results showed that there was significantly higher soil moisture content at depth of 0-30 cm and 30-60 cm in Continuous Contour Trenches as compared to control. *Anacardium occidentale* crop were recorded under continuous contour trenches with *Stylosanthes scabra* and *Vetiveria zizanioides* after five years of plantation. Maximum nut yields of 1.24 and 2.27 kg tree^{-1} were recorded in treatment comprising of continuous contour trenches with *S. scabra* and *V. zizanioides.* Accurate and consistent soil moisture monitoring has become increasingly important when researching environmental factors like climate change, decreasing water resources, improved crop production and protecting threatened habitats. Many environmental practices are driven by or related to soil hydrological processes. Monitoring soil moisture conditions whether for agriculture; soil health; soil research; crop yield, irrigation and optimisation; water conservation; hydrology studies; flood forecasting and soil erosion research delivers important information for the protection of soil and water resources in the future.

Keyword: *In-situ* Soil Moisture; degraded lands; Trenches; Soil Chemical Properties

HITASA/AB/2024/003

Influence of Thinning Regime on Wood Quality Attributes

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Thinning serves as a means of regulating both growth and the qualities of wood. Thinned plantations yield larger and higher quality logs, which are characterized by superior wood quality. The influence of thinning on crown development and growth rate can impact wood quality. Thinning induces earlier activity of the cambium in thinned stands compared to un-thinned ones, yet it leads to delayed production of latewood (Zobel, 1992). Wood quality refers to wood's suitability for specific end uses. Many wood quality attributes are hereditary, and

variations in quality among trees of the same species can be attributed to genetic distinctions. The standards for wood usage are outlined in terms of lumber grading. Key wood quality attributes encompass wood density, density variance, distribution of juvenile and mature wood, heartwood-to-sapwood ratio, fiber length, fibril angle, compression wood, knots, and grain orientation. Mechanical properties of thinned teak with that from natural forests, finding that teak from the latter, aged over 30 years, generally possessed superior mechanical attributes. However, there were instances where thinned teak outperformed older natural forest teak, specifically in the Standard Test Method for Tensile and Cleavage Test of Timber. Significant impact of various thinning intensities on the development of heartwood volume. However, no substantial influence on wood basic density alteration was observed. In terms of mechanical properties, thinning intensity levels showed no notable variations in modulus of elasticity, modulus of rupture, compressive strength parallel to grain, and compressive strength perpendicular to the grain. Ramifications of planting spacing on teak wood properties within the Longuza Forest Plantation in Tanzania. Wood properties for trees aged 14 years, with planting spacing regimes of 2 m, 3 m, and 4 m. The proportion of heartwood increased with planting spacing, while basic density remained unaffected. Wood properties such as modulus of rupture, modulus of elasticity, compression strength tangential to grain, and shear tangential to the grain remained largely unaltered with increased spacing, except for cleavage tangential to grain. The studies suggested that a spacing of 3 × 3 m could be recommended, though a spacing of 2.5 × 2.5 m could still be used if thinning were conducted before competition onset at 5 years. Additionally, a spacing of 4 × 4 m could yield a minimum of 50% heartwood at a shorter rotation age of 30 years. Growth, wood quality parameters, and productivity estimations of 12-year-old teak (*Tectona grandis*) trees cultivated under three distinct agroforestry systems: unmanaged block (Bum), unmanaged line on the farm boundary (Lum), and intensively managed block (Bim) plantations. The research involved evaluating various wood quality parameters by subjecting tree logs from each plantation to comprehensive testing for diverse physical and mechanical properties following established protocols. The findings indicated that the wood quality of both Bum and Bim plantations surpassed that of Lum, displaying superior characteristics. Need for standardized protocols to establish the relationship between thinning and wood quality, particularly for hardwood

species that exhibited positive responses in terms of high wood quality, whereas softwood species were less affected by thinning. Foresters are advised to consider wood quality implications specific to the site and species during thinning operations. Continuous research is essential to develop methods for producing high-quality wood through thinning and genetic improvement, while accommodating environmental and geographic variations to support economically optimal rotation ages with superior wood quality.

Keywords: Thinning; wood quality; heartwood-to-sapwood ratio; lumber grading

HITASA/AB/2024/004

Evaluation Of Different Integrated Pest Management Modules Against Rice Blue Beetle (*Leptispa pygmaea Baly.*)

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The data on infestation caused due to blue beetle at 30, 50 and 60 DAT revealed significantly lowest leaf damage in Module IPM-III (chemical + non-chemical based module). The next best modules were Module IPM-I (chemical based module), Module IPM-IV (spot application) and Module IPM-II (non-chemical based module), which showed significantly lower damage than Module IPM-V (farmer's practices).

The yield performance of different modules revealed the significant highest yield (61.25 q/ha) in Module IPM-III (chemical + non-chemical based module). The next effective modules were Module IPM-I (chemical based module) and Module IPM-IV (spot application) with 56.13 and 54.75 q/ha yield, respectively. Module IPM-II (non-chemical based module) (49.42 q/ha) recorded significantly higher yield over Module IPM-V (farmer's practices) (43.71 q/ha). The economics of different modules showed that Module IPM-IV (spot application) gave highest benefit cost ratio of 11.35 followed by 4.43 Module IPM-III (chemical + non-chemical based module), 3.06 in Module IPM-I (chemical based module) and 2.02 in

Module IPM-II (non-chemical based module) over Module IPM-V (farmer's practices).

Keywords : Module,Yield, Rice Blue Beetle etc.

HITASA/AB/2024/005

Selenium alleviates arsenite induced heavy metal toxicity in rice (Oryza sativa L.) by attenuating ROS via augmenting antioxidant effects

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The presence of Arsenic (As) in soil and irrigation water causes impaired crop growth and development. As is a toxic element with the potential to cause health effects in humans. Besides rice is a source of both amino acids (AAs) and mineral nutrients, it is undesired source of As for billions of people consuming rice as the staple food. Selenium (Se) is an essential metalloid, which can decrease heavy metal uptake and toxicity in plants and can regulate As toxicity by strengthening antioxidant potential. By using the raisins (*Vitis vinifera*) as plant extract and sodium selenite as an inorganic source of Se, Se nanoparticles (Se NPs) were synthesized by green method and we investigated the comparative role of Se NPs and sodium selenite on growth of *Oryza sativa* and tolerance against As stress**.** The Se NPs significantly enhanced the plant growth and other associated physiological attributes under As stress. The As treatment at 100 µM was given to study phytotoxic effects, however application of Se NPs resulted in a substantial increase in leaf chlorophyll fluorescence, biomass accumulation, and decreased ROS when compared with sodium selenite in plants under As stress . The use of Se NPs to As stressed plants reduced photosynthetic inhibition and oxidative stress attenuated the increase in H_2O_2 and MDA contents. The application of Se NPs also boosted the activities of antioxidant enzymes such as SOD, CAT, GPX and APX as well as the non enzymatic antioxidants such as Phenols and Proline under As stress. The results also showed Se NPs treatments alleviated the growth

inhibition induced by As by maintaining the balance between accumulation and loss of macro and micronutrients in leaves of *Oryza sativa* seedlings. Moreover, treatment with Se NPs improved the plant growth more successfully than treatment of sodium selenite under As stress. This study explored the mechanism of selenium efficiency in preventing As transport and accumulation in shoots roots to exert beneficial effects and boost plant enzymatic activities.

Keywords: Selenium, Selenium Nanoparticles, Arsenic, Sodium Selenite, ROS, Antioxidants and Chlorophyll Fluorescence

HITASA/AB/2024/006

Farmers' attitude towards Direct Marketing of farm produce in relation to doubling income in South Gujarat

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India is agriculture dominant country. The majority of the population directly or indirectly depends on agriculture. A huge number of the population is doing farming as an occupation. The income of farmers is very important for the growth of the whole agriculture sector. The government is also focusing on doubling farmers' income. Farmers' income largely depends on land holding size, type of farming, technologies used by farmers, price of agri inputs and the prices of farm produce farmers getting in the market. Marketing of farm produce is very important in relation to raise farmers' income. Generally, farmers sell their farm produce in market yard. It is big issue for farmers to get rational prices of their farm produce due to arrival of huge quantities of farm produce in the market yard. Wholesalers and retailers buy these farm produces from the market yard and sell it to consumers at high prices to earn high margins. If farmers adopt direct marketing by removing intermediaries, then farmers can achieve good prices of their farm produce and their income can be raised at a noticeable level. This study attempts to study the Farmers' attitude

towards the Direct Marketing of farm produce with concern to doubling their income. The result of the study indicated that farmers have little negative attitude towards direct marketing of their farm produce and the biggest constraint faced by farmers for direct marketing is lack of time.

HITASA/AB/2024/007

Influence of Different Combinations of Media and Bio Fertilizers on Flowering and Quality of Gerbera cv. Natasha under Protected Conditions

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The present investigation entitled "Studies on the effect of different combinations of media and bio fertilizers on growth, flowering and cut flower yield of gerbera (*gerbera jamsonii* L.) cv. Natasha under protected conditions". The whole experiment was arranged over 10 treatments consisting of five levels of media combinations, M_1 - Red soil + Coco peat (1:1), M_2 - Red soil + Vermicompost (1: 1), M_3 - Red soil + Coco peat + Vermicompost (1:1:1), M_4 - Red soil + Coco peat + Vermicompost (2:1:1) and M_5 - Control (Red soil only) with two levels of bio fertilizers B_1 - PSB (Phosphate Solubilizing Bacteria) and B_2 - VAM (Vesicular Arbuscular Mycorrhiza). Interaction between different media combinations and bio fertilizers had significant influence on flower parameters and quality parameters. M_3 combination of media (Red soil + Coco peat + Vermicompost (1:1:1)) and B_2 bio fertilizer, Vesicular Arbuscular mycorrhiza (VAM) registered significantly less number of days taken to first flower bud appearance (37.42 days) and first flower opening (51.52 days), more number of flowers per plant (6.70) and maximum diameter of the flower (11.82 cm), flower stalk (0.74 mm) and disc flower (5.58 cm), longer flower stalk (59.77 cm), more number of ray florets per flower (64.94), maximum fresh weight and dry weight of the flower (31.77 and 10.82 g respectively) and maximum longevity of the flower on plant (18.63 days).

Key words: Gerbera (*gerbera jamsonii* L.) cv. Natasha, Media combinations, Bio fertilizers, Flower parameters and Quality parameters.

HITASA/AB/2024/008

Impact of biostimulants on produce and returns of Soybean (Glycine max L.)

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Plant biostimulants, or agricultural biostimulants, include substances and microorganisms that enhance plant growth and yield. A field experiment on effect of biostimulants on yield and economics of soybean was conducted at University of Agricultural Sciences, Dharwad, Karnataka during *kharif* 2021-2022. Soil of experiment site was *vertisols*. Experiment was laid out in RCBD with 11 treatments replicated thrice comprising of T_1-foliar application of Crop Max @ 375 mlha^{-1} at flower initiation (FI) and pod formation (PF), T_2-foliar application of Crop Max @ 500 mlha^{-1} at FI and PF, T_3-foliar application of Crop Max @ 625 mlha^{-1} at FI and PF, T_4- foliar application of Crop Max @ 750 mlha^{-1} at FI and PF, T_5-foliar application of Crop Max @ 375 mlha^{-1} at FI and Biozyme @ 625 mlha^{-1} at PF, T_6-foliar application of Crop Max @ 500 mlha^{-1} at FI and Biozyme @ 625 mlha^{-1} at PF, T_7- foliar application of Crop Max @ 625 mlha^{-1} at FI and Biozyme @ 625 mlha^{-1} at PF, T_8- foliar application of Crop Max @ 750 mlha^{-1} at FI and Biozyme @ 625 mlha^{-1} at PF, T_9-foliar application of Biozyme @ 625 mlha^{-1} at FI and PF, T_{10}-Control (RDF+urea and KNO_3 sprays) and T_{11}-Control (no spray) only RDF (NPK). Among the different treatments, T_8-foliar application of Crop Max @ 750 mlha^{-1} at flower initiation (FI) and Biozyme @ 625 mlha^{-1} at pod formation (PF) has recorded significantly higher 100 grain weight (9.23 g), grain yield (2693 kg ha^{-1}), higher haulm yield (3977 kg ha^{-1}) and harvest index (40.40 %) with significantly higher B:C ratio (3.70). It was found on par with T_7, T_6 and T_4. Based on the response of soybean in terms biometric observations in T_8 lead to higher yield and gross returns. Thus, higher concentration of Crop Max at flowering followed by Biozyme at pod formation stage has more influence on yield and economics (9.61% and 9.1 % increase over RPP, respectively).

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Integrated Management of Leaf Blight of Sunflower Caused by *Alternaria helianthi* (Hansf.) Tubaki and Nishihara

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Sunflower (*Helianthus annuus* L.) is the third major oil seed crop is grown in tropical, sub-tropical and warm temperate regions. Leaf blight caused by *Alternaria helianthi* is the major disease causing yield loss of up to 80%, oil yield loss of up to 35% and germination failure of 30%. In the absence of reliable resistance source for the disease, there is lack of effective integrated management strategy. An effort was made to evaluate different combinations of Hexaconazole 5% EC (0.05%), Captan 70 + Hexaconazole 5% WP, *Trichoderma harzianum* (1%) and neem leaf extract (10%) under field conditions during *kharif* 2022. Seed treatment with Captan (2g/kg seeds) and foliar spray with Hexaconazole 0.1% was used as treated check. Seed treatment with Captan 70 + Hexaconazole 5% WP (2g/kg seeds) was used in common for all the combination treatments. Among all the treatments, T_2 (three sprays of Captan 70 % + Hexaconazole 5% WP at 0.2 per cent dose at 15days interval) found to be very effective which recorded lowest leaf blight severity of 34.11 per cent. In addition, the same treatment recorded highest head diameter (15.65cm), seed test weight (8.55g) and seed yield of 20.5q/ha which in turn recorded highest B:C ratio of 2.30. In comparison, the control treatment recorded highest leaf blight severity of 82.63% with 9.62cm average head diameter, 4.65g average seed test weight and 10.4q/ha seed yield. Treated check also recorded effective management of leaf blight disease with a B:C ratio of 2.13. Among treatment combinations, T_4 (three sprays of neem leaf extract @10%, starting from 30DAS at 15days interval) recorded lowest effectiveness against leaf blight (66% leaf blight severity), lowest head diameter of 12.56cm, lowest seed test weight of 5.22g and lowest seed yield of 13.7q/ha.

HITASA/AB/2024/010

Influence of spacing and nitrogen levels on growth and yield of turmeric (*Curcuma longa* L) var. PDKV Waigaon

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The present investigation entitled "Influence of nitrogen levels and spacing on growth and yield of turmeric (*Curcuma longa* L) var. PDKV Waigaon" was undertaken at College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli during the year 2021 and 2022 by considering the importance of turmeric under Konkan agro-climatic conditions. In the interaction effect of treatment combination S_1N_1 (45 cm × 45 cm; 300 kgha^{-1} N) recorded the highest number of leaves (14.98) and number of tillers per plant (3.91) whereas the interaction effect of treatment combination S_3N_1 (45 cm × 15 cm; 300 kg ha^{-1} N) recorded the highest plant height (110.19 cm). In post harvest parameters, treatment S_1N_1 (45 cm × 45 cm; 300 kg ha^{-1} N) recorded the highest number of primary fingers (15.51), the highest number of secondary fingers (19.42). The the highest yield per hectare in tones (58.48 t) was recorded in treatment combination S_3N_1 (45 cm × 15 cm; 300 kg ha^{-1} N). The economic analysis of the yield data revealed that S_3N_1 *i.e.,* 45 cm × 15 cm and 300 kg ha^{-1} N recorded the highest gross return (Rs. 1321800) and B:C ratio (1.91) as well.

HITASA/AB/2024/011

Influence of Pinching and Nitrogen Application on the Growth and Flower Production, of Annual Chrysanthemums

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This research was conducted to investigate the "Effect of pinching and nitrogen on growth and flower yield of annual chrysanthemum" was carried out during *rabi* season of the year 2019- 2020 at the farm of Horticulture Section, College of Agriculture, Nagpur. The experiment was laid out in factorial Randomized Block Design with 12 treatment replicated thrice. The treatments comprised of the three pinching treatments viz., no pinching, 20 DAT and 30 DAT and four nitrogen levels viz., 0 kg N ha^{-1}, 50 kg N ha^{-1}, 100 kg N ha^{-1} and 150 kg N ha^{-1}. The results obtained in the present investigation indicated that, the growth parameters in terms of height of plant was recorded maximum in 150 kg N ha^{-1} and no pinching, whereas, the maximum stem diameter, number of branches, spread of plant and leaf area were recorded with pinching at 20 DAT and 150 kg N ha^{-1}. As regards yield parameters, the maximum flower yield $plant^{-1}$ and $hectare^{-1}$ were recorded with pinching at 20 DAT and 150 kg N ha^{-1}.

Keywords: Annual chrysanthemum, Pinching, Nitrogen, Growth, Flower yield.

HITASA/AB/2024/012

Effect of Organic and Inorganic Fertilizers along with Microbial Consortia on Regenerative Traits of Soil

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An investigation was carried out to study the effect of source of nutrients and inoculation with microbial consortia with regenerative traits on soil regeneration and yield of wheat using a field study. The soil microbial biomass carbon, organic carbon content, sequestered carbon, per cent water stable aggregates, dehydrogenase activity, urease activity, phosphatase activity were found to be significantly highest in the treatment N_2 with recommended N equivalent through vermicompost

among source of nutrients, C_2 inoculation with liquid based consortium among different microbial consortia and their interaction treatments was found to be the highest in the treatment C_2N_2 receiving inoculation with liquid based consortium and recommended N equivalent through vermicompost. Whereas, the yield (1606 kg/ha) was found to be the highest in treatment (C_2N_3) receiving inoculation with liquid based consortium and 50% of RDN through chemical fertilizer and 50% of RDN through vermicompost. The results indicated that inoculation of microbial consortium prepared from efficient isolates isolated from naturally regenerating forests of Uttara Kannada district of Karnataka along with organic and inorganic source of nutrients, played an effective role in improving low fertile agricultural soils. Therefore, microbes along with organic source of nutrients from naturally regenerating forest types, play an important role in the regeneration of degraded or low fertile soils.

HITASA/AB/2024/013

From Waste to Taste: Honey Candied Orange Peel as a Sustainable Value-Added Product

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In India, citrus fruits hold a significant position among the most widely cultivated tropical and sub-tropical fruits, following closely behind mangoes and bananas in both production area and volume. As the ninth-largest producer of oranges globally, India contributes approximately 3% to the total worldwide orange output. Despite their popularity in juice processing, citrus fruits leave behind a substantial by product: the peel, which constitutes nearly half of the fruit's mass post-juicing. These peels are not merely waste; they are rich reservoirs of valuable components such as pectin, cellulose, hemi-cellulose, pigments, dietary fiber, oils, and various bioactive compounds. The present study aims to transform discarded orange peels into delectable candies, aligning with the concept of value addition and sustainability within the food sector. Candy, traditionally crafted from fruits or vegetables through immersion in sugar syrup, followed by syrup removal and drying, presents an innovative avenue for repurposing agricultural byproducts while satisfying consumer cravings

for sweet treats. In the present study, the traditional method of developing candy is advanced by using optimized blanching process and replacement of refined sugar with honey. To develop honey candied orange peel, orange peel were collected and processed followed by blanching. Blanching plays a vital role in the preparation of orange peel candy. Blanching does not only reduce bitterness of orange peel but also helps to making them more palatable by soften the texture of tough or fibrous ingredients, preserve the natural colour of ingredients, to ensure an appealing appearance and also reduces the risk of microbial contamination in the final product. In this present study, an optimized blanching technique was followed that gives a well accepted taste to orange peel candy. Orange peels were blanched thrice in salt solution for 10 minutes at 100°C temperature and washed thoroughly with fresh water. After blanching, the peels were steeped in honey syrup to develop honey candied orange peel. Sensory evaluation of prepared orange peel candy was done by using 9-point hedonic scale. In sensory evaluation the developed orange peel candy was found to be 'liked moderately' by selected panellists, thus considered acceptable. The overall acceptability score was 7.2.

HITASA/AB/2024/014

Effect of Bio-priming with Isolates of Fungal Bio Agents on Germination and incidence percentage of Chickpea wilt

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Chickpea (*Cicer arietinum* L.) is one of the most important pulse crop of India. Chickpea is one of the major and abundant sources of protein among pulses; production of chickpea is very low all over the world wide due to several biotic and abiotic stresses. Among the biotic stress disease are the major problems. Chickpea wilt caused by *Fusarium oxysporum* f. sp. *ciceri* has been considered as devastating one to cause up to 10 per cent

loss in yield every year. For eco-friendly and sustainable management of the disease, six isolates of two fungal bioagents *Trichoderma harzianum* and *Trichoderma viride* were evaluated for their antagonistic efficacy on colony growth by dual culture plate method. The results showed that the bio-agents suppressed the colony growth of pathogen which ranged between 70.80-59.29%. Isolates of T_1 [*Trichoderma harzianum* (KN)] was found very effective antagonistic effect compare to all treatments and control which was inhabiting maximum mycelial growth of pathogen about 70.80 mm in diameter followed by T_2 [*Trichoderma harzianum* (VN) which inhibited 68.80%, T_3 [*Trichoderma harzianum* (UNN) 66.45% and T_4 [*T. viride* (FBD)] 63.58% mycelia growth of pathogen and so on. Seed treatment *in vivo* showed that out of seven treatments includingT_1 treated seeds showed highest germination percent among all the treatments with a value of 85.71%. While, lowest germination percent was found in control about 47.61%, all treated pots significantly increased germination percent over control.. Result of the study show that bio-agents significantly reduced the wilt incidence, treated plants subsequently significantly increased germination percentage, morphological parameters and yield parameters over the non-treated plants.

Keywords: Chickpea, biotic & abiotic stress, fungal bio agent, pathogen and management

HITASA/AB/2024/015

Impact of curd foliar spray and micronutrients on wheat (*Triticum aestivum* L.) Growthand Yield Attributes

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The field experiments conducted at Oil Seed Research Farm, Kalyanpur in the Department of Seed Science and Technology of CSAUAT, Kanpur during the *Rabi* seasons of 2021-22 aimed to assess the effect of

micronutrients and curd foliar spray on the growth, yield, and quality parameters of wheat (*Triticum aestivum* L.) under different doses and conditions. The experiment included various treatments applied as foliar sprays at jointing and booting stages, designed in a Randomized Block Design (RBD) with three replications. The treatments included: T_0: Control, T_1: Zn (0.5%), T_2: B (0.2%), T_3:KNO3 (2.5%), T_4: Zn+B (0.5%+0.2%), T_5:Zn+KNO3 (0.5%+2.5%), T_6:B+KNO3 (0.2%+2.5%), T_7: Zn+B+KNO3 (0.5%+0.2%+2.5%), T_8: Curd of Cow (5kg ha-1) and T_9: Curd of Buffalo (5 kg ha-1). These treatments were applied under both drought and irrigated conditions. Significant results were observed in various parameters including Plants height (92.8 cm), No. of tillers plant^{-1}(4.50), Length of ear (8.61), No. of spikelet's spike^{-1}(13.27), No. of grain ear^{-1} (36.52), test weight (45.80g), Grain yield (37.67 q ha^{-1}), biological yield (89.26q ha^{-1}), Harvest index (42.20%). The results indicated that the application of curd of cow (5kg ha-1) showed promising effects on enhancing growth, quality of seeds, and inducing resistance to pests and diseases in a sustainable manner. Among all treatments, T_7 :(Zn+B+KNO3) exhibited the most significant improvement in various traits, particularly in increasing the yield of wheat cv ''K-1317'' in Kanpur, Uttar Pradesh.

Keywords: Micronutrients, foliar spray, wheat, growth and yield

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The Influence of Climatic and Edaphic Factors on Growth of Farm Grown Teak in Tamil Nadu

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Teak (*Tectona grandis,* Linn.f) is a prized hardwood species with remarkable properties that make it a favored material in various industries. In current trend, the cultivation of teak in farmlands is considered as a promising and viable option. But the documentation and research on growth attributes and the studies on influence of climatic and edaphic factors on growth of teak raised in farmland condition is lacking. In this regard, the present investigation on farm grown teak was perpetrated in three agroclimatic zones viz., High Rainfall Zone (HRZ), Southern Zone (SZ) and Cauvery Delta Zone (CDZ) of Tamil Nadu in four different age classes (0-5, 5-10, 10-15 and 15-20 years). The study was carried forward with the prime motive of determining growth attributes and analyzing the impact of climatic and edaphic parameters on growth biometry of farm raised teak, both in block and boundary plantations. The **soil physico-chemical** parameters were analyzed both in surface (0-15 cm) and subsurface (15-30 cm) of farm grown teak plantations and the outcomes exposed that maximum organic carbon (0.62%), available nitrogen (197 Kg ha^{-1}), available phosphorous (22 Kg ha^{-1}) and available potassium (340 Kg ha^{-1}) were observed in surface soils of high rainfall zone. Meanwhile maximum pH (8.30) and electrical conductivity (0.24 dS/m) were observed in southern zone. The follow-up of **correlation studies** between growth and climatic variables brought to light that tree volume positively correlated with climatic parameters viz., annual rainfall, mean maximum temperature, mean minimum temperature and mean relative humidity in both boundary and block plantations. Harmoniously, the correlation analysis between growth and edaphic parameters showed positive correlation with edaphic variables viz., organic carbon, available nitrogen, available phosphorous and available potassium, whereas growth depicted negative correlation with pH and electrical conductivity in both boundary and block plantations.

Keywords: Teak, Agro-climatic zone, Climatic, Edaphic, Correlation

HITASA/AB/2024/017

Evaluation of silica nano particles and some other seed protectants against pulse beetle (*Callsobruchus chinensiss* L.) in chickpea

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Chickpea is an important source of protein for millions of people in the developing countries, particularly in South Asia, who are largely vegetarian either by choice or because of economic regions.The pulse seed suffers a great damage during storage due to insect attack. Among the insect pests attacking stored products, pulse beetle, *Callosobruchus chinensis* is one of the most destructive and cosmopolitan pests of stored legume. It is observed that up to 60 percent of weight loss and 45.50 to 66.30 percent loss in protein content of stored pulse seeds occur due to *Callosobruchus chinenssis* infestation. An experiment was conduct in the laboratory of Department of Entomology, ANDUA&T, Ayodhya. The effect of seven treatments Silica nano particles @ 5g/ kg^{-1} seed, Silica nano particles @ 10 g/kg^{-1} seed, Emamectin benzoate @ 2ppm/kg seed, Deltamethrin@ 1.4 ppm/ kg-1 seed, Neem oil @ 10 ml/ kg-1 seed , Spinetoram @ 3ppm/kg seed and Wood ash @ 140g/ kg^{-1} seed and control were evaluated against pulse beetle using 500 g chickpea seed as the experimental unit. Among tested treatments the Silica nano particles @ 10g/ kg^{-1} seed, Emamectin benzoate @ 2ppm/ kg^{-1} seed, Silica nano particles @ 5g/ kg^{-1} seed and Spinetoram @ 3ppm/ kg-1 was found most effective as seed protectants with least seed damage and weight loss of chickpea seed up to 90 days of storage which able to maintain IMSCS level. The seed damage and seed weight lossof chickpea seed were increased with increased period of storage. Thus, all the treatments were revealed that Silica nano particles @10g/kg seed, Emamectin benzoate @2ppm/kg^{-1} seed Silica nano particles @5g/kg^{-1} seed and Spinetoram @3ppm/kg^{-1} seed may be used for protecting the seed of chickpea against pulse beetle (*C. chinensis*) for long period of storage.

Keywords: Chickpea, silica nano particles, seed protectants.

HITASA/AB/2024/018

Soil properties regulating urease activity in Inceptisol

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The use of urea by the farmers as a source of nitrogen has been increased in the recent years. However, the nitrogen use efficiency of applied chemical nitrogen fertilizers is less than 50% due to leaching, volatilization, denitrification and surface runoff. These losses are undesirable because of environment concerns and the high cost of crop production. After application of urea to soil, it hydrolyses to ammonia and carbon dioxide in soil by soil urease enzyme which is under influences of soil factors. Thus, study of soil properties regulating soil urease activity are the most important in regulating the process of urea hydrolysis which is the main concern in improving the use efficiency of urea and minimize the problems related to use of urea. In this context, the present investigation entitled, "Soil properties regulating urease activity in Inceptisol" was undertaken during 2020-21 at the laboratory of the Department of Soil Science and Agricultural Chemistry, MPKV, Rahuri, so as to understand the soil properties regulating urease activity in the Inceptisol.

Total 15 surface (0-15 cm) GPS based soil samples of an Inceptisol with wide range of variations in soil properties from the Central Campus of the MPKV, Rahuri on were collected and analysed for important physic-chemical and biological soil properties for the correlation studies with urease activity. Correlation studies between soil properties and urease activity from soil samples were analysed by simple linear correlation study.

The present study results indicated that, the urease activity is positively and highly significantly correlated with organic carbon (0.87**), total nitrogen (0.806**), available nitrogen (0.61**) and Clay (0.52*). The content of $CaCO_3$ (-0.487*) has significant negative correlation with urease activity. The other soil properties studied *i.e.* pH, EC, silt, sand and microbial

population did not show any significant correlation with urease activity in an Inceptisol soils.

Key words: Inceptisol, nitrogen, soil property, urease activity.

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The causes of farming distress and suggestions to overcomes farming distress.

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The issue of farmers' 'distress' is a vexed one. 'Distress' is the result of a complex interplay of a myriad issues and risks. Therefore, it will not be prudent to address the issue in isolation of the causative factors. Farmers' 'distress' is not due to indebtedness alone. There are several other factors such as social, psychological, genetic and family related developments that contribute significantly to this. Among the economic causes for farmers' distress, credit related issues normally play a prominent role. It has also been observed that mostly the small and marginal farmers, as well as, tenant farmers and farm labourers bear the brunt of crop failures. The main objective of the current study knows the causes of farming distress and suggestions to overcome farming distress.

Farmers' suicides are seen in diverse areas such as Vidarbha in Maharashtra, drought prone areas of Northern Karnataka, Telangana region of Andhra Pradesh, etc. where one could clearly identify the basic causes of distress is due to the mismatch between available natural endowments and the aspirational levels of agriculturists, the reasons could also be due to consumerism-led indebtedness leading to distress as is the case in Punjab and Kerala. Thus, it would be difficult to isolate the cause of distress to just backwardness of a region. Incidents of farmers committing suicide in certain parts of India have been a matter of serious concern. The

present study was conducted in Hingoli district of the Marathwada region of Maharashtra state.

In all 80 respondents were selected by using random sampling method. The EX-Post factor research design was used for conducting the study. The data collected was processed and statistically analyzed by using statistical techniques like frequency, percentage, mean, SD and Chi-square test. It was observed that, failure of crops due to insect pest and diseases is the major (93.75%) cause found in the risk factors among the farmers, followed by 87.50 per cent of the farmers thought that failure of crops due to draught or lack of irrigation is the another main cause of farmer 68.50per cent thought that recovery pressure from money lender was also the big cause, 56.25 per cent farmer said that, complicated procedure to get loan was another cause, majority 62.50 per cent of the farmers said dowry was the big cause of their distress, followed by 50.00 per cent partition of lands43.75 per cent Auction of assets / livestock / other household stock, other causes for farmers distress per suggestion related to farming 93.75 per cent of the respondent suggested thatassured irrigation facilities should be there and there is need for fixing minimum support price for all the crops. Uninterrupted power supply should be there suggested by 87.50 per cent. Develop special agriculture zones (SAZs)for farming 81.25 per cent. Subsidies for agricultural inputs should be Increased 70.00 per cent.

A comprehensive crop insurance scheme to protect farmers not only from vagaries of nature but also from market fluctuations 65.00 per cent. Provide timely market information 61.25 per cent. Provision of easy, timely and adequate credit at lower interest rate43.75 per cent. Effective extension methods (field days, result demonstration, method demonstration, etc.) should be conducted periodically 25.00 per cent.

Keywords: distress, farming distress, economical causes, social factor. Etc.

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Weed management in sesame: Integrated approach for better growth and yield

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A field experiment was conducted at Onattukara Regional Agricultural Research Centre, Kayamkulam, Kerala to evaluation the efficiency of directed application of pre and post-emergence herbicides for weed management; their effect on the growth, yield, and economics of sesame variety "Thilak" during the summer 2022. The experiment was laid out in RBD, replicated thrice with twelve treatments *viz.,* Oxyflourfen 80 g/ha at 2DAS *fb* carfentrazone ethyl 20 g/ha at 25DAS (T_1), Oxyflourfen 80 g/ha at 2DAS *fb* imazethapyr 50 g/ha at 25DAS (T_2), Oxyflourfen 80 g/ha at 2DAS *fb* mechanical weeding with wheel hoe weeder at 25DAS (T_3), Pendimethalin 500 g/ha at 2DAS *fb* carfentrazone ethyl 20 g/ha at 25DAS (T_4), Pendimethalin 500 g/ha at 2DAS *fb* imazethapyr 50 g/ha at 25DAS (T_5), Pendimethalin 500 g/ha at 2DAS *fb* mechanical weeding with wheel hoe weeder at 25DAS (T_6), Diclosulam 12.5 g/ha at 2DAS *fb* carfentrazone ethyl 20 g/ha at 25DAS (T_7), Diclosulam 12.5 g/ha at 2DAS *fb* imazethapyr 50 g/ha at 25DAS (T_8), Diclosulam 12.5 g/ha at 2DAS *fb* mechanical weeding with wheel hoe weeder at 25DAS (T_9), Mechanical weeding with wheel hoe weeder at 15 and 30DAS (T_{10}), Hand hoe weeding at 15 and 30DAS (T_{11}) and weedy check (T_{12}). Herbicides were applied by using crop protective herbicide applicator. Results revealed that treatment T_{10} resulted in the highest plant height (105.0 cm), no. of leaves (83.4), dry matter production (7.87g/plant), CGR (1.047 g m^{-2} day^{-1}), seed yield (478 kg/ha) and haulm yield (1177 kg/ha) which was comparable with T_6 and T_4. B:C ratio recorded highest in integration of pendimethalin 500g/ha at 2DAS *fb* mechanical weeding with wheel hoe weeder at 25DAS (T_6) and found to be identical with T_4 and T_{10}. Consequently, the study suggested three weed control practices for sesame. Mechanical weeding with wheel hoe weeder at 15 and 30DAS (T_{10}) could be recommended as a non chemical weed management practice. Pendimethalin 500 g/ha at 2DAS *fb* wheel hoe weeding at 25DAS (T_6) could be recommended as an integrated weed management practice and pendimethalin 500 g/ha at 2DAS *fb*

carfentrazone ethyl 20 g/ha at 25DAS (T_4) could be recommended as a chemical weed management practice for higher yield and return in sesame.

Keywords: Sesame, Pendimethalin, Carfentrazone ethyl, Mechanical wheel hoe weeder, Crop protective herbicide applicator, Integrated weed management.

HITASA/AB/2024/021

Evaluating Insecticide Efficacy Against Fall Armyworm, *Spodoptera frugiperda* (J.E. Smith) in Sweet Corn and Their Impact on Parasitization by *Trichogramma species*

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Sweet corn (*Zea mays* L.) is a vital staple food, but it faces a significant threat from the Fall Armyworm (*Spodoptera frugiperda*), which inflicts substantial damage on crops. Farmers commonly resort to insecticide applications to control this pest; however, the impact of these chemicals on beneficial organisms like *Trichogramma species*, which are natural enemies of the Fall Armyworm, is a growing concern. This study aimed to evaluate the efficacy of various insecticides against the Fall Armyworm while assessing their effects on Trichogramma parasitization. The field experiment, following a randomized block design, tested several insecticides, including seed treatments like Tetraniliprole ST 480 FS followed by Cyantraniliprole 10.26% OD foliar spray, and seed treatment with Cyantraniliprole 19.8% + Thiamethoxam 19.8 % FS followed by foliar spray with Spinetoram 11.7% SC, among others. The effectiveness of these treatments was measured through parameters such as leaf injury rating (LIR) and percentage infestation. Trichogramma parasitization was

evaluated using the sentinel card method, along with per cent adult emergence. Among the insecticides tested, seed treatment with Cyantraniliprole 19.8% + Thiamethoxam 19.8 % FS followed by Spinetoram 11.7% SC spray exhibited significant efficacy against Fall Armyworm, resulting in minimal plant and cob damage and increased grain yield. This was followed by seed treatment with Cyantraniliprole 600 FS and Chlorantraniliprole 9.3% + Lambda Cyhalothrin 4.6% ZC spray, as well as seed treatment with Tetraniliprole ST 480 FS followed by Cyantraniliprole 10.26% OD spray. However, the untreated control showed the highest per cent parasitization and adult emergence. While some treatments, such as foliar spray with Chlorantraniliprole 18.5% SC followed by seed treatment with Tetraniliprole ST 480 FS and Cyantraniliprole 10.26% OD, were relatively safer for Trichogramma parasitization, certain insecticides like emamectin benmzoate 5% SG and flubendiamide 480 SC displayed adverse effects on this beneficial species, potentially disrupting biological control mechanisms. This study underscores the importance of balancing pest control efficacy with ecological considerations when selecting insecticide treatments for managing Fall Armyworm in sweet corn. Integrated pest management approaches, which prioritize preserving beneficial organisms while using targeted insecticide applications, offer a sustainable solution for pest management in sweet corn production. Further research is needed to assess the long-term impacts of insecticide use on beneficial insect populations and optimize pest management strategies for enhanced sustainability in agricultural ecosystems.

HITASA/AB/2024/022

Apical Rooted Cutting Technology vs. Conventional Potato Cultivation: A Comparative Economic Study in Hassan district of Karnataka

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The area under potato cultivation in Karnataka has reduced drastically due to the outbreak of diseases, poor access and poor seed quality and high seed price. Apical Rooted Cuttings (ARC), a vegetative propagation technique, facilitates rapid multiplication, producing numerous high-quality seedlings and affordable seed potatoes for small farmers. A study in Hassan district, with a substantial number of ARC potato growers, examines the economic aspects of potato cultivation using ARC technology compared to conventional method. With the objective of analyzing cost and returns of ARC technology and Conventional method of potato cultivation. The cost of cultivation of potato in conventional method was higher (Rs. 78,822/acre) compared to ARC method (Rs. 67,322/acre). The lower cost of cultivation in ARC method was mainly attributed to reduction in seed material cost. The average yield of potato was marginally higher (69 q/acre) in ARC method compared to conventional method (67q/acre) of potato cultivation. The higher yield in ARC method was mainly attributed to high yielding varieties of seedlings than seed tubers. Increase in yield marginally by 2-3 per cent in ARC method contributed to higher gross returns with Rs. 1,35,240 per acre in comparison with conventional method of potato cultivation with Rs. 1,30,283 per acre. The net returns realized in ARC method (Rs. 48,325) of potato cultivation was higher compared to conventional method (Rs. 30,963) of potato cultivation mainly due to reduction in seed material cost and slight increase in yield of ARC method compared to conventional method of potato cultivation. Returns per rupee of expenditure in ARC and conventional method were Rs. 1.56 and Rs. 1.31, respectively. The adoption of ARC technology by sampled respondents saved seed costs by 14% and increased net income by 29.6% compared to the conventional potato cultivation method. Hence, awareness has to be created for popularization of ARC across all the stakeholders through conduct of field days, technology demonstrations for adoption and its dissemination.

Keywords: ARC Technology, Potato seed, ARC seedlings, Cost & Returns and Conventional potato production.

HITASA/AB/2024/023

Phytochemical profiling of spiny coriander (Eryngium foetidum L.) – A potential perennial spicing-culinary herb

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Spiny coriander (*Eryngium foetidum* L.) is a perennial medicinal herb commonly cultivated in tropical regions, notably in India, where it is celebrated for its culinary applications, providing garnish and flavor enhancement to a multitude of dishes while also being employed in traditional remedies for various ailments. In this study, we investigated the volatile flavor constituents of these unique plants via Gas Chromatography-Mass Spectrometry (GC-MS) analysis and found that the essential oil content of Eryngium leaves was approximately 0.15%. GC-MS analysis of the essential oil extracted from E. foetidum leaves revealed the presence of 50 distinct compounds. Remarkably, among constituents, trans-2-dodecenal was the most abundant, representing a substantial 23.74% of the total composition, thereby playing a pivotal role in defining the unique flavor of Eryngium. With their remarkable chemodiversity, Eryngium species hold great potential for applications in various industries, including the culinary, pharmaceutical and fragrance sectors.

Key words: Coriander, Aromatic herb, Phytochemicals

HITASA/AB/2024/024

Effect of NAA,GA3 and IAA On Growth Quality and Physiological Parameters of Brinjal

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An experiment was conducted at shri Shivaji college of agril. biotechnology, Amravati Dr. PDKV Akola. on “Effect of NAA, GA3 and IAA on

growth quality and physiological parameters of brinjal'' ***(solanum malongena L.)*** With following Objective: 1) To study the effect of different plant growth regulator on growth and yield brinjal varieties. 2) To find out the most suitable dose of plant growth regulators for higher yield and best cultivars. 3) To work out the most economical combination of growth regulators and variety of brinjal. Eight treatment of varieties/hybrids [MAHY 11 (Hybrid brinjal seeds MEBH 11)] And levels of three plant growth regulators le foliar spray of two levels of NAA 50 and 100 ppm, two levels of IAA 100 and 200 ppm , three levels of GA, 50, 100 and 200 ppm and water spray for control at 30 and 60 DAT. Observations were recorded for growth parameters (eg. plant height, numbers of branches of plant1,) days to first flowering , days to first picking), yield parameters like (number of fruits plants, fruit length, fruit width, fruit weight)

HITASA/AB/2024/025

Enhancing Paddy Residue Decomposition Efficiency through In Situ Application of Lignocellulolytic Fungal Consortium

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The sluggish breakdown speed of the resistant lignocellulosic structure poses a significant constraint on composting procedures for agricultural waste. The compost produced through the bioconversion of agroresidues offers numerous benefits, such as enhanced soil fertility and health, leading to increased agricultural productivity, greater soil biodiversity, reduced ecological risks, and a more sustainable environment. This study focused on exploration of potential bioagents capable of degradating lignocellulosic biomass sustainably via hydrolysis by lignocellulolytic enzymes. The soil & wood samples from Himalayan forests were used for isolation of lignocellulolytic degrading microbes. All the fungal isolates were screened for cellulase, xylanase and laccase enzyme activities both qualitatively and quantitatively. Out of 34 fungal isolates,

only 13 were capable of showing lignocellulolytic enzymes activity. The potential fungal isolates WRP2 exhibited maximum cellulose i.e. FPase (0.29 Uml^{-1}) and β-glucosidase (0.199 Uml^{-1}) activity, WRP13 exhibited maximum xylanase activity (4.57 Uml^{-1}) and WRP1 exhibited maximum laccase activity (151.66 Uml^{-1}). The fungal isolates also showed lignin peroxidase and manganese peroxidase production ability. However, Evaluation for In-situ degradation of Paddy straw through microbial consortium is under study. Hence, after field trail assessment, these fungal isolates can be used to developing an efficient, sustainable, and environmentally friendly biological method for pre-treatment and degradation of lignocellulosic biomass.

HITASA/AB/2024/026

Innovative approach for the management of citrus butterfly, *Papilio demoleus* (Papilionidae: Lepidoptera)

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Indiscriminate use of synthetic pesticides and fertilizers has led to various problems *viz*, pesticide resistance, resurgence, residues, environmental pollution, loss in soil fertility, decrease in crop yields and various health hazards. The ill effects of chemical farming have generated interest in organic farming, where it involves the use of fertilizers of organic origin by using farm and urban wastes, and natural plant based safer pesticides. Under this circumstance, alternative method of augmenting fertilizer and pesticides assumes a paramount importance. Earthworms contribute in different degrees for the mixing of organic and inorganic components of soil besides imparting good health to the crops by increasing the tolerance level against insect pests and diseases. *In-situ* vermiculturing is one such method which involves conversion of organic waste into vermicompost by the action of earthworms right in the field near the vicinity of the growing plants. The field experiment was carried out using Randomized Block Design to study the effect of *in-situ* vermiculturing along with foliar application of synthetic insecticides and

biorationals against citrus butterfly. The results indicated that *in-situ* vermiculturing with earthworms, *Eudrilus eugeniae* @ 200 per plant along with foliar spray of chlorantraniliprole 18.5 SC (0.23 larvae /plant) and spinosad 45 SC (0.35 larvae /plant) were found significantly effective in controlling citrus leaf miner on acid lime. The *in-situ* vermiculturing with *E. eugeniae* @ 200 earthworms per plant along with foliar spray of neem-based insecticide (1.50) and bio digester solution (10%) (1.98) were found on par in controlling citrus butterfly. The cumulative effect of *in-situ* vermiculturing and foliar spray resulted in better control of citrus butterfly. This kind of approach is novel one where modification of physiology of plant *via* supplying organic forms of nutrients will boost tolerance of plants and external application of insecticides and biorationals will add for overall control of of the pest. It can be considered as innovative approach for management of citrus butterfly on acid lime.

Keywords: Acid lime, citrus butterfly, *Papilio demoleus*, *in-situ* vermiculturing, chlorantraniliprole18.5 SC, spinosad 45 SC

HITASA/AB/2024/027

Assessing Nesolynx thymus as a Biological Control Agent for Uzi Fly (*Exorista bombycis*) Infestation in Mulberry Silkworms

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The study explored the natural enemies of the Uzi fly, a harmful pest for mulberry silkworms in Assam, India. The study identified the pupal parasitoid, *Nesolynx thymus*, as the primary predator. This gregarious parasitoid lays eggs on the Uzi fly pupae. The hatched larvae then develop inside the pupae, ultimately killing them. The study found that *Nesolynx thymus* was the most common natural enemy, with a parasitization rate of

63% in autumn and 47% in spring. Additionally, younger Uzi fly pupae, only 1-2 days old, were more susceptible to parasitization compared to older ones. Interestingly, red ants (*Oecophylla smaragdina*) were also observed attacking Uzi fly maggots and eggs. These findings suggest that *Nesolynx thymus* has promising potential as a biocontrol agent for managing Uzi fly populations in sericulture. However, further research is needed to optimize its use in real-world field settings.

Keywords: Uzi fly, Mulberry silkworm, Sericulture, Pupal parasitoid, Natural enemy

HITASA/AB/2024/028

The *Galleria mellonella* larvae as a preliminary *in vivo* model for evaluation of novel alternate antimicrobial agent against antibiotic-resistant poultry meat-origin bacteria

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Emerging antimicrobial resistance (AMR) against common food-borne pathogens, has been observed in an increasing trend recently. The situation become grave when multi-drug resistance reported toward the antibiotics of frontline therapy. Therefore, novel alternate therapeutics such as cationic antimicrobial peptides (AMPs), nanoparticles etc., have attracted considerable attention to combat AMR. This study evaluated the *in vivo* antimicrobial efficacy of previously characterized bactenecin and green synthesized silver nanoparticles (AgNPs) against antimicrobial resistant *L. monocytogenes* and *Staphylococcus* sp. isolates of poultry origin. To assess the *in vivo* antimicrobial efficacy, *Galleria mellonella* (Wax moth) larval model is used as a substitute of traditional murine *in vivo* models which have ethical, financial and logistical limitations. The micro broth dilution method

was used to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of bactenecin and AgNPs against both pathogens. The bactenecin MIC was found 0.5 and 64 µmol against *L. monocytogenes* and *Staphylococcus* sp., respectively, whereas MBC was 128 µmol for each. The MIC and MBC of AgNPs were found to be 32 and 64 µmol for *L. monocytogenes*, and for *Staphylococcus,* both, MIC and MBC values were 64 µmol. AgNPs exhibited better MBC than bactenecin against poultry originated *L. monocytogenes* and *Staphylococcus* sp. Further, survival rate, LD_{50}, bacterial count, melanization rate, hemocyte enumeration and cytotoxicity assay were carried out in *G. mellonella* model to assess *in vivo* antimicrobial efficacy of selected therapeutic candidates against both bacteria. The infected larvae treated with either bacitracin or AgNPs exhibited an improved survival rate, immunomodulatory effect, reduced bacterial counts thus leading to lower bacterial-induced cytotoxicity. To conclude, the results suggest that with respective MBC, both bactenecin and AgNPs as alternate therapeutic candidates showed an effective antimicrobial effect on AMR *L. monocytogenes* and *Staphylococcus sp.* of poultry origin. Typically, *in vitro* assays fail to represent real physiological reactions of living organisms, in such scenario, our study demonstrated that *G. mellonella* larvae serve as an excellent *in vivo* model for preliminary screening of the therapeutic compounds, including peptides and nanoparticles. We recommend its further investigation in appropriate animal models (mice/piglets) before its application in the target host.

Keywords: Antimicrobial resistance, antimicrobial peptide, silver nanoparticles, *Galleria mellonella*, alternate therapy,

HITASA/AB/2024/029

Wheat Establishment Technology for Climate Resilient Agriculture Scenario at West Champaran Bihar: Observations and Highlights

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It is crucial to reexamine agriculture in a way that makes it economically viable, climate-resilient, and resource-efficient due to factors including population growth, climate change, resource scarcity, and the urgent need to meet sustainable development goals. Traditional sowing of wheat involves higher tillage and inefficient resource utilization, high cost of production, and emission of greenhouse gases such as methane. Zero tillage Wheat sowing promoted for its climate-resilient nature, is often utilized by farmers in three different ways: line sowing after tillage, sowing with minimal tillage and zero tillage. However, these establishment technologies have certain advantages and limitations, as perceived by farmers. The intention of this investigation is to examine wheat crop performance in detail under the aforementioned crop establishing techniques. The study was carried out in farmers' fields with equal consideration given to the freedom to the farmers and the research circumstances. The study aims to analyse crop performance while emphasizing farmers' field-based knowledge to ensure a lab-land-lab loop for understanding the scope of refinement in agronomic as well extension strategies. The results of this study reveal the superiority of zero tillage over broadcasting and line sowing in terms of crop performance and economic performance in the northwest alluvial plain zone of Bihar. The study has also identified the constraints associated with adoption of line sowing and zero tillage.

Keywords: climate-resilient agriculture; Zero tillage sowing; sustainable agriculture, broad casting

HITASA/AB/2024/030

Studies on growth and yield of cowpea varieties as influenced by different spacings

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The field investigation entitled "Studies on growth and yield of cowpea (*Vigna unguiculata* L. Walp) varieties as influenced by different spacings" was conducted at Experimental Farm, Agronomy Section, College of Agriculture, Latur. The experimental field was leveled and well drained. The soil was medium and black in colour with good drainage. The soil was clayey in nature and slightly alkaline (7.8) in reaction, low in nitrogen, medium in available phosphorus and rich in available potassium. The environmental conditions were favorably congenial for normal growth and maturity of cowpea crop.

The experiment was laid out in Factorial Randomized Block Design with two factors and replicated thrice. Whereas first factor comprises the different spacing *viz.* 30 X 10 cm (S_1), 30 X 15 cm (S_2), 37.5 X 10 cm (S_3) and 45 X 10 cm (S_4), and second factor comprises the two varieties *viz.* Konkan Safed (V_1) and Konkan Sadabahar (V_2). The experimental gross plot size was 5.4 X 4.5 m and net plot size was varied as per treatment. The recommended dose of fertilizer 25:50:00 kg NPK ha^{-1} was considered. The fertilizers nitrogen and phosphorus was applied uniformly through urea and single super phosphate. Sowing was done by dibbling method on 27th June 2017 and harvested on 13th and 29th September 2017. All the cultural practices were followed by as per package of practices. The yield data for seed and straw yield for all plots were collected at the end of experimentation. Processed seed sample were digested and N was determined by micro kjeldahal method as advocated by Piper (1966). Protein content was calculated by multiplying N content by the factor 6.25.

The wider spacing 45 X 10 cm (S_4) gave significantly higher growth and yield attributes, gross monetary return, net monetary return and B: C ratio over the rest of the spacings except plant height and straw yield which was found maximum with lower spacing 30 X 10 cm (S_1). Among the two varieties, Konkan Safed (V_1) was recorded higher growth and yield attributes, gross monetary return, net monetary return and B: C ratio than the variety Konkan Sadabahar (V_2).

HITASA/AB/2024/031

High Throughput Phenotyping (HTP) for Crop Improvement

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Plant phenotyping is defined as the comprehensive assessment of complex traits of plants such as physiology, architecture, yield, and measurement of various quantitative traits. Breeding programs typically target phenotyping large populations for numerous traits across the crop cycle. However, conventional phenotyping methods are highly expensive, labor-intensive, destructive, and may compromise the significance or accuracy of the results. High Throughput Phenotyping (HTP) represents a cutting-edge technology merged with artificial intelligence, offering a solution to the challenges inherent in traditional phenotyping methods. It holds immense potential for non-destructive and efficient field-based plant phenotyping by collecting massive amounts of phenotypic data from hundreds of plants every day with a high degree of precision. HTP achieve genomics-assisted breeding (GAB) through genomic approaches of quantitative trait loci (QTL) mapping, marker assisted selection (MAS), genomic selection (GS), and genome-wide association studies. High throughput phenotyping has emerged as an effective solution for crop phenotyping, both under field conditions and controlled environments. By utilizing modern phenotyping platforms, it enables the evaluation of multiple traits, thereby enhancing breeding programs.

Keywords: High throughput phenotyping, genomic selection, non-destructive, genomics-assisted breeding

HITASA/AB/2024/032

Biochemical changes in Groundunt Genotypes against Tikka and Rust disease of Groundnut (*Arachis hypogaea* L.) under sandy soils of Guntur District.

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An experiment was conducted at Agricultural College, Bapatla. Preliminary screening of 42 genotypes for early, late leaf spot and rust for three seasons, after that eight groundnut genotypes, two each from resistant, moderately resistant, moderately susceptible, and susceptible were selected to further explore the biochemical mechanisms involved in resistance. Sowing was done during *kharif* (July 2018). Each genotype was sown five rows of 5 m length with a spacing of 45 X 15 cm in RBD with three replications. Biochemical constituents of phenol, Ortho-dihydroxy phenols, total sugar and reducing sugar at 60 DAS (flowering stage) were estimated from leaves of healthy and diseased samples. The biochemical changes (total phenol, Ortho-dihydroxy phenols, total sugar and reducing sugars) in tikka and rust disease were studied in resistant and susceptible genotypes. There was a significant difference in total phenol, Ortho-dihydroxy phenols, total sugar and reducing sugar contents between the healthy and diseased leaves of resistant and susceptible genotypes. The biochemical constituents found more in resistant genotypes and considered as parameter for disease resistance.

Keywords: Total phenol, Ortho-dihydroxy phenols, Total sugar, Reducing sugar, Early leaf spot, Late leaf spot, rust, groundnut genotypes

HITASA/AB/2024/033

Morphological Characterization for 16 qualitative traits in Groundnut (*Arachis hypogaea* L.) genotypes.

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The present study consisting of 42 genotypes were evaluated at Agricultural College Farm, Bapatla, Guntur (Dt.), Andhra Pradesh, located at an altitude of 5.4 m above MSL, $15^0$54' N latitude and $80^0$90' E longitude. The experimental field was a traditional coastal sandy loam soil with p^H 7, assured with an irrigation source around the year. The study was conducted in three consecutive seasons *viz., Kharif* (June 2017), *Rabi* (October 2018), *summer* (Feb 2018). The genotypes were evaluated for 16 morphological traits with the objective of assessing the morphological diversity, to know the importance of these traits as a descriptors. Among the 16 qualitative traits studied, growth habit, stem pigmentation, pod beak, pod constriction, pod reticulation, pod size, kernel size and testa colour have exhibited higher levels of variability.

Key words: Groundnut, descriptors, Characterization, PPVFR

HITASA/AB/2024/034

Effect of Fibrolytic Liquid Enzymes Pre-treated with Cotton Stalk Based Pelleted Complete Feed on Blood Serum Profile in Growing Goats

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The experiment was conducted to utilize cotton stalk treated with fibrolytic liquid enzymes and its incorporation in pelleted complete feed of growing goats as a sole roughage source. The extraction and assay of enzymes, quantitative analysis and degree of degradation and thermal stability of enzymes was done in the Department of Chemical Engineering, Visvesvaraya National Institute of Technology, Nagpur. The treatment of liquid fibrolytic enzymes on shredded cotton stalk and *in vitro* digestibility of treated cotton stalk was undertaken. The *in vivo* study was conducted on 24 growing goats at Instructional Livestock Farm Complex, Nagpur Veterinary College, Nagpur for 120 days with regards to rumen pH, rumen NH_3-N, rumen TVFA concentration, rumen total nitrogen, rumen TCA-ppt nitrogen and rumen NPN concentration of strained rumen liquor (SRL) in growing goats. The enzymes extraction and purification was done by solid state fermentation technique. As per quantitative analysis total cellulase activity was found to be 373.5 U/L and xylanase activity was found to be 1159.45 U/L. The enzyme was stable even at temperatures as high as 60°C. Blood samples were collected monthly from the experimental goats and were analyzed for total protein, albumin, serum globulin and blood urea nitrogen. The average total protein concentrations for T_0, T_1, T_2 and T_3 were found to be 6.46±0.11, 6.42±0.08, 6.75±0.12 and 6.76±0.10g/dl. The total protein (g/dl) differed significantly ($p<0.01$) amongst the treatment groups and period. The average serum albumin concentrations were found to be 2.40±0.06, 2.56±0.05, 2.46±0.03and 2.57±0.06 g/dl for T_0, T_1, T_2 and T_3 group. The serum albumin (g/dl) were comparable among the treatment groups and significantly ($p<0.01$) varied during periods. The serum globulin (g/dl) differed significantly ($p<0.01$) among the treatment groups and periods. The average serum globulin concentration was lowest for T_1 group (3.86$\pm$0.09) followed by T_0 group (4.06$\pm$0.10) whereas, T_2 (4.29±0.12) and T_3 (4.20±0.11) groups were comparable. The blood urea nitrogen values for T_0, T_1, T_2 and T_3 were found to be 17.14±0.61, 18.29±0.82, 17.80±0.90 and 17.77±0.65 mg/dl with non-significant variations.

Key words: Cotton stalk, fibrolytic liquid enzymes, goat, pelleted complete feed.

HITASA/AB/2024/035

Status and extent of secondary and micronutrients in soils of below sea level wetlands of Kerala

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Kole wet lands, a *Ramsar* site since 2002, are low lying tracts located 1 to 1.5 m below MSL and are considered as rice granary for central part of Kerala. Increased soil acidity ranging from 2.6 to 6.3 and salt water intrusion are the major factors limiting crop production in kole lands. A study was conducted to analyse the availability of secondary and micronutrient contents in soils of kole lands. Representative soil samples were collected from different locations in kole lands and analysed for organic carbon, macro and micro nutrients using standard procedures.The calcium content of soil varied from 289mg/kg to 1089 mg/kg with average of 687.50mg/kg. Magnesium content showed a range from 3.36mg/kg to 90.05mg/kg with average of 46.71mg/kg. The data indicated a positive relationship between organic carbon and magnesium content. The magnesium content of soil was noticed to be below the critical limit for crops indicating wide spread deficiency of magnesium and signified the application of magnesium during cropping period. The micronutrients Fe and Mn was detected in remarkably larger quantities compared to other micronutrients especially copper, boron and zinc. The extent of variation of Fe and Mn was noticed to be from 200ppm to 2856 ppm and 10.12 ppm to 90.05ppm respectively. The micronutrients viz. copper, zinc and boron was detected to be below critical level in most of the regions. The soil analysis of boron detected a limiting inclination towards soil availability though ranged between 0.09 ppm to 2.75 ppm. The correlation studies indicated direct relationship of organic carbon content with magnesium and micronutrients suggesting the profound implication of organic matter application for secondary and micro nutrient availability in kole lands.

HITASA/AB/2024/036

Impact of cotton trade on labour income

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India's cotton textile sector is highly organized which engages about 16 per cent of the nation's capital and over 20 per cent of industrial labour. Indian textile sector has strong backward linkages with primary input multiplier and household income multiplier of 4.13 and 3.44, respectively and thus transmitting external impacts to the labour income. The sector has a higher multiplier effect of 10.17 on production activities of which the impact on cotton sector is 0.126. In the present study, simulations were carried out for increase in carry over stock and reduction in domestic consumption and exports of cotton revealing that limiting the production and supply of the commodity would retain the market equilibrium and increase the domestic price to the advantage of the farmers. Appropriate planning for area under cotton cultivation and alternate procurement mechanism during the situation of emergency would stabilise the Indian cotton economy.

HITASA/AB/2024/037

Diversity of Spider Fauna and Impact of Weather Parameters in Maize Ecosystems of Warangal District in Telangana

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A roving survey of spiders associated with Maize crop in Warangal district was conducted across different villages covering ten quadrants in each village during both seasons at different growth stages. In all, 380 specimens were collected, documented and identified up to species level with 14 species belonging to 11 genera and 7 families. Among all collected specimens, 100 were belonging to family Lycosidae (26.8%) documented as largest family followed by Araneidae > Tetragnathidae > Oxyopidae > Cheiracanthiidae > Theridiidae > Salticidae. During both stages, the species *Tetragnatha mandibulata* was recorded as the dominant species*. Anelosimus sp.* and *Plexippus sp.* were recorded as the lowest abundance during the vegetative stage, whereas *Telamonia sp.* during the reproductive stage. In both seasons, Shannon-Wiener index was obtained 2.457 and 2.461 and Simpson's index was 0.09 and 0.1 indicated that the diversity of spiders slightly high during *Rabi* than *Kharif* with moderate diversity in both seasons of Warangal. Pielou's eveness index was 0.739 and 0.638 revealed that spiders were evenly distributed across both seasons with high Margalef species richness 2.526 during *Rabi* than 2.436 in *Kharif.* The results of 'Pearson' correlation studies indicated that majority of species were positively correlated with maximum and minimum temperature except *Araneus sp*. The results of multiple step-down regression analysis of each species indicated that maximum temperature, minimum temperature, relative humidity at 7 am and rainfall were major factors influenced more than 60 per cent of development in majority of species. The moderate diversity of spiders in maize crop was due to interrupt with regular intercultural operations, low prey density and indiscriminate use of pesticides.

HITASA/AB/2024/038

Effect of Vitamin C and Vitamin E on Oxidative Enzyme Status, Thyroid Status and Expression of HSP70 in Heat Stressed Broilers

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The present study was carried to study the effect of vitamin C and vitamin E on oxidative enzymes, thyroid status and heat shock protein 70 expression analysis in broiler birds exposed to cyclic heat stress. A total number of 84 day old broiler birds were randomly divided into 7 groups; group G1 was kept as control, whereas G2, G3, G4 groups were supplemented with 100 mg, 200 mg and 300 mg vitamin C and G5, G6 and G7 were supplemented with 100 mg, 200 mg and 300 mg vitamin E, respectively. Birds were exposed to 37±5.0°C throughout the experiment period. Significantly (*P≤0.01*) higher concentrations of SOD and catalase (Umg/ Hb); T3 and T4 (ng/ml) concentrations was observed in group G3 and G7 200 mg vitamin C and 300 mg vitamin E/ kg diet. On western blot expression analysis it was found that maximum HSP70 expression was observed in control i.e. G1 group and minimum HSP70 expression was observed in 200 mg vitamin C and 300 mg vitamin E supplemented groups. Therefore supplementation of 200 mg of vitamin C and 300 mg/ kg diet of vitamin E may be beneficial to alleviate the rigors of heat stress.

Key words: Broilers, Heat Stress, HSP70, vitamin C, vitamin E

HITASA/AB/2024/039

Ameliorative Effect of Cold Drinking Water on Oxidative and Biochemical Attributes of Summer Stressed Crossbred Cattle of North-Western Himalayas-India

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The present study was carried out at Division of Veterinary Physiology and Biochemistry, F.V.Sc & A.H., Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST-J), R.S. Pura. Six healthy, non-productive adult crossbred cattle were used in the study. The proposed work was conducted in three phases: phase-I in the month of March (treated as Control phase); phase-II in the month of July (treated as T_1) and phase-III in the month of August (treated as T_2). In phase-I, II and III of experiment, the animals were allowed to adapt to dietary roughage and concentrate at a ratio of 70:30 for 7 days, however, in phase-III, animals were provided with cold drinking water (15°C) in place of normal water. THI was calculated from environmental variables as per NRC, 1971. The recorded THI during phase-I was 70.02±0.49 showing animals were in very comfort conditions and the THI during phase II and III was 80.50±1.22, showing animals were in severe stress. Significant ($p<0.05$) increase in SOD, Catalse and GPx activities of erythrocytes were found in T_1 and T_2 phases as compared to control phase. However, significant decrease in SOD, Catalse and GPx activities were observed in T_2 phase (cold water provision phase) as compared to T_1 phase. A significant ($p<0.05$) decrease in plasma glucose concentrations were observed in T_1 phase as compared to control phase. However, upon provision of cold drinking water significant ($p<0.05$) increase in plasma glucose concentrations was observed when compared to T_1 phase. Significant ($p<0.05$) increase in plasma concentrations of BUN, Creatinine, Total protein and ALT and AST activities were observed in T_1 phase as compared to control phase. However, upon provision of cold drinking water significant ($p<0.05$) decrease in plasma concentrations of BUN, Creatinine, Total protein and ALT and AST activities was observed when compared to T_1 phase. In conclusion, the summer stress resulted alterations in plasma biochemical constituents, however, upon cold water provision altered, biochemical constituents were reverted towards normal levels.

Keywords: Cold water, Crossbred cattle, Oxidative, Plasma biochemical, Summer stress

HITASA/AB/2024/040

Effect of nutrient management on dry matter accumulation of rice (*Pusa Sugangh-5*) and wheat (*HD-2967*) in different crop establishment methods

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Rice and wheat are important for food and nutritional security for majority of population. The area under cultivation was either remains constant of showing slight increase since last two decade (for rice 44.71 in 2000-01 to 46.38 million ha in 2022-23 and for wheat 25.73 million ha to 30.47 million ha in 2022-23). Among the major thrust areas of research and development, changes in cultivation methods and/or crop establishment methods is carrying significant importance due to their higher contribution to economics, energetic, technology and policy based interventions. Among the inputs and practices in rice and wheat production process, nutrients, tillage and irrigation have highest share in energy consumption; Hence experiment was planned involving six crop establishment methods viz., puddled transplanted rice (PTR), system of rice intensification (SRI), aerobic rice system (ARS), conventional drill sown wheat (CDW), system of wheat intensification (SWI) and zero tillage wheat (ZTW). In these CEMs, nine nutrient management treatments were applied (Control(No fertilizer application), recommended dose of nutrients (RDN) (120 kg N ha^{-1} and 25.8 kg P ha^{-1}), RDN + Zn (Soil applied 5 kg Zn ha^{-1} through zinc sulphate heptahydrate), 75 % RDN, 75 % RDN + Zn, 75 % RDN + MC1 (*Anabaena* sp. (CR1) + *Providencia* sp. (PR3) consortia), 75 % RDM + MC1 + Zn, 75 % RDN + MC2 (*Anabaena–Pseudomonas* biofilmed formulations) and 75 % RDN + MC2 + Zn). The impact of treatment variables were studied on dry matter accumulation of rice at 100 days after sowing (DAS) and for wheat at 90 DAS. The result showed that, SRI and PTR remain on par to each other and both recorded significantly higher biomass over ARS in both years. Among nutrient management treatments recommended dose (RDN) (N120P25.8) + Zn recorded significantly higher

dry matter and remain on par with 75% RDN (N90P19.35) + CR1 + PR3 + Zn and 75% RDN (N90P19.35) + An-Ps biofilmed formulation + Zn. These three treatments recorded significantly higher dry matter than same treatments without Zn application. In case of wheat, CDW and SWI remain on par with each other; while ZTW had significantly higher dry matter accumulation than both methods in both years. The interaction between nutriment management treatments and crop establishment methods was found significant. All treatments (except 75% RDN (N90P19.35) + CR1+ PR3) in ZTW were superior then same treatment applied in SWI; while treatment performance in CDW and SWI was remain on par. All treatments in ZTW was also superior to same treatment applied in CDW (except 75% RDN (N90P19.35) + CR1+ PR3). In wheat also RDN (N120P25.8) + Zn recorded significantly higher dry matter and remain on par with 75% RDN (N90P19.35) + CR1 + PR3 + Zn and 75% RDN (N90P19.35) + An-Ps biofilmed formulation + Zn.

Keywords: System of rice intensification, system of wheat intensification, zero tillage, aerobic rice, microbial consortia.

HITASA/AB/2024/041

Seasonal fluctuations on egg production in Vanraja birds from Southern Bihar

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An experiment was performed to determine the seasonal fluctuation on egg production in Vanraja birds. The egg production in different seasons viz. winter (December to February month), spring (March to May month), autumn (September to November month) and in summer (June to August months) were studied in organized farm of college situated in southern Bihar, under intensive system of rearing. When the hens reached the age at sexual maturity (156.01±0.4 days) the laid eggs were collected and the data were statistically analyzed as per the standard method. The highest egg production was found in the in the winter

followed by spring, autumn and lowest in the summer. There was significant difference ($p<0.05$) observed for egg numbers obtained from selected hens in the southern region. The results of mean egg production and percentage of egg production were highest in Vanraja birds when compared with non-descript birds available in the farmers under intensive system of rearing. Understanding these fluctuations is crucial for poultry farmers in Southern Bihar to optimize their production strategies and ensure the well-being of their Vanraja birds. By examining these production parameters throughout the different seasons, we aim to provide valuable insights and practical recommendations for poultry farmers to effectively manage their flock and maximize productivity.

Keywords: Vanraja Birds, egg productions, seasonal fluctuation, non-descript birds, flock

HITASA/AB/2024/042

Soil Management for Climate Smart Agriculture

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The concept of Climate-smart agriculture focus on farming practices that improve farm productivity and ensure profitability, this help farmers adapt to the down effects of climate change at field level and mitigate climate change effects, *i.e.* by reducing the greenhouse gas emissions by sequestering soil carbon. Climate-smart soil management practices like locally practiced conservation agriculture, retaining crop residues for soil fertility, soil moisture conservation, disturbing the soil to a minimal extent and crop diversifying through rotation or intercropping. The existing sustainable soil management differs in the aspect of not accounting the global climate change and its unforeseen consequences during food production.

It was Paustian in 2016 who first put forth the idea of climate smart soils. He opined that the soils have the capacity to sequester carbon from

atmosphere, thus helping the fight against climate change. And this hugely depends on soil and crop management practices. However Soils also release greenhouse gases, especially the contribution of agricultural soils is estimated to be 37 % among the emission from all agricultural operations, mostly of carbon dioxide (CO_2) and nitrous oxide (N_2O), these are contributed by N fertilizers applied to the soil. Improved soil management can reduce these emissions by converting the CO_2 taken up by plants into soil organic matter.

With the background of Climate change disrupting crop production and quality, for example, projected increases in temperatures, changes in precipitation patterns, changes in extreme weather events, and reductions in water availability may all result in reduced agricultural productivity. The Climate-smart agriculture is known to make way to ensured food security under climate change with three main objectives of sustainably increase in agricultural productivity, adapt and build resilience to climate change and remove and reduce and greenhouse gases and their emissions in to the atmosphere. The role of Climate Smart soils in support of all three objectives are indispensible, as addressing the thrust areas and right fertilizing the soils ensure increased food production. Secondly, making the soil more resilient for the climate change by integrated nutrient management *i.e.,* by relying equally on chemical fertilizers and locally available organic inputs, as the organic amendments are proven to be improving physical, chemical, and biological properties of the soil. Thirdly by crop rotations, tillage and by supplementing soils with organic materials like cover cropping, organic manuring, biochar etc… can bring down the chance of CO_2 ending in the atmosphere. With the estimated capacity of sequestering 20 Pg C in 25 years, the soils when brought under above management practices can be easily achieved.

Keyword: Soil Health; Crop Management; Nutrient Management

HITASA/AB/2024/043

Impact of Nitrogen Fertilization on carbon and Nitrogen Mineralization in some major soils of India

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The Lab experiment was carried out at the Soil Chemistry and Fertility Division of, ICAR-Indian Institute of Soil Science, Bhopal, Madhya Pradesh and the development of Soil Science RAK College of Agriculture Sehore MP India during 2019-2020 The experiment was laid out in completely Randomized Block design with six treatments, replicated three times. The study comprises two separate experimentations. In first experiment, an incubation study was carried out for a period of 120 days to monitor the impact of different levels of nitrogen fertilization on carbon mineralization in three distinct soil types i.e. Vertisol, Alfisol and Inceptisol. The samples used in the incubation study were collected from Vertisol of Madhya Pradesh, Inceptisol of of Barrackpore (W.B), and Alfisol of Bangalore. This study was also used for quantifying the impact of different levels of N fertilization on extracellular enzyme activities. In 2nd experiment, an effort was made to derive relationship between soil nitrogen mineralization and soil bio-chemical properties. For this, a total of 111 soil samples having variation in soil properties were collected from Vertisol, Alfisol and Inceptisol of India.

[20/02, 1:05 pm] Ramesh Chandra Jain: Results from the present study suggested that application of N up to 25 mg N kg -1 soil has stimulatory effect on soil carbon mineralization red soil and beyond that it significantly reduced soil carbon mineralization. In alluvial and black soils, the positive effect of N fertilization on soil carbon mineralization was recorded up to 50 mg of N kg-1 of soil and thereafter, no significant effect of N application was recorded on soil carbon mineralization. Nitrogen mineralization in soil showed significant and positive relationship with dissolved organic carbon, labile carbon, glomalin concentration and total organic carbon.

Keywords: Alfisols, Inceptisol, Vertisol, Mineralization, Incubation

HITASA/AB/2024/044

Extraction of gum and biochemical analysis of Cluster Bean (*cyamopsis tetragonoloba* L.)

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Cluster bean (*Cyamopsis tetragonoloba L.*) is an annual legume crop known for its drought tolerance. Galactomannan, the predominant polysaccharide in cluster beans, exhibits diverse and commercially valuable properties. This study focuses on gum extraction from 20 different cluster bean genotypes collected from the pulses research station. The endosperm was separated from the hull and embryo, and guar gum extraction from the endosperm was performed using various solvents, including methanol, ethanol, propane-1-ol, propane-2-ol, and butane-1-ol. Comparative analysis of gum extraction with different solvents revealed that propan-2-ol is the superior solvent for both endosperm and whole seed extraction. Among the genotypes, RGC-197 exhibited the highest gum content (20.75%) when extracted with propan-2-ol, while the lowest gum content (19.13%) was observed with propan-1-ol from the same genotype. In the case of whole seeds, genotype GG-1913 displayed the highest gum content (21.1%) when extracted with propan-2-ol, while the lowest yield was found in ethanol-extracted gum from genotype RGC-197 (15.43%). Protein content in the gum varied across genotypes, with GG-1904 having the highest protein yield, and GG-1910 showing the lowest (3.49 ± 0.11%). Total phenol estimation from the extracted gum indicated that genotype GG-1908 exhibited the highest phenol content (0.153 ± 0.0026), while GG-1911 displayed the minimum phenol content (0.067 ± 0.0031). In conclusion, this study highlights the efficient production of guar gum by various genotypes, with RGC-197 identified as a promising candidate for guar gum production. The findings provide valuable insights into the

selection of optimal solvents and genotypes for enhancing guar gum yield and quality.

Keywords: Cluster bean, gum extraction, identification of genotypes, propan-2-ol

HITASA/AB/2024/045

Efficacy of biocontrol agents against collar rot of chickpea, under *in vitro* conditions

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Bundelkhand is the major pulse growing region of Uttar Pradesh and chickpea (*Cicer arietinum* L.) is an important *Rabi* season pulse crop in this region belong to family fabaceae and sub family papilionaceae. The necrotrophic soil-borne fungus *Sclerotium rolfsii*, which cause collar rot in chickpea and it, is severe danger to chickpea production globally. The present study was conducted to Efficacy of bio-control agents against collar rot of chickpea, under *in vitro* conditions. Six native fungal antagonists (*Trichoderma* spp.) were evaluated *in vitro* against *Sclerotium rolfsii* through dual culture and non-volatile (culture filtrate) techniques among them *Trichoderma harzianum* (TH2) found highly effective against the pathogen, which inhibited maximum growth of the pathogen 75.18% and 61.85% in both dual culture and culture filtrate techniques, respectively. The results indicated that application of these biocontrol agents effectively reduces chickpea collar rot and increases the growth and yield of chickpea plants.

Keyword: Chickpea, collar rot, *Sclerotium rolfsii*, biocontrol agents

HITASA/AB/2024/046

Understorey crops in jhum-based agroforestry system in Nagaland

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Shifting cultivation or *Jhum*, is a traditional land-use system which is widely practised in North-east hill region in India, in which a patch of the forest is slashed, burned and utilised for cultivation and then shifted to a new site for the next cycle. This system continues to be one of the primary agricultural system, because it was found to be best suited for the climate and topography of the region and always been the subject of debate. However, there is a transition and many farmers are now switching from shifting cultivation to agroforestry systems where understorey crops are largely preferred in conjunction with trees. Understorey crops enhance the income of the farming family while awaiting the trees to mature. The requirement of the sunlight (intensity) varies from crop to crop and it ranges from 15-75% of total sunlight. Some of the partial shade-tolerant crops commonly grown by farmers are large cardamom, betelvine, blackpepper, turmeric and ginger. The extensive tree planting in Nagaland has created a niche for growing shade loving crops, which in return enhances the farmers income. These crops provide low volume and high value and also prevent soil erosion and thereby minimize the management cost and time. Such system emphasizing trees and shade loving crops should be promoted widely, which will not only reduce pressure on land resources but also transform from a sustenance to market economy.

Keyword: Shifting cultivation, *Jhum,* understorey, agro-forestry, Nagaland.

HITASA/AB/2024/047

Carbon Farming: A Way towards Sustainable Agriculture

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Carbon farming is the removing of carbon from atmosphere and its storage in the plant and/or soil. Building-up of carbon is more emphasized in agricultural practices such as agro-forestry, growing of cover crops, rotational grazing, reducing fertilizer use and less tillage which absorb carbon dioxide from the air and store it in the soil and plants. Agriculture is part of the problem and it can also be part of the solution. Agriculture currently accounts for 11% of global emissions of green-house gases with livestock farming being the largest contributor. India has a unique carbon emissions profile. Agriculture is the second most carbon emitting sector after energy and electricity production sector. We are third largest agricultural greenhouse gases emitter next to China and U.S.A. Rice cultivation and dairy farming are the biggest factors for this. Rice cultivation in India is one of the largest sources of methane emissions in the world. Indian farmers do not have more interest to save water due to facility of free of cost of canal waters and use of groundwater by electric tube-wells as subsidies provided by the government on electricity bill. This problem can be minimized by the practice of alternate wetting and drying during the rice cultivation. It will help to prevent methane emissions during rice cultivation and will also save water as it will affect many water cycles and rice flooding. Emissions of greenhouse gases can be reduced by a variety of agricultural practices including reducing the use of chemical fertilizers, proper management of irrigation water, reducing tillage, agro-forestry practices and growing of cover crops in crop rotation. In recent years, these approaches are also called “regenerative agriculture”and are increasingly adopted.Modern agriculture in India not only harms the environment of the world by releasing greenhouse gases but also causes air pollution and water scarcity to the human beings.Furthermore, an unbalanced and excessive application of fertilizers reduces agricultural production and ultimately affecting national food security.Fortunately, all these problems can be solved with carbon farming.Research shows that

farmers are more interested in sustainable agriculture that emphasize financial support through environmental and social integration.There are also social opportunities that arise co-benefits from carbon farming, for example, increase in number of seasonal jobs for farmers to perform conservation practices. It may be concluded that carbon farming, offers an all –inclusive and sustainable soil management method, is beneficial for our environment and the social life; improves agricultural production and food security for coming generations.

Keywords: Carbon Farming, Conservation Practices, Green House Gases, Food Security

HITASA/AB/2024/048

Impact of Integrated Farming System in Terms of Change in Employment Generation

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In India, agriculture plays a vital role in the Indian economy. Farming is the primary source of income for more than 70.00 per cent of rural households. It employs more than 60.00 percent of the workforce and accounts for over 18.80 percent of the country's GDP, making it a key sector of the Indian economy (Economic Survey 2021-22). The main objective of the current study knows the impact of integrated farming system on doubling farmers' income. It referred to the total income generation by different farming system and employment generation from IFS in terms of man-days for both family and hired labour in an agricultural year. It was calculated by computing the actual time in hours devoted to all the activities per day. To measure the per cent change labour used, last ten years data of labour used was recorded and analyzed. The study was conducted in four district of Konkan region of Maharashtra state. The study was conducted in four district of Konkan region of Maharashtra state. In all 200 respondents were selected by using random sampling method. The EX-Post factor research design was used for conducting the study. The data collected was processed and statistically analyzed by using statistical techniques like frequency, percentage, mean, SD and Chi-square test. It was

observed that, majority (83.00 per cent) employment was generated in Agriculture + Horticulture + Poultry + Dairy farming system followed by Agriculture + Horticulture + Dairy (70.00 per cent), Agriculture + Poultry + Goat rearing + Horticulture (66.00 per cent), Agriculture + Poultry + Dairy (62.00 per cent), Agriculture + Dairy (52.00 per cent), Agriculture + Horticulture + Fishery (51.00 per cent), Agriculture + Horticulture + Poultry (50.00 per cent), Agriculture + Horticulture + Goat rearing (47.00 per cent), Agriculture + Poultry + Goat rearing (43.00 per cent), Agriculture + Goat rearing (40.00 per cent), Agriculture + Dairy + Goat rearing (40.00 per cent) and Agriculture + Poultry (33.00 per cent) and majority (90.50 per cent) of the respondents were belonged to 'medium' category of impact on employment generation while 6.50 per cent of them were belonged to 'high' category of impact and 3.00 per cent of them were belonged to 'low' category of impact on employment generation.

Keywords: Integrated farming system, Doubling farmers income, Impact, Employment generation, Economic motivation and Farming experience.

HITASA/AB/2024/049

Organizational structure of Third Sector Organizations (TSOs) in Karnataka

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Third sector organizations comprise of charities, social enterprises, and voluntary groups supporting communities at local level. The study has focused on the relationship between the State and Third Sector Organizations (TSOs) in delivering services to impoverished rural community. Thirty TSOs were chosen from Kolar, Chikkaballapur, and Tumakuru districts, encompassing a variety of entities including NGOs,

SHGs, and primary-level cooperatives. To achieve the specific objectives of the study, developed the organizational structure. The findings revealed that the organizational structure of NGOs Mainly includes Top level Management: The top management of an NGO consists of three entities - the Board of Directors, and the Executive Director. The Organizational structure of SHGs consists of Representative, Sub-Representative and Members of the group. The Organisational structure of PACSs consist of Board of Directors consist of General Body of PACS: The general body members are the supreme authority for any society and exercise control over board and management. The study suggests the fostering inter-sectoral partnerships to enhance service delivery efficiency, and implementing capacity-building initiatives tailored to diverse organizational structures to ensure effective community support in impoverished rural areas.

Keywords: TSOs, NGOs, SHGs, Primary level cooperatives

HITASA/AB/2024/050

Climate change: threat to global biodiversity

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Climate change poses significant threats to biodiversity across the globe. Rising temperatures, changing precipitation patterns, and extreme weather events alter habitats, leading to loss and fragmentation of ecosystems. Species that rely on specific habitats, such as polar bears in the Arctic or corals in tropical seas, face significant challenges as their habitats shrink or disappear. As temperature changes, many species are moving towards higher latitudes or elevations in search of suitable conditions. This can disrupt ecosystems and lead to competition with native species or predators, potentially leading to declines in biodiversity. Climate change affects seasonal events such as flowering, migration, and breeding which leads to mismatches between interdependent species, such as plants and

their pollinators, which can have cascading effects throughout ecosystems. Biodiversity hotspots, such as tropical rainforests and coral reefs, are vulnerable to climate change impacts such as habitat destruction, increased temperatures, and ocean acidification, putting countless species at risk of extinction. Climate change exacerbates existing threats to species, such as habitat destruction, pollution, and overexploitation. Species with specialized habitats are particularly vulnerable, and many may struggle to adapt quickly enough to survive in changing conditions, leading to increased extinction rates. Elevated carbon dioxide levels in the atmosphere lead to ocean acidification, which harms marine life such as corals, shellfish, and plankton. This can disrupt marine food webs and lead to declines in biodiversity. Biodiverse ecosystems provide crucial services such as pollination, nutrient cycling, and water purification. As biodiversity declines due to climate change, these services may become less reliable, impacting human well-being and livelihoods. Climate change can trigger feedback loops that further accelerate its impacts on biodiversity. Addressing climate change and implementing strategies for climate resilience are essential to mitigate these impacts and safeguard biodiversity for future generations. This includes reducing greenhouse gas emissions, protecting and restoring habitats, and promoting sustainable land and ocean management practices.

Keywords: Biodiversity, habitats, species, hotspots, acidification, food web, feedback loop, climate resilience and mitigate

HITASA/AB/2024/051

Seasonal assessment of mastitis using thermogram analysis in Gir cows

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"India is the world's leading producer of milk" and demands a non-invasive diagnostic tool like infrared thermography (IRT) to identify the costliest production disease, mastitis. Therefore, the present study focuses

on thermal imaging of the udder and teat quarters of Gir cows during different seasons to identify subclinical (SCM) and clinical mastitis (CM) cases using the Darvi DTL007 camera. Also, short-milking-tube thermograms (SMT) are captured to explore the possibility of an alternative to udder skin surface temperature (USST) and teat skin surface temperature (TSST). A total of 18-32 lactating Gir cows were screened out using IRT regularly throughout the year. The IMI was further assessed using the California Mastitis Test (CMT) and somatic cell count (SCC). The thermogram analysis revealed a significant difference ($p<0.01$) in the mean values of the USST, TSST, and SMT of Gir cows between healthy, SCM, and CM during different seasons. Further results revealed an increase ($p<0.01$) in mean values of pre-milking USST during winter, summer, rainy, and autumn were 1.14, 2.80; 0.80, 1.41; 0.86, 1.77; 0.68, 1.96ºC and TSST were 1.88, 3.34; 1.17, 1.60; 0.83, 1.75, 0.81, 1.8ºC of SCM, CM-affected quarters to healthy quarters, respectively. The SMT showed a very strong correlation ($p<0.01$) with all the thermographic parameters, SCC and CMT. The mean values of SMT showed an increase in temperature from 1.91 to 4.90 ºC in SCM-affected quarters and 4.23 to 8.02 ºC in CM-affected quarters compared to healthy quarters during different seasons. The results of SMT thermogram analysis are promising over the other thermographic parameters in the assessment of mastitis in Gir cows. Henceforth, irrespective of the seasons studied in the present work, IRT is an efficient, supportive tool for the early identification of SCM in Gir cows.

Keywords: Clinical mastitis, Gir cows, subclinical mastitis, thermogram, TSST, USST

HITASA/AB/2024/052

Effect of soil moisture and soil temperature on incidence of stem and root rot of cowpea caused by *Macrophomina phaseolina* (Tassi) Goid.

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Cowpea crop is infected by various biotic and abiotic stresses which are responsible for its poor quality and low yield resulting in severe yield losses. Among the root diseases, stem and root rot caused by *Macrophomina phaseolina* is an important disease causing the yield losses up to 50 per cent. So, there is a need to formulate suitable management practices against root rot disease. An experiment was conducted to study the effect of soil moisture and soil temperature on root rot incidence. The incidence of stem and root rot of cowpea with respect to variation in soil temperature and moisture was noted down from 40 to 90 days after sowing by using soil thermometer and digital soil moisture meter (Lutron PMS 714). The results indicated that there was increased incidence of disease due to increased soil temperature coupled with optimum soil moisture. Soil temperature of 36 ^{0}C coupled with soil moisture of 29.88 per cent was most favourable for *M. phaseolina* infection which resulted in maximum disease incidence of 46.65 per cent. Correlation studies was made between soil temperature, soil moisture and disease incidence. Results revealed that significant positive correlation (0.939) was observed between high soil temperature and disease incidence whereas, negative correlation (-0.995) was noticed with high soil moisture and disease incidence.

Keywords: Cowpea, Stem and root rot, *Macrophomina phaseolina*, Correlation.

HITASA/AB/2024/053

Pseudostem Candy- Processing and Quality Evaluation

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Banana is a popular fruit with highest production in India. After harvesting of fruits huge quantity of pseudostem is being wasted. The Central core of the pseudostem is rich source of nutrients and minerals, effective against parasites of the kidney and liver, and the sap extracted from central core is used as traditional remedy for kidney stones. There is an ample scope for utilization of this waste pseudostem for development of novel value added products with high nutritional and organoleptic quality. Therefore, standardization of the protocol for the processing banana (cv. Rajapuri) pseudostem candy and its quality evaluation was carrie out in the present study. The pseudostem candy was prepared by varying the combination of blanching methods (water and steam blanching) with or without addition of pineapple flavour followed by osmotic dehydration. Results revealed that among different treatment combinations, banana pseudostem candies prepared by steam blanching of cubes and steeping them in 40-60ºBrix syrup with pineapple flavour (T_6) has scored highest overall acceptability (8.43) with maximum recovery percentage (80.06%) compared to control. Quality evaluation of candy showed that the moisture content (14.20%), water activity (0.248 a_w), colour values (L*- 80.12, a*- 0.62 and b*- 7.22), Total sugars (52.51%), crude fibre (0.480%), non-enzymatic browning (0.182 OD) and mineral contents were optimum in treatment 6 compared to control. Treatment 6 was better organoleptically and nutritionally. It proved to be the best protocol for preparation and preservation of the banana pseudostem candy. Therefore, the utilization of pseudostem for the preparation of candy can be an innovative and

economical approach for creating wealth in terms of food, health, value-added products, additional income and employment opportunities.

Keywords: Pseudostem, candy and blanching

HITASA/AB/2024/054

Extent of Adoption of Improved Dairy Farming Practices by the Tribals of Tapi District

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The study was conducted in Tapi district of Gujarat, with a view to find out the adoption of improved dairy husbandry practices by tribal dairy farmers. The data were collected from 120 respondents belonging to Vyara, Valod, Dolvan, Songadh, Uchhal, Nizar and Kukarmunda talukas of Tapi district with the help of structured interview schedule containing questionnaire about improved dairy husbandry practices, through personal interview technique. Education (0.0367*), No. of Calving (0.00117*), Age at first calving (0.0404*) and No. of artificial Insemination (0.729*) found positively correlated with breeding efficiency, while Age (-0.1236), Size of land holding (-0.0017) and Total number of animals (-0.1610) were negatively correlated with breeding efficiency. 72.50% of the respondents suggested financial help to make pucca shed followed by awareness and training programme 68.33% and 61.67% cattle growers suggested regarding timely veterinary services. Majority of the respondents (55.00 %) had medium level of overall adoption of improved dairy farming practices.

Keywords: Dairy farmers, Adoption, Dairy farming practices, Breeding efficiency

HITASA/AB/2024/055

Impact of Chemically Modified Litter on Litter Quality and Welfare Parameters of Commercial Broiler Chicken

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The experiment was conducted to study the impact of chemically modified litter on the litter quality and welfare parameters of commercial broiler chicken. A total of 144 straight-run day-old commercial broiler chicks were distributed randomly into six treatment groups; each group consisted of four replications, each of six chicks. The experiment was conducted in two different seasons, winter and monsoon, each of 6 weeks duration. The treatments included: T_1 (control, rice husk as litter material); T_2 (rice husk litter treated with alum @ 90 g/sq.ft.), T_3 (litter treated with boric acid, H_3BO_3, @ 24 g/sq.ft.; T_4 (litter altered with sodium bisulphate (NaHSO4) @ 25 g/sq.ft.); T_5 (litter treated with commercially available probiotic product @ 1 g/ sq.ft); and T_6 (litter treated with commercially available *Yucca schidigera* liquid solution @ 1.0 mL/ sq.ft). The chemical alteration of litter (T_2 to T_6) was done on the 1st, 15th and 29th days of the experiment period. The litter quality was estimated as litter pH level, moisture, nitrogen content, and ammonia emission. The litter parameters were scrutinised on a weekly basis, with the exception of litter ammonia, which was assessed at the end (42nd day) of the experiments. Welfare parameters were studied as footpad lesions, hock lesions, and breast blisters. The parameter was examined at the end of the 6th week of the experiment. The overall results of the current study indicate that broiler birds raised on rice husk litter, treated or amended with alum at a rate of 90 g/sq.ft, exhibited a reduction in litter quality parameters such as litter pH, moisture, and ammonia, while showing an increase in litter nitrogen

compared to the control group and other treatment groups. Furthermore, this approach led to an improvement in all welfare parameters compared to the control and other treatment groups.

Key words: Broiler, chicken, commercial, litter quality, welfare parameters

HITASA/AB/2024/056

Study Of Stability Analysis in Ashwagandha [*Withania somnifera* (L.) Dunal]

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The present investigation entitled, "Study of stability analysis in Ashwagandha [*Withania somnifera* (L.) Dunal]" was carried out to elicit information of genetic diversity based on morphological analysis. Genotype × Environment interaction and stability parameters were carried out for dry root yield and other quantitative characters in three different locations *viz*., E1 - Seed Spices Research Station, S. D. Agricultural University, Jagudan (Dist-Mehsana), E2 - Seed Technology, S. D. Agricultural University, Sardarkrushinagar (Dist-Banaskantha) and E3 - Cotton Research Station, S. D. Agricultural University, Talod (Dist-Sabarkantha) during *rabi* 2015-16. The experimental material comprised of 24 diverse genotypes of ashwagandha procured from Department of Genetics and Plant Breeding, SDAU, Sardarkrushinagar. Genotypes were evaluated in Randomized Block Design (RBD) with three replications. The genotypes evaluated were done based on ten quantitative characters *viz*., days to flowering, plant height (cm), number of primary branches per plant, number of secondary branches per plant, root length (cm), root diameter (mm), fresh root yield per plant (g), biological yield per plant (g), harvest index (%) and dry root yield per plant (g). G × E interaction and stability parameters were studied for identifying stable genotypes for various characters under three different environmental conditions.

The joint regression analysis revealed that Genotype × Environment interactions was significant for all characters except for

number of primary branches per plant, number of secondary branches per plant, root length (cm), root diameter (mm) and harvest index (%) which showed differential response of the genotypes to varying environments. Hence, evaluation of breeding material in different environmental conditions appeared essential. Environmental index revealed the suitability of an environment based on the positive values. E1 environment was found to be most favourable location for days to flowering, number of secondary branches per plant, root length, root diameter and harvest index. E2 environment was found the most favourable location for days to flowering, plant height, number of secondary branches per plant, root length, root diameter, fresh root yield per plant, dry root yield per plant and biological yield per plant. E3 environment was found the most favourable for number of primary branches per plant, dry root yield per plant and harvest index. The stability parameters were worked out and interpreted only for five characters, days to flowering, plant height (cm), fresh root yield per plant (g), dry root yield per plant (g) and biological yield per plant (g); as G × E linear component was significantly higher than its counterpart G × E non-linear component for the above characters. However, for remaining characters, non-linear component was higher than linear component, which made them unpredictable. Bartlett's test was performed to study the homogeneity for error variances. The $\chi 2$ values were non-significant and also the coefficient of variations was low for all characters except days to flowering and number of secondary branches per plant.

HITASA/AB/2024/057

Mapping of Product Specific Value Chain Actors in Coconut in Western Tamil Nadu

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The coconut industry in Western Tamil Nadu, India, epitomizes the intricate interplay of actors and activities within the agricultural value chain. Despite India's prominent stature as the leading coconut producer globally, challenges persist, including price disparities and limited value addition. This study investigates the coconut value chain in Western Tamil Nadu, mapping its actors and activities to elucidate opportunities for enhancing efficiency and sustainability. Employing a multi-stage sampling technique, data were collected from 300 coconut farmers and various stakeholders. Six value chains were identified, encompassing domestic, processing, and export markets. Primary actors, including farmers, harvest contractors, commission agents, wholesalers, retailers, processors, farmer producer companies (FPCs), and exporters, were analyzed in terms of their roles and activities. Results highlight the significance of value chain mapping in understanding market dynamics and optimizing resource allocation. Channel III, facilitated by FPCs, emerged as a promising avenue for reducing costs and enhancing market efficiency. This study underscores the importance of informed decision-making and strategic interventions for fostering a sustainable and vibrant coconut industry in Western Tamil Nadu and beyond.

Key Words: Actors, Market Intermediaries, Mapping, Value Chain

HITASA/AB/2024/058

Utilization of Red Pumpkin (*Cucurbita pepo L*) for the preparation of *Burfi*

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The present investigation entitled “Utilization of Red Pumpkin (*Cucurbita Pepo L.*) for the preparation of *Burfi*” was undertaken with a view to standardize the levels of red pumpkin powder in the burfi and to study the shelf life of developed product.

Initially, preliminary trials were conducted to optimize the levels of red pumpkin powder in the burfi. The burfi samples were prepared with 0,

1, 3, 5, 7, 9, 11, 13, 15, 17 and 19 per cent red pumpkin powder with 30% sugar. Experiment was laid out in Completely Randomized Design (CRD).On the basis of the results of sensory evaluation of the preliminary trials, three levels of red pumpkin powder i. e. 15, 17 and 19 per cent were chosen for experimental trials.

The experimental treatments comprised, without red pumpkin powder i.e. control (T_0) and with red pumpkin powder @ 15% (T_1), 17% (T_2) and 19% (T_3). Experimental burfi samples were analyzed using standard methods for sensory, physico-chemical and microbiological qualities on day 0 (fresh), day 4, day 8, day 12 and day 16 at a temperature of 30±1^{0}C. The burfi samples were evaluated for sensory attributes viz; colour and appearance, body & texture, flavour, and overall acceptability. The burfi samples were chemically analyzed for fat, protein, total solids(TS), reducing sugar, total sugar, total fibre, Free fatty acids (FFA), HMF, Water activity (a_w), Titratable acidity, pH and mineral content. The microbiological analysis comprised of Standard Plate Count (SPC), Yeast and Moulds Count (YMC) and coliform count.

The average chemical composition of fresh burfi prepared under different treatment combinations ranged from 17.94 to 19.40 per cent fat, 11.44 to 13.82 per cent protein, 75.96 to 79.37 per cent total solids, 14.66 to 19.82 per cent reducing sugar, 24.17 to 32.41 per cent total sugar, 0.00 to 3.11 per cent total fibre,0.11 to 0.21 per cent free fatty acids,29.75 to 42.85 µmoles /100 gm HMF,0.84 to 0.89 Water activity, 0.27 to 0.32 per cent %LA and 6.10 to 6.49 pH.

The mean standard plate count (SPC) of fresh burfi samples ranged from log 0.40 cfu/g to log 0.80cfu/g. No YMC and coliform count detected in the fresh red pumpkin burfi.

The treatment T_2 remained more acceptable as compare to other treatments in the study. The chemical quality of burfi samples also significantly ($P<0.05$) decreased during storage.

Out of 100 consumers, 60% consumers responded excellent and 26% responded very good.

The better quality burfi can be prepared by using 17% red pumpkin powder, 30% sugar with shelf life of 16th days at 30±1^{0}C.

Keyword: Burfi, Red Pumpkin Powder, Physico-chemical quality, microbial count, consumer acceptability.

HITASA/AB/2024/059

Process development of Drumstick (*Moringa oleifera L.)* Whey Beverage

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Present investigation entitled Process development of Drumstick (Moringa oleifera L.) whey based beverage was undertaken with view to standardize the levels of drumstick pod powder in the whey beverage and to study the shelf life of developed product. Initially, pre-experimental trials were conducted to decide the different levels of addition of drumstick pod powder to prepare acceptable whey. On the basis of results of preliminary trials the most acceptable three levels of drumstick pod powder were chosen for experimental trials (0.5%, 1.0 % and 1.5%). The experimental whey beverage prepared with and without drumstick pod powder were (control) (T_0), 0.5 % (T_1), 1 % (T_2) and 1.5 % (T_3), and 8 per cent sugar. All the experimental drumstick whey beverage samples were stored at 5±1^{0}C temperature up to storage period of 18 days. The experimental samples were analyzed for sensory, physico-chemical and microbiological qualities at 6 days interval. The standard methods of analysis were followed and the experimental result was statistically analyzed. The chemical quality of whey beverage samples also significantly ($P<0.05$) influenced during storage. The fat, protein, total sugar, reducing sugar, total solids, total fibre, ash, lactic acidity (% LA), pH, Viscosity, β-carotene , Vit-C of drumstick whey beverage values ranged from 0.38 to 0.72 per cent, 0.61 to 0.99 per cent, 12.32 to 13.43 per cent, 4.38 to 4.39 per cent, 13.90 to 15.97 per cent, 0.05 to 0.15 per cent,0.30 to 0.46 % LA, 4.22 to 5.24, 0.59 to 0.83 per cent, 3.58 to 3.89 mPa.s, 0.54 to 1.66 µg/100 gm, 1.125 to 3.605 mg /100g, respectively upto 18 days of storage period.The SPC of drumstick whey beverage increased from 5.60 cfu/ml x 102 to 18.40 cfu/ml x 104 during storage period up to 18th day. The SPC count of whey beverage samples significantly ($P<0.05$) increased during storage of 18th day.

Keyword: Beverage, Drumstick pod powder, Whey, RTS, Physico-chemical quality, sensory, microbial count

HITASA/AB/2024/060

Comparative Study of Phyto-Extracts for Organic Weed Control in Sweet Corn.

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In the present-day context, organic sweet corn assuming greater importance due to its chemical free nature and has a big market potential. Weed menace is one of the major challenges under organic production system. Therefore, a field experiment was conducted at All India Network Programme on Organic Farming (NPOF) unit at University of Agricultural Sciences, Dharwad on Vertisols with medium soil fertility during kharif 2020 and 2021 to find out suitable economical phytoextracts for weed management in sweet corn under organic production system. Experiment was laid out in RCBD with 15 treatments comprising of weed management through directed spray of leaf extracts (*Prosopis juliflora*, *Parthenium hysterophorus, Cassia sericea* and *Lantana camara*) at 30 % as pre-emergent *fb*. spray at 20 & 40 DAS, dual spray at 20 & 40 DAS and spray at 20 DAS fb. IC at 40 DAS & one hand weeding which were compared with IC at 20 and 40 DAS and one hand weeding at 20 DAS, weedy check and weed free check. Results of pooled data indicated that significantly higher fresh cob yield (205.07 q ha^{-1}) was observed under weed free check. Among different weed management treatments, IC at 20 and 40 DAS and one hand weeding at 20 DAS recorded significantly higher fresh cob yield (180.26 q ha^{-1}), net returns (₹ 2,45,049 ha^{-1}) and B:C (4.16) with higher weed control efficiency of 91.11 and 88.15 per cent at 30 and 60 DAS, respectively. Among different phyto-extract applications, directed spray of *Parthenium hysterophorus* leaf extract at 30 % concentration at 20 DAS & one IC at 40 DAS *fb*. hand weeding recorded significantly higher fresh cob yield (159.15 q ha^{-1}), net returns (₹ 2,07,914 ha^{-1}) and B:C (3.66) with the higher WCE of 80.40 and 68.76 per cent at 60 DAS and at harvest, respectively as compared to other phyto-extracts treatments. None of the treatments affected the dehydrogenase activity in the soil at 45 DAS.

Keywords: Allelochemicals, phyto extracts, sweet corn, weed control efficiency, weed index

HITASA/AB/2024/061

Principal component analysis of Yield and its attributing traits in Recombinant Inbred Lines of Rice under submerged condition (*Oryza sativa* L.)

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Evaluation of Principle Component Analysis (PCA) of recombinant inbred lines (RILs) was done at phenotypic level under submerged conditions to reduce a large series of data into smaller number of components by looking for groups that have very strong inter-correlation in a set of variables and each component explained *per cent* variation to the total variability. The RIL population was derived from an inter-specific cross between BPT5204 and HPR14 parents. A study was conducted using 1256 Recombinant Inbreed Lines submerged condition in the two seasons at College of Agriculture V.C. Farm, Mandya with nine agro-morphological traits and a principle component analysis was carried out. Out of nine principle components, four exhibited Eigenvalue more than one governing 77.74% variance and 69.86% variance in the *summer* and *kharif* seasons respectively. The highest positive Eigenvalue was observed for total number of tillers, productive tillers, non-productive tillers and fallowed by single plant yield in PC1 in the *summer* and *kharif* season respectively. The highest positive Eigenvalue was observed for five panicle weight, single panicle length, single plant yield and plant height in PC2 of *summer* and *kharif* season respectively. Indicating their pronounced effect on the overall variation in the Recombinant Inbreed Lines of Rice.

Keywords: Rice, RILs, PCA, Eigenvalues, Yield.

HITASA/AB/2024/062

Clonal Evaluation and Genetic Divergence Studies in Mulberry Genotypes

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This study evaluated 21 screened mulberry clones for various growth attributes through organized clonal evaluation tests, focusing on plant height, diameter at breast height (DBH), volume, and number of branches. Among these clones, only three (MI-0718, MI-0807, and MI-0845) consistently demonstrated superior growth across all periods. Volume exhibited high phenotypic and genotypic variance, followed by leaf area, leaf width, and plant height, which showed moderate values. Number of leaves, number of branches, leaf length, leaf petiole length, DBH, and basal diameter recorded low phenotypic and genotypic coefficients of variation. The study revealed higher phenotypic than genotypic coefficient of variance, suggesting environmental influence on the observed variability. Heritability was high for all traits, with volume showing the highest (98.57%) and basal diameter the lowest (75.69%). Genetic advance as a percentage of mean was highest for volume, indicating its potential for genetic improvement. Genotypic correlations were higher than phenotypic correlations for all traits, suggesting strong genetic control. Path coefficient analysis revealed that diameter at breast height had the highest positive direct effect on volume, followed by plant height and basal diameter. The study also clustered the clones, revealing genetic diversity not dependent on geographical locations. Cluster analysis showed high intra-cluster distance in clusters I and III, indicating diverse genotypes, whereas cluster II had similar genotypes. Volume contributed the most towards genetic divergence, followed by leaf area and plant height. This study provides valuable insights into mulberry clone selection for improvement programs,

highlighting the importance of specific growth attributes in enhancing wood volume and genetic diversity.

Keywords: Correlation, Growth Attributes, Genetic Diversity, Mulberry

HITASA/AB/2024/063

Integrated Pest Management in high density planting system of cotton

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The present investigation was undertaken regarding Integrated Pest Management in high density planting system of cotton at Department of Agricultural Entomology, VNMKV, Parbhani. Studies on Integrated Pest Management in high density planting system of cotton revealed that IPM module proved superior in suppressing sucking pests, larval population, fruiting bodies damage, rosette flowers, green boll damage and open boll damage also, realized highest yield. It was, however, on par with chemical control. Considering the ICBR and safety to natural enemies, an inference can be drawn that high density planting system of cotton with IPM module is the most ideal combination. Besides reduction in insecticide use, it is also expected to ensure favorable for ecological and economic returns in contrast to the adverse effects due to conventional insecticides. The IPM approach, which takes care of varying pest situation, appears to be essential for gaining higher advantage from high density planting system of cotton.

Keywords: IPM, ICBR, HDPS, Cotton

HITASA/AB/2024/064

Antimicrobial activity and Phytochemical Screening of Aqueous, Acetone, Ethanol and Methanol Leaf Extracts of *Ocimum teniflorum, Ocimum gratissimum* and *Ocimum sanctum*

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The use of plants as sources of medicines are human substances has been in vogue since antiquity. A large number of plants show enormous versatility in synthesizing complex materials which have no immediate obvious effect on growth or metabolic functions. These complex materials are referred to as secondary metabolites. Phytochemicals are naturally occurring and biologically active components that have potential disease inhibiting capabilities. Phytochemicals are effective in combating or preventing disease due to their antioxidant effect. The medicinal and antimicrobial properties of plants lie in their component phytochemicals. The most important of these phytochemicals are alkaloids, tannins, flavonoids, saponins and phenolic compounds. *Ocimum* is a well-known medicinal plant that consists of various biochemically active components which have many functional effects. In the present study, the phytochemical characteristics of four different extracts (aqueous, acetone, ethanol and methanol) of three *Ocimum* spp., like *Ocimum teniflorum, Ocimum gratissimum, Ocimum sanctum* were screened against four different bacterial isolates (*E.coli, Staphylococcus, Bacillus* and *Pseudomonas*). The leaf extracts were prepared by using aqueous, acetone, ethanol and methanol solvents and phytochemical analysis was conducted for tannins, saponins, phlabotannins, flavonoids, terpenoids, glycosides and steroids. The results revealed that tannins were found in all the extracts of three *Ocimum* spp., Saponins were present in all extracts except methanol extract of *Ocimum* spp., the presence of phlabotannins were observed only

in aqueous extract *Ocimum* spp., Flavonoids were present in aqueous and methanol extracts of *Ocimum* spp., Glycosides were found in ethanol and methanol extracts of *Ocimum* spp., The presence of steroids was observed in all extracts except aqueous of *Ocimum* spp., Terpinoids were present in all extracts except aqueous extract of *O. teniflorum* and *O. gratissimum.*

Keywords: *Ocimum* spp., aqueous, acetone, ethanol, methanol extract and phytochemical analysis.

HITASA/AB/2024/065

Bio-intensive management of pomegranate wilt caused by *Ceratocystis fimbriata* Ell. and Halst

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Pomegranate (*Punica granatum* L.) is one of the important fruit crops cultivated all over the world, particularly in the tropical and sub-tropics. It is affected by several diseases of which one of the most important diseases is Ceratocystis fimbriata. In the present study, we aimed to the management of pomegranate wilt. The management, under in vitro studies, captan, mancozeb, ziram, thiram, and zineb recorded maximum inhibition of mycelial growth at all concentrations (0.10%, 0.20%, and 0.30% respectively). Out of nine systemic fungicides tested, carbendazim, hexaconazole, thiophanate methyl, propiconazole, and tebuconazole showed 100 per cent inhibition at all concentrations (0.05%, 0.10% and 0.15% respectively). In case of combi-fungicide molecules, hexaconazole + zineb, carbendazim + mancozeb, trifloxystrobin + tebuconazole and captan + hexaconazole were found highly effective. Among bio-agents tested, *T. harzianum* (Th-R) and Diamond (*T. viride*) were found more effective as compared to other bio-control agents and inhibited maximum fungal growth (100%) of *C. fimbriata*. The fungicides and bio-agents which showed superior performance in vitro were selected and treatment combinations were made to develop a bio-intensive

integrated management strategy against pomegranate wilt under field conditions. Field evaluation over two years indicated that three drenching of propiconazole (0.2%), Diamond (*T. viride*) (0.7 g/l) and *T. harzianum* (5g/l) at an interval of 15 days showed maximum disease control

Keywords: Pomegranate; drenching; bioagents; bio-intensive, wilt

HITASA/AB/2024/066

Pollination Efficacy of Stingless bee (*Tetragonula iridipennis*) on Greenhouse Gherkin *Cucumis sativus* var. *anguria*

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Pollination plays a significant role in the agriculture sector and serves as a basic pillar for crop production. Bees are considered significant pollinators due to their effectiveness and wide availability. Bee pollination provides excellent value to crop quality and quantity, improving global economic and dietary outcomes. In this context, an experiment was conducted in greenhouses of Devar seed farm, Ranebennur, Haveri district of Karnataka, India during 2021-2022. Stingless bees prefer to visit gherkin flowers from 07.00h to 17.00h and they visit both pistillate and staminate flowers to collect nectar and pollen, characterizing them as effective pollinators. The foraging activity of stingless bees start slowly; increase exponentially and reach its peak at 11.00 to 12.00h (12.02 bees/m^2/10 min) then, the activity slowly declines at the end of the day. In cucurbit flower, stigma becomes more receptive during five to six hours after flower opening so, maximum activity of outgoing foragers, incoming foragers with pollen were observed during 10.00h to 13.00h. Pollination by stingless bee enhanced quantitative parameters such as, number of fruits/plant (37.98), percentage of fruit set (92.63 %), yield/plant (207.83 g), fruit length (40.42 mm), fruit girth (11.95 mm) and fruit weight (3.53 g), and also quality parameters such as, total soluble solids (4.78 %) and moisture content

(95.37 %) in gherkin compared to control (1.23 fruits/plant, 3.04 % fruit set, 4.89 g/plant, 18.77 mm fruit length, 6.62 mm fruit girth, 1.13 g/fruit, 1.89 % TSS and 40.93 % moisture content). Thus, stingless bees are good candidates for future alternatives in commercial pollination as these bees has short foraging range it can adjust to confined space of greenhouse.

HITASA/AB/2024/067

Effect of FMD vaccination on scrotal thermal profile and semen characteristics of Murrah bull

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Present investigation was carried out the effect of FMD vaccination on temperature gradient and semen quality of Murrah bull. Infrared thermography **(**IRT) can be used as non-invasive tool for the assessment of scrotal surface temperatures to understand the thermoregulatory mechanism of testis for quality semen production. The experiment was carried out on eight Murrah buffalo bulls maintained at Artificial Breeding Research Centre, ICAR-NDRI, Karnal. Thermal images of different regions of scrotum (PPT, MPT, DPT and ET) were taken from 1.0 m distance using an infrared camera (Darvi DTL007). The semen evaluation is done three weeks before vaccination, and six week and 60th day after vaccination. The testicular temperature gradient was significantly decreased in 1st and 2nd week after vaccination. Mass activity and individual motility were significantly ($P<0.05$) decreased up to three weeks of vaccination and thereafter non-significant difference as compared to pre-vaccination. Sperm concentration was significantly ($P<0.05$) decreased up to two weeks after vaccination as compared to pre-vaccination. Percent of non-eosinophilic counts, acrosomal integrity and HOST were decreased

significantly (P<0.05) up to the fourth week of post-vaccination as compared to pre-vaccination. The sperm abnormalities was significantly (P<0.05) increased up to fourth week after vaccination and non-significant thereafter. Application of FMD vaccine had significantly (P < 0.05) adverse effect on most of the seminal attributes during post-vaccination MU buffalo bulls.

HITASA/AB/2024/068

GC-MS based phytochemical profiling of bioactive constituents from different parts of *Terminalia chebula* and *Terminalia bellirica*

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Terminalia chebula Retz. and *Terminalia bellirica* (Gaertn.) Roxb. are very promising plants belonging to the family Combretaceae and extensively used as ethno-medicinal and traditional plants. Aqueous and hydro-ethanolic extracts were screened qualitatively and quantitatively to reveal different phytochemical categories. The ethanolic fruit extracts of *T. chebula* and *T. bellirica* species had the maximum phenolic content, according to an evaluation of successive extraction, which also showed that extracts of different plant parts varied in colour, consistency, and phytochemistry. The *T. chebula* fruit extract had the highest overall antioxidant activity, whereas the *T. bellirica* bark aqueous extract had the lowest. The presence of various antifungal compounds, such as caryophyllene, decamethyl-cyclopentasiloxane, allyl acetate and acetonitrile, and silicon compounds, was found by GC-MS analysis of dried powder of selected species. This finding supports the use of plant extracts against various pathogens with fewer side effects and is advised for phytopharmaceutical importance.

Keywords: Composition, Phytochemicals, Pharmaceutical, Trees

HITASA/AB/2024/069

Analytic Hierarchy Process (AHP)-based Strategies to promote precision farming in India

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The use of cutting-edge technology in precision farming aims to boost crop yields, save labor costs, monitor crops to guarantee correct fertilizer and irrigation management, and empower farmers to make well-informed decisions. Agriculture is one of the industries most impacted by the negative effects of climate change, which lowers crop productivity and jeopardizes food security. Precision farming not only increases farmer incomes but also promotes soil health, lowers chemical usage, increases water efficiency, and much more. It also helps to alleviate the negative effects of climate change Precision farming must be supported by policy makers as a crucial element of sustainable farming and food security assurance. This study intends to use the AHP technique to rank precision farming strategies in this regard. A problem model was created by identifying and developing a number of techniques that support precision farming, taking into account the opinions of extension professionals and prior research. The four categories of the problem model are agricultural tactics, political strategies, technological strategies, and socioeconomic strategies. The developed problem model was sent to extension experts to indicate their opinion based on the importance of the component by using Saaty scale. The gathered data was subjected to analysis using AHP method and found that farm level strategies was the first and foremost factor of importance while promoting precision farming; followed by socio-economic strategies, technological strategies and political strategies. Further, consistency ratio was found to be 0.069 which reveals that there is less than 10 per cent error in the data.

Keywords: Precision farming, Technological strategies, Farm level strategies, Policy interventions and AHP.

HITASA/AB/2024/070

How selenium affects mungbean morpho-physiological characteristics and seed yield during soil moisture stress

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The pot experiment was conducted at the screen house of the Department of Botany and Plant Physiology at CCS Haryana Agricultural University in Hisar during the Kharif seasons of 2019 and 2020. The study sought to evaluate the effects of selenium and decreased soil moisture levels on mungbean growth and yield characteristics. The study used a factorial completely randomised design with three water levels: control (12.5±0.05% soil moisture content), moderate moisture stress (7.0±0.05% of soil saturation percent), and severe moisture stress (4.5±0.05% of soil saturation percent), as well as three selenium treatments. The treatments included a control group (no selenium), soil selenium treatment (5 ppm), foliar spray F1 (5 ppm), and foliar application F2 (10 ppm) throughout two phases of plant growth: flowering and pod formation. Drought stress has a significant influence on plant growth, photosynthetic efficiency, water balance, and yields. Selenium treatments demonstrated a significant effect on plant-water interactions in both normal and water-deprived conditions. Adding selenium to the soil resulted in a long and fine root system, despite the low dry weight. It reduced water loss by creating a thick cuticle that limited transpiration. It decreased the height of the stem, directing more dry matter deposition to the leaf. Applying selenium directly to the plant's leaves was more favorable since it increased chlorophyll levels and improved membrane integrity by eliminating reactive oxygen species. F1 treatment was the most effective under normal conditions, while F2 treatment was the most advantageous in moderate and severe water stress, resulting in a 6.6%, 6.3%, and 4.5% increase in seed output, respectively, compared to the control group without selenium. The plant's hydration

state and photosynthetic system were strongly connected with seed yield when selenium was applied in mungbean under moisture stress environments.

Keywords: mungbean, selenium, soil moisture stress

HITASA/AB/2024/071

Performance of Tamarind Genotypes (*Tamarindusindica* L.)for yield and qualities attributes for Southern dry zone of Karnataka,India

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Tamarind (*Tamarindusindica* L.)is one of the most important multipurpose tree species, It is considered as one of the minor tree spice crop in India.In this views, twenty Tamarind genotypes were evaluated at HREC,Arsikere,India.Analysis of varianceof 5 years mean data indicated that, there was a significant differenceobserved in vegetative and yield characters. Among the genotypes studied, highest pod yield per plant was recorded in tree number 10 (110 kg/tree) followed by tree no. 151 (105 kg/tree) compared to other genotypes. However the lowest pod yield was recorded in tree no.28(70kg/tree).The maximum pulp yield was recorded in tree number 10 (50.95 kg/tree)followed by tree number 51 (36.24 kg/tree) and tree no.14(33.98 kg/tree).The TSS was highest in tree number 10 (18^0B) followed by tree 51(17.5^0B) compared to other genotypes.Significant variation was observed among the genotypes with respect to yield, podcharacters, and tartaric acid content. Among the tamarind genotypes, tree number 10 has recorded the highest pod yield per plant (110kg), pulp yield per tree(50.948kg),pulp weight per pod(10.15g) and TSS(18°B)and hence it was recommended to releases as variety ATS-1(Arsikere Tamarind selection -1) for southern dry zone of Karnataka, India and these attributes could be effectively used in tamarind improvement programme for selecting genotypes.

Key words: Tamarind,Genotypes,yield,Pulp,TSS

HITASA/AB/2024/072

Doubling the farmer income through Integrated Nutrient Management in Coconut based cropping system for sustained productivity under Central zone of Karnataka

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A field experiment was conducted at AICRP,Arsikere centre(UHS, Bagalkot,Karnataka) to know the performance of organic and inorganic treatment grown in different intercrops system in 60 year old Tiptur tall coconut garden with 4 nutrient management viz.,75% recommended NPK + 25 % of N through organic recycling with vermicompost, 50% recommended NPK +50% of N through organic recycling with vermicompost + vermiwash+biofertilizer + insitu green manure.fully Organic 100% N through organic recycling with vermicompost + vermiwash+biofertilizer + insitugreen leaf manuring followed by composted coir pith and mulching with coconut leaves and monocrop of coconut with recommended NPK and organic manure were evaluated by adopt RBD design with 4 treatments for standardizing the nutrient management practices for coconut sequence cropping under coconut based farming system in central dry zone of Karnataka. Intercropping coconut was supplied with 50% RDF NPK,vermicompost, vermiwash, biofertilizer, green manure resulted in higher nut yield(10396 nuts/ha), Copra content(1593kg/ha) followed by 100 % N through application of vermicompost + vermiwash +biofertilizer,green manure and coirpith (9913 nuts/ha), Copra content(1525kg/ha). The lowest yield and quality attribute was recorded in monocrop of coconut. Cropping sequence cocoa (269.5 kg/ha) drumstick(1119.75kg/ha), lime(1205.5 kg/ha), banana(10411.67 kg/ha) resulted in the higher coconut equivalent yield of

intercrop and cropping system (24355.50 nuts per ha) in organic treatments .In pooled analysis indicated that organic and inorganic treatment resulted in significantly higher net income(Rs.242165/ha) followed by INM(Rs.219961/ha) compared to other treatments. This shows Integrated Nutrient Management in Coconut based cropping system increases the farmers income in central dry zone of Karnataka.

Keywords: Coconut, Copra,Vermicompost,Yield,Biofertlizer,Coconut equivalent yield.

HITASA/AB/2024/073

Resource use pattern of Sugarcane cultivation

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An important industrial crop, sugarcane is used to produce sugar, bioenergy, and other derivatives. Because of this, it is a crop that is grown in 121 countries on 26.9 million hectares of land and has an economic value of 70.9 t/ha in tropical and subtropical locations. Adverse effects of various biotic and a biotic stresses on sugarcane crop. Imbalance and use of chemical fertilizers. Un-controlled and faulty irrigation schedules and methods for sugarcane. Resources viz., water, nutrient and energy play an important role in sugarcane cultivation. On average sugarcane requires around 1200 to 1800 mm of water and recommended dose of fertilizer for Zone 8 of Karnataka is 250:75:190 kg N:P_2O_5:K_2O/ ha. For cultivation of sugarcane the estimated input energy is 73,202 MJ. In which, for land preparation-5,013 MJ, Planting-13,407 MJ, Manures and Fertilizers-26,291 MJ, Plant protection-2,218 MJ, Irrigation- 25,085 MJ and Harvesting and transportation-1,188 MJ of energy is needed. Considering the average yield of 131.4 t/ha in sugarcane, the energy output will be 6,96,747.5 MJ with net energy of 6,23,545 MJ. Energy ratio and energy productivity is 9.52 and 1.98 kg/MJ, respectively. Water productivity of sugarcane cultivation was 11.19 kg/m^3 with 255.2 kg/kg combined nutrient use efficiency.

Keywords: Energy ratio, energy productivity, nutrient use efficiency and water productivity.

HITASA/AB/2024/074

Assessment of Soil Nutrient Indices in Cotton Cultivation Fields within Northern Transitional Zone of Karnataka

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Bt cotton cultivation spans a diverse array of soils within the regions of Dharwad and Haveri districts in northern Karnataka. During the kharif season of 2021-22, a comprehensive field survey was executed to delve into the soil nutrient dynamics within fields designated for cotton growth. This investigation was undertaken with a meticulous analysis of 153 individual farms spread across the aforementioned districts. The pivotal stage of fifty per cent flowering was chosen for soil sample collection, and the cotton yield, measured in kapas, was meticulously recorded during both the initial and subsequent harvesting stages. Within this study locale, the kapas yield exhibited a wide-ranging spectrum, fluctuating between 3.59 to 25.85 quintals per hectare, culminating in an average of 15.95 quintals per hectare. An essential facet of the research pertained to the evaluation of nutrient indices, which unveiled significant insights. Notably, the soil composition of the examined area was found to be deficient in available nitrogen, while maintaining a moderate level of soil organic carbon. Similarly, available phosphorus, potassium, and sulphur content exhibited a medium range. However, in the case of micronutrients, a noteworthy deficit was observed. The

DTPA extractable iron, zinc, and available boron content were identified as insufficient within the cotton fields of northern Karnataka.

Keywords: Nutrients indices, Kapas yield, Bt cotton, Dharwad, Haveri

HITASA/AB/2024/075

Effect of Date of sowing and correlation of different weather parameters on false smut disease severity

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False smut of rice is recently a disease of concern for rice producers around the globe affecting the quality and quantity of produce. A field study on effect of sowing time and relation of different weather parameters with false smut disease severity was conducted for two consecutive years during 2018 and 2019. False smut susceptible rice variety MTU 7029 was sown in three different dates i.e. 10th June, 10th July and 10th August. Molecular identification of pathogen was done using ITS primers and morphological identification of was done using light and electron microscope before inoculation to rice plants. Spore suspension of U. virens was prepared and injected at booting stage. Different weather parameters such as high temperature, low temperature, wind speed, bright sunshine hours, maximum relative humidity, minimum relative humidity was observed for its effect on false smut disease severity. The submission of ITS sequence of isolate on NCBI BLAST confirmed the pathogen as *Ustilaginoidae virens.* Olive green colour, circular spore with double walled was observed under light microscope. Under scanning electron microscope, a clear picture of spines all around the surface was observed. All the inoculated plots produced typical false smut symptom in significant amount. Highest disease severity was observed on plants that were sown on 10th of July whereas lowest disease severity was observed in plants that were sown on August. From the pooled data of both the years, a negative correlation of relative humidity, rainfall and temperature was observed suggesting that these weather parameters play a significant role in the development of false smut disease of rice.

HITASA/AB/2024/076

Perceived benefits attained by farmers using smartphone for accessing agricultural information

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This paper will be discussed about the findings of perceived benefits attained by farmers using smartphone for accessing agricultural information. The study was conducted in the year 2022 and three major crops viz., rice, millets and cotton were selected for the study since those crops represents wetland, dry land and commercial cropping system. Thanjavur, Salem and Virudhunagar districts were purposively selected for the study due to the reason of highest production. From each district 60 respondents were selected respectively and the total numbers of respondents were 180. The results showed that most of the rice (53.33%), millets (61.66%) and cotton growers (65.00%) attained moderate level of change. While observing specifically, all the three categories of respondents, reported that their knowledge on weather forecast was greatly increased after using smartphone for accessing agricultural information. Further the study found that the travel hours for gathering information and purchasing inputs were reduced for the respondents. From the study it was observed that use of smartphone has uplifted the farmers to the next level in terms of knowledge, skill, contact and yield of the crops.

Keywords: agriculture, smartphone, agricultural information, perceived benefits

HITASA/AB/2024/077

Screening of Pearl millet inbreds for blast resistance

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Pearl millet (*Pennisetum glaucum* (L.) R. Br.) is one of the most widely grown millet and an important crop in India extensively cultivated in arid and semi-arid regions after rice, wheat and sorghum. India is the single largest producer of pearl millet in the world. Among various constraints responsible for low yields in pearl millet, blast disease caused by *Pyricularia grisea* [teleomorph: *Magnaporthe grisea*] is considered to be most important and serious disease causing severe yield losses and at present is spreading at an alarming rate in the major Pearl millet growing regions of India affecting grain yield and green fodder yield. Use of host plant resistance is the most feasible and economical means of managing this disease as the crop is mainly cultivated by resource-poor farmers. In this regard, a field experiment was conducted during kharif, 2022 and 2024 to identify resistant sources for blast disease among 85 pearl millet inbred lines developed at Agricultural Research Station, Perumallapalle. Two susceptible checks (ICMB-89111 and ICMB-95444) were used as infector rows for spread of the disease. Among 85 bajra inbreds tested for blast resistance, 28 entries ie., PPBI -2, 3, 15, 22,26, 27,28, 30,31, 32,33, 34, 36, 47, 48,51, 55, 57,58, 74 and 83 showed resistant reaction to blast disease. 40 entries have shown moderately resistant reaction while 13 entries showed susceptible reaction. Five entries ie., PPBI-39, 41, 59, 84 and susceptible check ICMB-95444 showed highly susceptible reaction.

HITASA/AB/2024/078

Yield of wheat (*Triticum aestivum* L.) as influenced by various fertilizer recommendation approaches

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Soil test based fertilizer recommendation approaches are efficient in use of fertilizer and maintenance of soil fertility. To evaluate the effect of different fertilizer recommendation approaches on the yield a field experiment was conducted at the Research Farm of All India Co-ordinated Wheat and Barley Improvement Project (AICW & BIP), MARS, UAS, Dharwad during rabi, 2020-21. The experiment was laidout in completely randomized block design with fifteen treatments replicated thrice. The treatments consisted of different fertilizer recommendation approaches namely site specific nutrient management (SSNM) and soil test crop response (STCR) for targeted yields at 40, 45, 50 and 55 q ha^{-1}, Nutrient Expert (NE) approach target yield at 40 q ha^{-1} and soil test laboratory (STL) and these were compared with graded levels of fertilizer application (125 and 150% of RDF) and RPP. The growth, yield attributes and yield of wheat was significantly influenced by the various fertilizer recommendation approaches. The results revealed that the yield target at 55 q ha^{-1} under SSNM practice significantly increased the number of effective tillers m^{-2} (289.8), number of grains $panicle^{-1}$ (42.9), grain weight $panicle^{-1}$ (1.96g), test weight (46.5 g), grain (52.2 q ha^{-1}) and straw (78.6q ha^{-1}) yields in wheat. The higher grain yield in SSNM approach might be attributed to better nutrient availability during the crop growth period and also the ability of targeted yield approaches to satisfy the nutrients demand of the crop more efficiently. Application of fertilizers through SSNM practice for targeted yield of 55 q ha^{-1} was not achieved in the present study. This might be due to attainment of maximum genetic potential of the genotype in the treatment at 50 q ha^{-1} yield target under this approach of fertilizer recommendation.

Keywords: RDF, SSNM, STCR, STL, targeted yield, wheat

HITASA/AB/2024/079

Exploring Molecular Pathways of Host-Parasite Interaction in Tropical Theileriosis: Insights from Proteomic Analysis in Crossbred Cattle

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Tropical theileriosis imposes a significant financial strain on the cattle industry, with estimated global annual losses ranging from US$13.9 to US$18.7 billion. In India, the disease accounts for an annual economic loss of approximately US$384.3 million. The causative agent, *Theileria annulata*, infiltrates leukocytes, triggering reversible transformations that prompt uncontrolled cell proliferation. The interplay between the parasite and its host plays a critical role in disease progression. Investigating the molecular pathways and genetic mechanisms underlying these transformations could deepen our understanding of pathogenesis and offer insights into potential therapeutic avenues. This study delved into alterations in host cell gene expression by profiling the proteome of *in vitro* cultured and *T. annulata*-infected PBMCs from crossbred cattle in Kerala. Among the 408 significantly differentially expressed proteins (DEPs), 162 were downregulated and 246 were upregulated in infected crossbred cattle. Notably, 39 proteins identified exclusively in infected crossbred cattle PBMCs were significantly enriched in immune system pathways, complement pathways, and the membrane attack complex. Genes involved in these processes included *C9, S100A8, IL23A, PTPN11*, and *CD58*. Conversely, no enriched Gene Ontology terms were associated with

proteins exclusively present in crossbred cattle PBMCs without infection. Analysis of the DEPs revealed significant upregulation of biological processes such as negative regulation of intrinsic and extrinsic apoptotic pathways, positive regulation of ERK1 and ERK2 cascade, positive regulation of NF-kappaB transcription factor activity, and asymmetric cell division. Altered KEGG pathways included platelet activation, chemokine signaling, complement and coagulation cascades, Ras signaling, Rap1 signaling, and PI3K-Akt signaling, among others. Gene network analysis of these DEGs plays an important role to understand the interaction among genes. Real-time qPCR validation was performed for four genes, confirming the protein data. Proteome data analysis highlighted changes in cell transformation mechanisms, inflammation, activation of complement and coagulation cascade, apoptosis, antigen presentation, and cholesterol metabolism. Therefore, the susceptibility of crossbred cattle to theileriosis may stem from the hijacking of pathways related to cellular proliferation and host cell immunity, which could inform effective therapeutic interventions.

HITASA/AB/2024/080

Bioefficacy of Bioagents against *Alternaria alternata*, Causing Leaf blight of Groundnut

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Groundnut (*Arachis hypogea* L.) is one of the most important leguminous edible oilseed crops grown commercially in tropical and sub-tropical countries, including India. Among various diseases, the leaf blight/spot (*Alternaria alternata)* has been emerging as a major constraint in profitable production of groundnut. Therefore, the present study was conducted during, 2018 at the Department of Plant Pathology, College of Agriculture, Dapoli. A total of seven bioagents evaluated *in vitro,* applying Poisoned food technique and the experiment was planned in CRD, with all the treatments replicated thrice.

The results revealed that the test biocontrol agents as potential antagonists, which significantly inhibited mycelial growth of *A*. *alternata*, over untreated control. However, *T*. *hamatum* was found most effective with significantly highest mycelial growth inhibition (82.68 %), followed by *T.viride* (81.11 %), *T*. *harzianum* (77.07 %), *Aspergillus niger* (75.00 %), *T*. *koningii* (73.33 %), *P*. *fluorescens* (47.87 %) and *Bacillus subtilis* (44.38 %).

Key Words: Groundnut, *Alternaria alternata,* Bioagents, Inhibition.

HITASA/AB/2024/081

Farming System of Small and Marginal Farmers in Gorakhpur district of eastern Uttar Pradesh

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The total geographical area is 3483.8 sq km, out of this total cultivated area is 248723 ha, forest 6031 ha, land under non agriculture 45875ha, Pasture 211 ha and cultivable waste land 2255. Annual average rainfall is 1100 mm. Maximum temperature goes up to 43.50C in summer and minimum temp. 6.1 C goes in winter. The soil is sandy loam, clay loam and loam. The cropping intensity is 154.4. Dominant cropping system is Rice-Wheat which is grown in about 80% area. The present study on farm structure, cropping pattern, cropping intensity was conducted in Bharohiya, Jungle Kaudiya, Campierganj and Chargawan blocks of Gorakhpur district of eastern Uttar Pradesh. 120 small and marginal farmers were selected by simple random sampling method from eight villages by using proportionate random sampling technique. It was found that maximum investment on the farm building followed by machinery implements and livestock. On overall farm per farm investment was positively related with holding size but per hectare investment was inversely related. In the cropping pattern paddy, vegetable in Kharif, Wheat, Vegetable in Rabi and Vegetable, Maize in Zaid season stood on first

rank among all the crops. A whole farm approach or an integrated farming system approach would be of great relevance to the small and marginal farmers to deal with such situations. Farming system is a complex inter-related matrix of soils, plants, animals, implements, labour and capital, inter-dependent farming enterprises which are unique and reasonably stable arrangement complementary to each other. Further, the farm family manages these enterprises in response to their physical, biological and socio-economic environment, household goals, preferences and resources. Farming system concept as such is not new to our farmers who have been practicing mixture of plant and animal units in farming from time immemorial by combining crops with mulch animals and/or goats, sheep etc.

Keywords: farm structure, land utilization pattern, cropping pattern, farming system, livestock.

HITASA/AB/2024/082

Value Addition of Fruits and Vegetalbes – A Food Security Solution

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Fruits and vegetables are regarded as some of the healthiest foods available to humans because they are essential for a well-balanced diet and are rich in nutrients, vitamins and minerals, etc.. Many tasty, safe, and stable value-added products can be made from a variety of fruits and vegetables. A product that contributes to raising the value of the unprocessed horticulture product which in turn raises the product's market value is considered value added. For improved usage and the creation of high-quality processed products, fruits and vegetables must be stable as raw materials in terms of storage and quality retention. However, fresh produce is a highly perishable living produce that keeps on breathing

and transpiring long after it is harvested until it is eaten or processed into a product with added value. A few of them for a very short season, and transporting the fresh product to far-off markets can cause significant postharvest losses. By adhering to appropriate methods, such as harvesting at the proper maturity stage, utilizing appropriate post-harvest treatments, and packing, transporting, storing, and ripening, post-harvest losses can be reduced to a minimum. Many fruit and vegetable processing by-products have been suggested as suitable starting materials for the production of affordable biodegradable packaging films and coatings as a value-added application. Global demand for factory-made processed products is rising as a result of rising middle class spending power, changing eating patterns, and more urbanization. The food sector has intriguing growth prospects due to the potential for new "advanced" processing methods to preserve all other qualitative qualities and nutritional content of fruits and vegetables, while also adding extra health benefits.

Keywords: Value addition, fruits, vegetables, food security

HITASA/AB/2024/083

Evaluation of parents and hybrids of tomato (*Soolanum lycopersicum* L.) for their suitability to prepare ketchup and paste

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A set of 18 F1 hybrids developed as a result of line x tester mating design involving six lines and three testers were evaluated in randomized block design in three replications for their suitability to prepare ketchup and paste. Acidity of the ketchup and paste was highest in the parent LE-65

(2.36 and 3.08 %) followed by parent EC-165749 (2.10 and 3.40 %) and the hybrids LE-65 x Punjab chhuhara (2.34 and 3.36 %), EC -165749 x Pant T-3 (2.05 and 3.14 %), LE-65 x Pant T-3 (1.95 and 2.82 %), LE-65 x Pusa Gaurav (1.89 and 2.97%) and EC -165749 x Pusa Gaurav (1.89 and 3.06 %). The highest ascorbic acid content of ketchup and paste was recorded by the parent LE-56 (62.26 and 76.20 mg/100 g) followed by Punjab Chhuhara (59.83 and 74.62 mg/100 g) and the hybrids LE-64 × Punjab Chhuhara (78.25 and 88.45 mg/100 g), LE-56 × Pusa Gaurav (74.03 and 84.40 mg/100 g), LE-56 × Pant T-3 (72.42 and 82.32 mg/100 g) and LE-64 × Punjab chhuhara (70.98 and 80.54 mg/100 g). Considering the lycopene content, the parent LE-64 (19.80 and 21.79 mg/100 g for lycopene content) recorded the highest ketchup and paste followed by LE-65 (18.50 and 20.68 mg/100 g for lycopene content) and Punjab Chhuhara (17.90 and 20.90 mg/100 g for lycopene content) and the hybrids LE-56 × Punjab Chhuhara (22.47 and 25.86 mg/100 g for lycopene content), LE-64 × Punjab Chhuhara (21.20 and 23.70 mg/100 g for lycopene content), LE-62 × Punjab Chhuhara (20.62 and 23.20 mg/100 g for lycopene content) and LE-65 × Pusa Gurav (20.30 and 22.43 mg/100 g for lycopene content).The hybrids LE-56 × Punjab Chhuhara, LE-64 × Punjab Chhuhara LE-62 × Punjab Chhuhara and LE-56 × Pusa Gaurav are best suited for processing having moderate acidity and high lycopene content and these hybrids scored maximum for overall acceptability of the products.

HITASA/AB/2024/084

Tissue-specific expression, a fundamental approach in transgene development

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Promoter is the upstream gene coding region of DNA which contains specific sequences recognized by proteins involved in the initiation of transcription and drives the expression of a gene. Constitutive expression of transgene proteins may lead to metabolic burden imposed on plants by constant synthesis of foreign gene products and also pose the threat of increased resistance by insect pests. Therefore, targeted

expression of transgene has become particularly important for the development of value added crops. Besides this, the public also may more likely accept less intrusive transgenic products. Hence, a number of different tissue specific promoters have been isolated and their spatial and temporal control of *gus* gene expression have also been investigated in different plants. For instance, pea *rbcS*, maize *PEPC* and rice *PD540* for green tissue specific, *ACC oxidase* and *PG* for fruit specific, *GBSS* and *patatin* for tuber specific, wheat glutenin, maize *zein*, rice *oleosin18* for seed specific, Arabidopsis *SUC2* for phloem specific, tobacco *TA29* for anther specific, potato *SK2* for pistil specific and Agrobacterium *rol D* for root specific expression of gene have been well characterized. Overall, tissue-specific expression is a fundamental aspect of transgene development that enables precise control over gene expression, enhances efficacy, reduces toxicity, and facilitates the study and manipulation of biological systems for various applications in biotechnology

Keywords: Promoter, Tissue specific expression, Transgene.

HITASA/AB/2024/085

Influence Of Organic Manures And Biofertilizers In Protray Raised Seedlings On Yield, Quality And Economics Of Turmeric (*Curcuma longa* L.) Varieties

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The present investigation on the "Impact of organic manures and biofertilizers on protray raised seedlings on yield, quality and economics of turmeric (*Curcuma longa* L.) Varieties" was conducted at College of Horticulture, Rajendranagar, SKLTSHU, Mulugu during 2019-20. The experiment was laid out in Factorial Randomized Block Design (FRBD) with 2 replications and 18 treatments. The results revealed that among all the organic manures, biofertilizers, varieties and their combinations, among the yield and quality parameters, the treatment M_1 – FYM 45 t/ha + AMC (Arka microbial consortium) 1 lit per quintal manure recorded maximum fresh weight of rhizomes per clump (409.53 g), dry weight of rhizomes per clump (82.2 g), rhizome yield per plant (486.98 g), rhizome yield per plot (24.33 kg), curing percentage (24.71 %), antioxidant activity (12.01 µg mL^{-1}), curcumin content (5.75 %) and oleoresin content (9.25 %). Among the varieties, Salem recorded significantly the highest values for fresh weight of rhizomes per clump (482.34 g), dry weight of rhizomes per clump (88.92 g), rhizome yield per plant (670.65 g), rhizome yield per plot (33.51 kg), curing percentage (26.15 %), antioxidant activity (10.68 µg mL^{-1}), curcumin content (6.03 %) and oleoresin content (10.20 %). Among the interaction effects between organic manures, biofertilizers and varieties, the treatment M_1V_1 – FYM 45 t/ha + AMC (Arka microbial consortium) 1 lit per quintal manure + vertical split of mother rhizome of Salem variety recorded maximum fresh weight of rhizomes per clump (756.10 g), dry weight of rhizomes per clump (148.15 g), rhizome yield per plant (890.40 g), rhizome yield per plot (44.50 kg), highest curing percentage (33.05 %), antioxidant activity (10.18 µg mL^{-1}), curcumin content (7.14 %) and oleoresin content (12.38 %). Application of organic manures and biofertilizers, the treatment M_1V_1 – FYM 45 t/ha + AMC (Arka microbial consortium) 1 lit per quintal manure + vertical split of mother rhizome of Salem variety has recorded maximum benefit-cost ratio (3.68). Practising the application of organic manures and biofertilizers ultimately increased yield which led to higher returns.

Keywords: FYM, Vermicompost, Organic manures, biofertilizers, Arka microbial consortium, Salem, Antioxidant activity

HITASA/AB/2024/086

Technological yield gaps and constraints of Rapeseed and Mustard in South Kamrup area under Lower BrahmaputraValley Zone of Assam

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Rapeseeds and Mustards are the important crops of Assam and the yield often get fluctuated with the availability of water, nutrients and quality type seeds. The cultivations practices done by the farmers of this areas were not very much satisfactory compared to the research activities done by scientists at different stations. The analysis of yield gap and the factors responsible would facilities in formulation of production strategies in mitigating the constraints and there by improving the crop yield in farmer's field. Therefore, an attempt has been made to study the yield gap and production constraints of Rapeseeds/Mustards as Oilseed crop in South Kamrup area of Assam. Increase in Yield gap II indicates improvement over the technological adoption in the crop field. In reality, a gap always prevails between what is projected as the potential yield of any variety at any research station and what is harvested by the farmers themselves in their crop field. Technically, this is referred as yield gap of different types. Production constraints were (1)Continuous use of same seeds year after year in same crop field,(2)Poor irrigation facilities, (3)Imbalance fertilizer use and (4)Lack of seed treatments etc. So, more demonstration works needs to be fullfilled in future)

HITASA/AB/2024/087

Impact of fertigation and liquid plant growth promoting rhizo microbial consortia on economics of strawberry (*Fragaria* x *ananassa* Duch.) grown under naturally ventilated polyhouse

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The present study was carried out to evaluate the effect of fertigation and liquid plant growth promoting rhizo microbial consortia on economic parameters of strawberry (*Fragaria* x *ananassa* Duch.) under naturally ventilated polyhouse at the Department of Fruit Science, College of Horticulture, Mudigere during 2017-18 on strawberry *cv*. Sabrina. The experiment was laid out in Completely Randomized Design with eleven treatments replicated thrice. Significant differences were observed among treatments tested for economic parameters. Application of 75% RDF (112.5: 75: 90 Kg NPK/ha) through fertigation + *Azotobacter* + Phosphate solubilising bacteria (PSB) + Potassium solubilising bacteria (KSB) in liquid form recorded highest net income of Rs. 3,23,114 for 1032 m^2 of poly house area which was followed by T_8 (Rs. 2,71,021 for 1032 m^2 of poly house area) which received 75 per cent RDF through fertigation + *Azotobacter* + PSB whereas T_4 supplied with 75 per cent RDF through soil application was found to be lowest (Rs.1,07,551 for 1032 m^2 of poly house area). The maximum benefit cost ratio (2.90) was obtained from T_{11} which was followed by T_8 (2.59) while, the lowest benefit cost ratio (1.66) was observed in T_4. Application of 75% RDF through fertigation along with *Azotobacter*, PSB and KSB in liquid form showed promising results with respect to economic parameters there by it saved 25 per cent of fertilizers

Keywords: *Azotobacter,* Phosphate solubilising bacteria, Potassium solubilising bacteria, Strawberry

HITASA/AB/2024/088

Estimation of Heterosis for Green Pod Yield and Attributing Characters in Cowpea (*Vigna unguiculata* (L.) Walp.)

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The present investigations were carried out to know the extent of standard heterosis in cowpeas(*Vigna unguiculata* (L.) Walp.). Thirty hybrids were developed by using six parents, namely, **NCK-15-9**, **NCK-15-10, NC-15-41, NC-15-42, NC-15-44, and NC-15-45** adopting full diallel mating design. A set of thirtyeight cowpea entries including six parents, thirty crosses and two check varieties,**GC-3** andGDVC-2 were evaluated at three locations *viz.* Navsari, Mangrol and Achhaliauseda randomized block design with three replications during *Kharif*-2017. The observations were recorded on parents and F_1's for twelve quantitative traits and one quality trait*viz.*days to 50 per cent flowering, plant height (cm), primary branches per plant, pods per plant, pod length (cm), days to maturity, seeds per pod, green seed wt. (g), green pod yield per plant(g), and protein content (per cent). The cross NC-15-45 x NCK-15-10, NC-15-45 x NC-15-41 and NCK-15-10 x NC-15-45 recorded high heterotic values for green pod yield per plant along with high *per se* performance.

Keywords: Cowpea, *Vigna unguiculata* (L.), standard heterosis, hybrid variety

HITASA/AB/2024/089

Micro RNAs: Potential Strategy for Heat Stress Tolerance in Plants for crop Improvement

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MicroRNAs (miRNAs) have been realized as one of the most recent genome editing tools in crop improvement for heat stress tolerance. The

success of modern plant breeding is primarily dependent on effective utilization of coding and non-coding genetic elements as they play a major role in wide range of biological processes for heat stress tolerance in majority of crops. MicroRNAs are short non-coding RNAs (20–24 nt), single stranded, riboregulator RNAs transcribed from specific class of genes and are abundant in higher organisms. These tiny RNAs regulate key biological processes in plants by targeting messenger RNAs for cleavage or translational inhibition making them potential targets for genetic manipulations, to engineer heat stress tolerance in crop plants. This review is aimed to provide recent updates on plant miRNAs, their biogenesis and functions, target prediction and identification. Moreover, computational tools and databases available for plant miRNAs, their roles in heat stress-responses and adaptive mechanisms in major crop plants also have been elaborated.

Keywords: microRNA, Non Coding RNA, crop improvement, heat stress

HITASA/AB/2024/090

Effect of conservation tillage and nitrogen management on soil properties in aerobic rice

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This study investigates the impact of different tillage practices, namely Conventional Tillage (CT), Minimum Tillage (MT) with residue retention, and Zero Tillage (ZT), and nitrogen fertilizer schedules (N1-100% RDN (120 kg ha^{-1}), N2-100% RDN + Nano urea 2.5 ml l^{-1} at active tillering (AT) and panicle initiation (PI) stage, N3-100% RDN + Nano DAP 2.5 ml l^{-1} at AT and PI stage, N4-75% RDN + Nano urea 2.5 ml l^{-1} at AT and PI stage, N5- 75% RDN + Nano DAP 2.5 ml l^{-1} at AT and PI stage) on soil pH, EC, organic carbon, temperature, moisture, and their interaction in aerobic rice cultivation. Results revealed that nitrogen fertilizer schedules and their interaction with tillage practices did not show any significant differences in

soil pH, EC, organic carbon, temperature and moisture. Tillage practices and their interaction with nitrogen fertilizer schedules did not show any significant differences in soil pH, EC and organic carbon. However, tillage practices showed significant differences in soil temperature and moisture. Conventional tillage consistently exhibits the highest soil temperatures during the initial weeks, attributed to its intensive soil disturbance, while MT and ZT maintain lower temperatures. From the 6th to the 15th week, a convergence in soil temperatures is observed, with diminishing thermal differences among practices. In later weeks, temperature trends diverge, emphasizing the cumulative effects of continuous soil disturbance in CT. In terms of moisture, CT exhibits lower levels in the early stages due to increased evaporation, while MT and ZT demonstrate comparable moisture retention capabilities. Negative correlations between soil temperature and moisture underscore the common response pattern, with CT showing the most pronounced impact. These findings contribute valuable insights into optimizing tillage practices for sustainable rice cultivation systems.

Keywords: Aerobic rice cultivation- Soil moisture - Soil temperature - Tillage practices

HITASA/AB/2024/091

Transmissible Venereal Tumor in A Pomeranian Bitch with Uterine Implantation

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A three-year-old pomeranian bitch was presented to the veterinary clinical complex with the history of prolonged intermittent sero-sanguineous and hemorrhagic vaginal discharge for a past few weeks. The animal had a history of unilateral removal of one uterine horn. A multi-lobulated vegetative growth was observed in the vaginal passage. Exfoliate cytology of Leishman-stained vaginal smear revealed high cellularity. Individual neoplastic cells had round nuclei, fine to granular chromatin pattern, prominent nucleoli with and frequent mitotic figures suggestive of

TVT. Following excision of the vaginal growth, the bitch recovered without any complication. After three months, the condition recurred with hard palpable mass in the lower abdominal area, which was found to be radiolucent. Cytological study of the discharge showed evidence of TVT. Exploratory laparotomy through right flank approach revealed an intact right uterine horn and ovary and a healed stump of the left horn. A hard mass observed in the cervical area was exteriorized. The mass along with the uterine horn and ovary was removed. The mass, which was pale red, fleshy in consistency, measured about 2 cm in diameter was histopathological confirmed as TVT based on the characteristic round to ovoid shaped neoplastic cells arranged in compact masses or sheets with minimal stroma. In the affected part of the uterus, endometrium was completely replaced by the neoplastic growth. After a span of three months, the animal again showed sero-sanguineous vaginal discharge, the cytology of which confirmed the recurrence of the neoplasm. The animal was placed on chemotherapy with vincristine sulphate at a dose rate of 0.025 mg/kg.bwt. per week by intravenous route at weekly intervals for three weeks. The animal recovered well and subsequently did not show any signs of illness.

HITASA/AB/2024/092

Enhancing the Shelf-Life of Guava with a Different Coating Material and an Ethylene Inhibitor

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Guava (*Psidium guajava* L.) is considered one of the most vital fruits, and is also known as the apple of tropical and subtropical regions of the world. The objective of this work was the Shelf-life enhancement of guava by using ethylene inhibitor and different coating materials. The effect of edible coatings based on 1-MCP (1-Methylcyclopropene), mineral oil, chitosan, and bee wax (BW) applied to guavas harvested green and stored for 15 days at 35°C was evaluated. Guavas were coated with cards of ethylene inhibitor (1-Methylcyclopropene), mineral oil (0.4, 0.8, 1.2 ml), chitosan (1, 2, 3%), and beeswax (2%), and control (uncoated). The coatings reduced the respiration rate, inhibited ethylene synthesis and slowed the ripening process. The effect on fruit ripening was indicated by peel colour, TSS, change in titratable acidity, decreased fruit softening and weight loss, retained ascorbic acid content and maintained the overall quality of the fruits. The shelf life of guava having edible coatings such as 1-MCP, mineral oil, chitosan and beeswax as compared to control sample days (2 days) were found to be 10,8,4,4 days, respectively. The fruits treated with 1-MCP showed the best results in maintaining the quality of the fruits, reducing weight loss, delaying the ripening and maximum shelf life of about 8 days.

Keywords: Shelf life, 1-MCP, Bee wax, Chitosan, Mineral oil, Guava .

HITASA/AB/2024/093

Role of plant extract in management of chickpea wilt

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Chickpea is an important pulse crop of India and Bundelkhand region of Uttar Pradesh is the major pulse growing areas. The disease

caused by soil borne fungus such as collar rot (*Sclerotium rolfsii*), wilt (*Fusarium oxysporum* f. sp. *ciceris*), and dry root rot (*Rhizoctonia bataticola*) has been considered most devastating for the production of chickpea. The present experiment was conducted Role of plant extract in management of chickpea wilt. Among nine plant extract evaluated under *in vitro* conditions, the neem leaves extract was found to be most effective and inhibited the maximum mycelial growth of *Fusarium oxysporum* f. sp. *ciceris* followed by garlic clove and datura leaves. Out of four plant extracts of tested against wilt of chickpea under *in vivo* conditions, the seed treatment with garlic clove and neem extract at 10% concentration was found most effective and decrease the incidence 32.66% and 36.56% along with the increase seed yield 5.76% and 8.06% respectively.

Keyword: Chickpea, wilt, plant extract, management

HITASA/AB/2024/094

Varietal screening of lablab bean genotypes against major insect pest in *Konkan* region

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The field experiment was conducted during two successive years 2017-18 and 2018-19 in *Rabi* season at Botany farm, College of Agriculture, Dapoli, Tal: Dapoli, Dist: Ratnagiri (M.S.) to screen out different lablab bean genotypes against major insect pest in *Konkan* region. The results revealed that the maximum mean population of aphids was recorded in culture Line 9 (4.46 aphids three leaves^{-1} plant^{-1}) and lowest (2.19) mean population of aphids was recorded in culture Line 26. In resistance rating status, the 18 cultures *viz*., Line 4, Line 6, Line 8, Line 9, Line 10, Line 11, Line 14, Line 16, Line 22, Line 26, Line 29, Line 36, Line 38, Line 39, Line 40, Line 41, Line 42 and Line 44 *i.e.* Konkan Wal -2 were observed to be moderately resistance

noticed with 1.1 to 2.0 mean infestation index of aphids. The highest mean population of jassids was recorded in the culture Line 44 (0.42 jassids three leaves^{-1} plant^{-1}) whereas; lowest mean population of jassids (0.28) was recorded in culture Line 4 and Line 11. The highest mean population of whiteflies (1.43) was recorded in genotype Line 8 and lowest (0.28 whiteflies three leaves^{-1} plant^{-1}) was recorded in genotypes Line 10 and Line 26. The maximum mean population of thrips was recorded in cultures Line 14, Line 41 and Line 44 *i.e.* Konkan Wal -2 (0.12) while, lowest (0.03) mean population of thrips was recorded in culture Line 16. The maximum pod damage (15.23%) was recorded in genotype Line 44 and lowest pod damage (10.41%) was recorded in genotype Line 16. In resistance rating status, the all 18 cultures were observed to be highly resistance (0-20% pod damage) against pod borer.

While, in the relation with natural enemies the maximum mean population of coccinellids was recorded in culture Line 40 (0.41 coccinellids plant^{-1}) whereas, lowest (0.22) mean population of coccinellids was recorded in culture Line 22 and Line 44. The highest mean population (0.43) was recorded in genotype Line 8 while, the lowest mean population (0.28 mirid bugs plant^{-1}) was recorded in genotype Line 26. The maximum mean population of spiders was recorded in culture Line 41 (1.16 spiders plant^{-1}) and lowest (1.01) mean population of spiders was recorded in culture Line 4.

Keywords: Screening, lablab bean, genotypes, insect pest.

HITASA/AB/2024/095

Bio-efficacy of Fipronil 0.6% WG (SIZ-1) against Early shoot borer (*Chilo infuscatellus*) in Sugarcane

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The field experiment was conducted in the years 2021-22 and 2022-23 for the study of the bio-efficacy of Fipronil 0.6% WG (SIZ-1) against early shoot borer (*Chilo infuscatellus*) in Sugarcane at Sugarcane Research Station, Napane, Tal. Vaibhavwadi, Dist. Sindhudurg (M.S.). The results revealed that data on the percent dead heart damage due to Early shoot borer at 10, 20 and 30 days after 1st and 2nd application revealed that the treatment Fipronil 0.6% WG (SIZ-1) @ 16666 g/ha and treatment of Fipronil 0.6% WG (SIZ-1) @ 13333 g/ha were found to be significantly superior over rest of the treatments under study at all the three days of observations after all the two applications and both these treatments were found statistically at par with each other in both of the years.
The highest per cent reduction over control at 30th day after 1st and 2nd application was obtained with Fipronil 0.6% WG (SIZ-1) @ 16666 g/ha recorded (71.98% and 81.03%) in 2021-22 and (74.42% and 83.76%) in 2022-23, respectively which was followed by Fipronil 0.6% WG (SIZ-1) @ 13333 g/ha recorded (71.48 % and 80.69%) in 2021-22 and (71.98% and 83.48%) in 2022-23, respectively.

While, in relation with yield in both of the years the treatment of Fipronil 0.6 % WG (SIZ-1) @ 16666 g/ha given 78.66 t/ha and 79.91 t/ha milleable cane yield followed by treatment of Fipronil 0.6 % WG (SIZ-1) @ 13333 g/ha which has given 77.94 t/ha and 78.17 t/ha milleable cane yield of sugarcane.

Keywords: Bio-efficacy, sugarcane, early shoot borer, newer insecticide.

HITASA/AB/2024/096

Field evaluation of Fipronil 0.6% WG (SIZ-1) against termites (*Odontotermes* spp.) in Sugarcane

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The field experiment was carried out in the years 2021-22 and 2022-23 for evaluate Fipronil 0.6% WG (SIZ-1) against termites (*Odontotermes* spp.) in Sugarcane at Sugarcane Research Station, Napane, Tal. Vaibhavwadi, Dist. Sindhudurg (M.S.). The results revealed that data on the stalk damage due to termites (*Odontotermes* spp.) at 30 days after 2nd application and at harvest revealed that the treatment Fipronil 0.6% WG (SIZ-1) @ 16666 g/ha and treatment of Fipronil 0.6% WG (SIZ-1) @ 13333 g/ha were found to be significantly superior over rest of the treatments under study at 30 days after 2nd application and at harvest and both these treatments were found statistically at par with each other.

The highest per cent reduction over control at 30th day after 2nd application and at harvest was obtained with Fipronil 0.6 % WG (SIZ-1) @ 16666 g/ha recorded (80.95% and 83.74%) in 2021-22 and (84.14% and 88.12%) in 2022-23, respectively which was followed by Fipronil 0.6% WG (SIZ-1) @ 13333 g/ha recorded (80.59% and 83.44%) in 2021-22 and (83.85% and 86.69%) in 2022-23, respectively).

In the both of the years all the insecticidal treatments did not show any adverse effect on spiders and coccinellids throughout the experimental period. Thus, the Fipronil 0.6 % WG (SIZ-1) was found safe to natural enemies as their population was statistically similar in all the treatments studied in sugarcane. There was no any phytotoxicity symptoms such as leaf tip injury, chlorosis, yellowing, necrosis, wilting, scorching, epinasty and hyponasty, were noticed on the sugarcane crop at the day of application as well as after 1, 3, 5, 7, and 10 days after application of Fipronil 0.6 % WG (SIZ-1).

Keywords: Termites, phytotoxicity, natural enemies.

HITASA/AB/2024/097

Population fluctuation of pests infesting lablab bean in relation to weather parameters in *Konkan* region

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The field experiment was carried out during two consecutive years of *Rabi* season 2017-18 and 2018-19 at Botany farm, College of Agriculture, Dapoli, Tal: Dapoli, Dist: Ratnagiri (M.S.) to population fluctuation of pests infesting lablab bean in relation to weather parameters in *Konkan* region. Results indicated that the peak activity (0.45 and 1.00) of jassids three leaves^{-1} plant^{-1} was recorded in 11th SMW (12-18 March, 2018) and 11th SMW (12-18 March, 2019). The maximum population (0.31, 1.36 and 1.36) of whiteflies three leaves^{-1} plant^{-1} was recorded in 8th SMW (19-25 February, 2018), 6th SMW (5-11 February, 2019) and 8th SMW (19-25 February, 2019). The peak (0.33 and 0.36 thrips three leaves^{-1} plant^{-1}) population was recorded in 9th SMW (26 February – 4 March, 2018) and 8th SMW (19-25 February, 2019). The peak incidence of *Maruca vitrata* 14.97 and 27.28 per cent pod damage plant^{-1} was noticed in 12th SMW (19-25 March, 2018) and 11th SMW (12-18 March, 2019).

The minimum temperature (r = 0.792), wind speed (r = 0.741 and 0.826) and evaporation (r = 0.802 and 0.952, respectively) were found to be positively significant with jassids population. While, morning relative humidity (r = -0.528) had found to be negatively significant with jassids population. Whereas, the wind speed and evaporation were found to be positively significant with whitefly population (r = 0.813, and 0.797, respectively). The maximum temperature (r = 0.586) and evaporation (r = 0.535) were found to be positively significant with thrips population. The minimum temperature (r = 0.702 and 0.518), wind speed (r = 0.814 and 0.657) and evaporation (r = 0.776 and 0.858) were positively significant with pod borer infestation whereas, the morning relative humidity (r = -0.543) was found to be negatively significant with pod borer infestation. Rest of all the weather parameters was found to be non- significant.

Keywords: population, lablab bean, weather parameters.

HITASA/AB/2024/098

Screening of Native *Bacillus spp*. for its Antimicrobial activities against Plant Pathogens infesting Maize

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Bacillus thuringiensis is a gram positive spore forming bacteria that carry cry and vip toxins which provides them with insecticidal activity, apart from that the strains were screened for chitinase activity, antifungal and antibacterial activity. Primary screening for chitinolytic activity using native *Bacillus spp* was carried out and positive isolates were subjected to quantification and calculation of chitin utilization index. Colloidal chitin preparation methodology was standardized and the resultant colloidal chitin was used for primary screening and quantification. The bio-efficacy study was carried with native *Bacillus spp* against fall armyworm, *Spodoptera frugiperda* and results were analysed in view of chitinolytic ability of the *Bacillus spp* stains. Chitin utilization index and chitinase activity varies from 1.4 to 1.7 mm and 273.00 -371.89 µg/ml/min in reference *Bt* strains µg/ml/min respectively. Whereas in native *Bacillus spp* the chitin utilization index (1.6-2.6 mm) as well as chitinase activity (325.22-643.00 µg/ml/min) were found to be more than reference *Bt* strains*.* Bio efficacy studies of *Bacillus spp* against neonates of *S. frugiperda* showed that highest mortality was obtained with VKK-9 (73.33%) and the higher chitinase activity of VKK-9 may be contributed to its success in invasion of insect midgut. In Antifungal, Bt strain VKK9, VKK-MPW, VKK-

LE1 and *Btk*-HD2 showed antifungal activity against all the three pathogenic fungi lie. *Phomopsis vexans*, *Rhizoctonia solani* and *Fusarium solani*. In antibacterial assay, VKK9 showed antibacterial activity against *Ralsatonia solanacearum*. The native Bacillus isolates showed insecticidal, bactericidal and fungicidal activity, which can be utilized for comprehensive pest and disease management in future.
Key words: Chitin, Bacillus thuringiensis, chitinase, insecticidal activity, Antifungal activity, Antibacterial activity

HITASA/AB/2024/099

Eco-Friendly *Bt*-Based Bioinsecticide for Sustainable Pest Management

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The increasing demand for food due to population growth coupled with limited land resources underscores the need for efficient pest management in agriculture. In India, where agriculture is a vital livelihood for a significant portion of the population, the use of microbial biopesticides, particularly those based on *Bacillus thuringiensis (Bt),* has gained attraction due to their reduced environmental impact and specificity towards target pests. This paper provides an overview of efforts undertaken to harness the potential of *Bt* for managing lepidopteran insect pests in crops, focusing on the example of castor. Research initiatives have focused on identifying virulent *Bt* isolates, developing cost-effective production protocols, and formulating *Bt*-based biopesticides. A novel solid-state fermentation method for *Bt* production has been developed, enabling localized production through micro-enterprises. Various formulations of *Bt* have been evaluated for efficacy through laboratory bioassays and field trials, demonstrating their effectiveness against major pests such as *Helicoverpa armigera, Spodoptera litura*, and *Achaea janata*.

Furthermore, outreach activities have been conducted to raise awareness among farmers about the benefits of *Bt* technology and facilitate its adoption. Licensing of *Bt* production technology to biopesticide firms has facilitated its commercialization, enabling widespread access to *Bt*-based bioinsecticides for farmers. Intellectual property rights have been secured to protect innovations in *Bt* production and formulation. Additionally, genetic engineering approaches have been explored to enhance resistance in crops against lepidopteran pests. Transgenic castor plants expressing *Bt* genes have shown promising results in laboratory and field trials, offering a sustainable alternative to chemical insecticides. Overall, the adoption of eco-friendly *Bt*-based bioinsecticides presents a promising avenue for sustainable pest management in agriculture, contributing to food security, environmental conservation, and economic prosperity.

Key words: Eco-friendly, *Bacillus thuringiensis*, bioinsecticide, sustainable pest management, genetic engineering, transgenic crops.

HITASA/AB/2024/100

Evaluation of spore suspension and culture filtrate of bioagents against *Meloidogyne incognita* infesting green gram

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The impact of soil application (4g/4ml kg^{-1}soil) with spore suspension (SS) and culture filtrate (CF) of biocontrol agents (BCAs) *viz., Trichoderma harzianum* AMUTHZ-71, *T. viride* AMUTVR-61, *T. atroviride* AMUATROV-31, *T. asperelloides* AMUASPLD-51, *Pochonia chlamydosporia* AMUPC-31, *Purpureocillium lilacinum* AMUPL-31, *Bacillus subtilis* AMUBS-80 against *Meloidogyne incognita* on causing root-knot in green gram were examined under pot condition. The seed treatment with rhizobium, along with soil application of SS and CF of BCAs, effectively reduced the disease severity of root-knot nematode in terms of the number of galls, improved plant growth and grain yield of green gram cv. SML-668. Inoculation with

the root-knot nematode, *M. incognita* (2000J_2/plant), caused characteristic oval and fleshy galls on the root system of green gram, significantly reducing plant growth (20-24%) and grain yield (36%) compared to control. Soil application with SS and CF of *P. lilacinum* AMUPL-31 was found to be most effective and significantly reduced the galling (56% and 44%) and soil population of the nematode (48-57% and 35-45%) and significantly enhanced the plant growth (19-24% and 16-20%) and grain yield (29 and 25%) over inoculated control. Next in effectiveness was *P. chlamydosporia* AMUPC-31, which resulted in 46% and 32% decrease in the galling and an increase in the plant growth (17-22% & 14-17%) and grain yield (27% and 22%), followed by the *T. harzianum* AMUTHZ-71 and *T. viride* AMUTVR-61 over inoculated control. The present study has revealed that SS with *P. lilacinum* AMUPL-31, *P. chlamydosporia* AMUPC-31, *T. harzianum* AMUTHZ-71 and *T. viride* AMUTVR-61, along with rhizobium may significantly control the disease severity of root-knot and improve the grain yield of green gram.

Keyword: Biocontrol agents, *Rhizobium*, *Meloidogyne incognita*, root-knot disease, green gram.

HITASA/AB/2024/101

Gendered Impacts of Climate change on Agriculture sector: A Comprehensive analysis

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Crop and dairy farming play critical role in livelihood and nutritional security of India. These farm enterprises are sensitive to climate change and climate variability, which pose serious long term challenges to productivity and profitability. Vulnerability has emerged as a cross-cutting theme in research on the human dimensions of global environmental

change. All populations are potentially vulnerable to climate change and gender-differentiated risks significantly affect access to resources, decision-making processes and division of labour among men and women. This article examines the gender-specific vulnerabilities of farmers in the context of climate change, with a particular focus on the challenges faced by women in agriculture. Key concerns include water scarcity, crop failure, shifts in agricultural practices, health risks, migration and displacement, limited access to resources, vulnerability to extreme events, and the impact of social and cultural dynamics. Women, responsible for water retrieval and engaged in rain-fed agriculture, confront substantial hurdles arising from irregular rainfall patterns and heightened temperatures. Alterations in traditional cropping calendars, coupled with additional caregiving responsibilities, further disrupt women's work schedules. The study underscores the compounded challenges for women farmers, emphasizing the need for targeted interventions. The impacts of climate change are magnified by the lack of access to timely climate information and existing gender disparities in land ownership and credit access, intensifying women's vulnerabilities. Addressing these challenges requires comprehensive strategies, including empowering women through educational initiatives and implementing inclusive policies that acknowledge the distinct adversities faced by women. This research contributes valuable insights to the ongoing discourse on climate change adaptation, urging for tailored approaches that recognize and rectify the gendered dimensions of vulnerability in the agricultural sector.

Keywords*:* Gender, Climate-change impact, Agriculture sector

HITASA/AB/2024/102

Response of Palak to Foliar Application of Ascorbic Acid Under Different Sources of Nitrogen Fertilizers

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An experiment was conducted to investigate the impact of foliar application of ascorbic acid using various nitrogen sources (Urea, Ammonium nitrate, and Ammonium sulphate) on spinach plants. The experiment is conducted with three replications. Each replication was conducted on 11 raised beds. The project included parameters such as fresh weight, dried weight, plant height, number of leaves, number of roots, germination percentage, and yield. Finally, the assessment of ascorbic and chlorophyll content was also analysed. Ascorbic acid was applied via foliar spray at various concentrations: Control, 100ppm, 300ppm, and 500ppm. Urea exhibited superior vegetative growth characteristics in comparison to other nitrogen sources such as Ammonium sulphate and Ammonium nitrate.The data properties described were enhanced as a result of the impact of ascorbic acid applied via foliar spray on spinach.The study found that the combination of urea form and 100 ppm ascorbic acid resulted in the greatest values.

Keyword: Palak, Ascobic acid, Nitrogen sources

HITASA/AB/2024/103

In vitro efficacy of fungicides against seed mycoflora of Sesame

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Sesame (*Sesamum indicum* L.) is the major oilseed crop also known as 'Queen of oilseed crops' grown in India and prone to many seedborne diseases which causes seed rot as well as reduction in seed germination which results in huge quantitative and qualitative yield losses. Hence, present investigation was carried out on "*In vitro* efficacy of fungicides against seed mycoflora of Sesame", conducted during 2020-21, at Department of Plant Pathology, College of Agriculture, Latur. A total of seven systemic (each @ 500 and 1000 ppm) and seven non-systemic and combi-product (each @ 2000 and 2500 ppm) fungicides at their recommended dosages were evaluated *in vitro* by poisoned food technique against seedborne fungi *Fusarium oxysporum* f. sp. *sesami* which was

detected in seed health testing methods. The results revealed that all the systemic fungicides inhibited mean mycelial growth was ranged from 44.43 to 100 per cent. However, cent per cent mycelial growth inhibition with Carbendazim 50 % WP (100 %), followed by Propiconazole 25 % EC (88.33%), Thiophanate methyl 70 % WP (86.08%), Difenconazole 25 % EC (82.79%), Azoxystrobin 23 % EC (63.34 %) and Metalaxyl 32 % WS (44.43%). Among non-systemic and combi-product fungicides tested, mean mycelial growth inhibition was ranged from 81.16 to 100 per cent. However, cent per cent mycelial growth inhibition with Propineb 70 % WP, Carbendazim 12% + Mancozeb 63 % WP, Carboxin 37.5 % + Thiram 37.5 % WP and Metalaxyl M 4 % + Mancozeb 64 % WP (100 %), followed by Tebuconazole 50 % + Trifloxystorbin 25 % WG (95.60 %), Mancozeb 75 % WP (94.01 %) and Chlorothalonil 75 % WP (81.16 %).

Keywords: *Sesamum indicum,* Seed mycoflora, Fungicides, *In vitro.*

HITASA/AB/2024/104

Coriander Harvester

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In contemporary times marked by remarkable technological progress, the manual harvesting of coriander persists despite its inefficiencies. Recognizing the limitations and labor intensiveness of traditional coriander harvesting methods, the College of Agricultural Engineering, JNKVV has developed a specialized harvester tailored specifically for coriander crops. This innovative machinery boasts an impressive 85% field efficiency, signifying a significant advancement in coriander harvesting techniques. By mechanizing the harvesting process, the harvester aims to revolutionize coriander farming practices, increasing productivity while reducing the labor burden on farmers. Overall, this

development represents a crucial step towards enhancing efficiency and sustainability in coriander cultivation.

HITASA/AB/2024/105

Fenugreek Harvester

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Fenugreek is widely consumed in Indian cuisine due to its unique flavour and numerous health benefits. However, traditionally, it has been harvested manually, which is a labour-intensive and time-consuming process. Recognizing this challenge, the College of Agricultural Engineering, JNKVV, Jabalpur, has developed a specialized Fenugreek Harvester. This innovative equipment significantly improves efficiency by automating the harvesting process, thereby reducing the time and labor required for fenugreek cultivation. With an impressive field efficiency of 81%, this harvester represents a significant advancement in agricultural technology, promising increased productivity and sustainability in fenugreek farming practices

HITASA/AB/2024/106

Quality Potato seed production by using Apical Root Cuttings (ARC) Technology

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Potato (*Solanum tuberosum* L) is emerging as one of the important food crops in India but its production is still constrained by the inadequacy of quality planting material, as it has a direct influence on crop productivity. There is a huge gap between the requirement and supply of certified seed potatoes and it is difficult and to produce such a huge quantity using traditional methods. It is, therefore, imperative to evolve a seed production system, encompassing innovative techniques to improve the quality of seed. Though the idea of True Potato Seed (TPS) has many advantages over potato seed tubers as they are disease and pest free planting material, easy storage and transportation, and a highly reduced seed rate but another new technology through which seed potato production will be possible by involving micro propagation techniques called Apical Root Cuttings can overcome still much more of the problems associated with the traditional seed production system (Buckseth *et al*., 2022). The healthy buffer stock of micro plants acts as initial planting material on nursery beds. The first round of apical cuttings starts after 15-20 days of planting of the mother stock. Sequential cuttings of laterals from mother plants are followed at an interval of 7-10 days, and it continues depending on the growth of new shoots in the variety for over 35-45 days(CIP, Bangaluru). ARC technology has immense potential if it can be fitted in the seed production window following standard operating procedures to ensure seed health. ARC technology is an alternative method of quality potato seed production but not a replacement to other methods.

Keywords : TPS, Apical Root Cuttings

HITASA/AB/2024/107

Artificial Climate Control Systems in Green House

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Greenhouse crop production was a very significant event in the history of agriculture since it was realized that with the help of it many plants could be protected from different biotic and abiotic stress. It developed as a mechanism to shield crops from harsh and unfavorable environments that hinder plant growth. Because the greenhouse is a non-linear system, regulating it becomes challenging. Temperature, relative humidity, carbon dioxide, nutrition, water availability, and growing media are the factors that impact plant growth. The use of smart greenhouses has significantly increased as automation and artificial intelligence have progressed These greenhouses are equipped with tools and systems that enhance the quantity and quality of the products while minimizing energy consumption.

Modern greenhouses measure, display, and control various parameters that affect the growth of greenhouse products, such as environmental temperature and humidity, light intensity and duration, carbon dioxide level, soil temperature, and other factors. Robust sensors, actuators, and control algorithms are the main components that make artificial temperature control systems function. Together, these parts monitor environmental factors and modify system configurations to ensure that the environment is customized to meet the unique needs of various plant species. Precise temperature, humidity, and nutrient control are made possible by sophisticated technologies including automated irrigation, heating, cooling, and ventilation systems which are monitored by complex control algorithms and installed with many sensors both inside and outside the greenhouse. These systems maximize plant growth while consuming less resources and having a positive environmental impact. In conclusion, artificial climate control systems play a crucial role in modern greenhouse agriculture, enabling precise regulation of environmental conditions to enhance crop growth, productivity, and sustainability.

HITASA/AB/2024/108

Diversity of predatory dipterans associated with mealybugs of horticultural crops of Karnataka

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Predatory dipterans are some of the most common natural enemies associated with mealybugs. However, poor knowledge on their life history and taxonomy has obscured their role in the biological control of mealybug species. Surveys were conducted to study the diversity of predatory dipterans associated with mealybugs of horticultural crops of Karnataka from 2019 to 2021. Mealybugs were found infesting on the leaves, shoots, nodes, flowers, fruits, roots and under loose bark in many fruit crops, vegetable crops, plantation and as well as ornamental crops during present investigation. The collected mealybug species were slide-mounted and identified based on morphological key. Maggots predating on various stages of mealybugs under field condition were collected and identified by rearing them in lab condition until adulthood. In the present investigation, a total of seven dipterans belonging to five families *viz*., Cecidomyiidae (*Triommata coccidivora* (Felt) and *Diadiplosis* sp.), Drosophilidae (*Cacoxenus perspicax* (Knab) and *Acletoxenus* sp.), Chamaemyiidae (*Leucopis* sp.), Cryptochaetidae (*Cryptochaetum* sp.) and Syrphidae (*Paragus* sp.) were found associated with eight mealybug species *viz*., *Ferrisia virgata, Maconellicoccus hirsutus, Nipaecoccus viridis, Phenacoccus solenopsis, P. madeirensis, Planococcus citri, Psuedococcus longispinus* and *Rastrococcus iceryoides* on various hosts during the present study. Among them, highest number of predatory diptera was recorded from the family Cecidomyiidae (69.3967 %), followed by Drosophilidae (19.73 %), Chamaemyiidae (4.76 %), Cryptochaetidae (3.40 %), and Syrphidae (2.72 %). The present study efficiently demonstrated that cecidomyiids (predatory gall midge) are the most common predators reared from

mealybug colonies, but the impact of these natural enemies on mealybug populations needs to be evaluated further.

HITASA/AB/2024/109

Effects of Organic manures and Inorganic fertilizers on Growth, Fruit Yield and Quality of Cherry Tomato (*Solanum lycopersicum* var. *cerasiforme*) c.v. Pusa Cherry Tomato-1 under Naturally Ventilated Polyhouse Condition

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The present investigation was carried out at Naturally Ventilated Polyhouse, Department of Horticulture, SHUATS, Prayagraj (U.P.) during winter season of 2021 - 2022, to evaluate the most suitable treatment combination of organic manures and inorganic fertilizers for growth, fruit yield and Quality of Cherry Tomato. The experiment was laid out in randomized block design with 13 treatments replicated thrice. The treatments consisted of different combinations of organic manures i.e., FYM (Farmyard Manure), Poultry manure and Vermicompost and inorganic fertilizers. Among thirteen treatments under study, treatment T3 100% Organic Manures(33% FYM + 33% Poultry manure + 33% Vermicompost) recorded maximum plant height (235.20 cm), minimum days to first flowering (45.36), minimum days to 50% flowering (61.42), maximum number of branches per plant (11.33), maximum number of fruits per cluster (24.17), minimum days to first fruit setting (55.97), maximum number of cluster per plant (12.2), maximum average number of fruits per plant (237.53), maximum fruit set Percentage (86.65%),maximum fruit weight (13.25g), maximum fruit width (3.04 cm), maximum fruit yield per plant (3.91kg), maximum fruit yield per hectare (130.59 tonne), maximum TSS(10.64^{o}Brix), Max. Juiciness (27%). Maximum number of flowers per cluster (29.33) was observed in T6(75% RDN + 25%

Vermicompost), Max. ascorbic acid content (24.57 mg/100g) was observed in T11(25% RDN + 75% Poultry manure).

Key words : Cherry Tomato, Organic, Yield and Quality.

HITASA/AB/2024/110

Effect of Agronomic fortification of pigeonpea with Zn and Fe on growth and yield parameter and yield of pigeonpea

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Pigeonpea (*Cajanus cajan*) is a vital leguminous crop providing substantial nutritional benefits to millions worldwide. However, its yield and nutritional quality are often constrained by micronutrient deficiencies, particularly zinc (Zn) and iron (Fe). This study investigates the effects of agronomic fortification with Zn and Fe on the growth, yield parameters and overall yield of pigeonpea. The experiment was conducted through a randomized complete block design with nine treatments and replicated thrice. Agronomic fortification involved foliar application of Zn and Fe at flowering and pod development stages. Results indicated, among different treatments the foliar application of 0.5 % $ZnSO_4$ + 0.5 % $FeSO_4$ at flower and pod initiation recorded significant higher plant height (156.7 cm), number of branches per plant (16.8), number of pods per plant (98.5), number of seeds per pod (5.4), pod weight per plant (128.5 g), seed weight per plant (83.5 g), seed yield (1056 kg ha^{-1}) and stalk yield (2503 kg ha^{-1}) in the fortified treatments compared to the control. Notably, the combined Zn-Fe fortification exhibited the most pronounced effects on growth and yield parameters. Overall, agronomic fortification with Zn and Fe positively influenced the growth, yield parameters, and yield of pigeonpea, suggesting its potential as a

sustainable strategy to alleviate micronutrient deficiencies and enhance crop productivity in pigeonpea cultivation systems.

Keywords: Pigeonpea, Fortification, Zinc, Iron, Micronutients, Growth, Yield.

HITASA/AB/2024/111

Growth and yield attributes and yield of pigeonpea as influenced by Pigeonpea + Speciality corn and parching sorghum intercropping

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Intercropping systems offer promising strategies for sustainable agriculture by maximizing land use efficiency and enhancing crop productivity. This study examines the impact of intercropping pigeonpea with specialty corn and parching sorghum on growth attributes, yield parameters and overall yield of pigeonpea. The experiment was conducted using a randomized complete block design with five treatments: T_1: Sole Pigeonpea, T_2: Pigeonpea + Field bean (1:2), T_3: Pigeonpea + Sweet corn (1:2), T_4: Pigeonpea + Baby corn (1:2) and T_5: Pigeonpea + Parching sorghum (1:2) were replicated thrice. Growth parameters such as plant height, number of branches were assessed alongside yield attributes including pod number per plant, number of seeds per and seed weight per plant. Results indicated that among different intercropping systems, pigeonpea + Field bean (1:2) ratio recorded significant higher plant height (158 cm), number of branches per plant (13.2), number of pods per plant (90.4), number of seeds per pod (5.0), pod weight per plant (56.8 g), seed weight per plant (40.5 g), seed yield (885 kg ha^{-1}) and stalk yield (1593 kg ha^{-1}) followed by pigeonpea + parching sorghum (1:2) intercropping as

compared to other intercropping system. The pigeonpea + fieldbean intercropping system exhibited superior performance, showing increased yield attributes and overall yield compared to other treatments. The enhanced growth and yield observed in intercropped systems highlight the potential of diversifying cropping systems to optimize resource utilization and improve crop productivity in pigeonpea cultivation. This research underscores the importance of exploring innovative intercropping strategies for sustainable intensification of agriculture and ensuring food security in diverse agroecological contexts.

Keywords: Pigeonpea, Fieldbean, Sweet Corn, Baby Corn, Parching Sorghum, Intercropping.

HITASA/AB/2024/112

Utilizing Karonda Pulp as a Nutrient Booster in Extruded Snack

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Karonda (*Carissa carandas* L.) is one of the potential underutilized fruits that have nutritional benefits and applicable for the preparation of different value-added products. Extrusion processing is High-Temperature Short Time (HTST) process whereby the food product is exposed to very high temperatures for only a few seconds. The study on the topic "Utilizing karonda pulp as a nutrient booster in extruded snack" was conducted at the Department of Postharvest Technology, College of Horticulture, Bengaluru in the academic year 2021-2022. Karonda pulp fortified extruded snack was developed with three variables namely karonda pulp

(5, 7.5 and 10%), barrel temperature (100, 115 and 130 °C) and moisture content (16, 18 and 20%). Sensory scores (9-point hedonic scale) of extruded snacks prepared with 10 per cent of karonda pulp, 100 °C barrel temperature and 18 per cent of moisture content had recorded maximum sensory scores. The extruded snack with the same composition registered 2.88 expansion ratio, 198 crispness, 10.73 Kg hardness, 49.04 Kg sec chewability, 86.54 mm fracturability, 0.92 per cent crude fibre, 8.81 per cent protein, 0.91 per cent anthocyanin, 4.38 ppm copper, 40.23 ppm zinc, 4.12 ppm manganese and 37.34 $mg100g^{-1}$ iron.

Keywords: Extruded snack, karonda pulp, fortification, expansion Ratio, textural characteristics

HITASA/AB/2024/113

Doubling Farmers' Income in Saurashtra Region: A Multifaceted Approach

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The Saurashtra region faces the critical challenge of doubling farmers' income, demanding a comprehensive and multifaceted approach. Our strategy encompasses agricultural diversification, technological adoption, and market linkages to enhance productivity and profitability. Through targeted skill development programs, farmers will be empowered with the latest farming techniques and sustainable practices. Water management will be a key focus, leveraging innovative irrigation methods and rainwater harvesting to mitigate the impact of erratic climatic

conditions. Access to credit and financial inclusion initiatives will be strengthened, ensuring farmers have the necessary resources to invest in modern farming technologies and inputs. Market-oriented interventions, such as creating farmer producer organizations and strengthening supply chains, will enable direct access to markets, reducing dependency on middlemen. Furthermore, the promotion of agro-processing industries in the region will add value to agricultural produce, opening new avenues for income generation. This multifaceted approach, blending technology, training, financial support, and market reforms, aims to create a sustainable and resilient agricultural ecosystem in Saurashtra, ultimately realizing the ambitious goal of doubling farmers' income.

Keywords*:* Doubling, Farmers, Income, Saurashtra, Region

HITASA/AB/2024/114

Biotechnological approach and impact on tropical and subtropical fruit crops

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The requirement of fruits is increasing proportionally with the increasing population in the country. India is the second largest producer of fruits in the world, falling behind China. Productivity of majority of fruit crops in India is low. India's share in world fruit market is also very low. Although conventional plant breeding techniques have made considerable progress in the development of improved varieties, they have not been able

to keep pace with the increasing demand for fruits in the developing countries. Therefore an immediate need is felt to integrate biotechnology to speed up the crop improvement programmes. So, plant biotechnology has opened new avenues and opportunities, especially tissue culture, genetic engineering and genetic marker in horticulture to combat all kind of challenges. Biotechnological advancements have revolutionized tropical and subtropical fruit crop cultivation, enhancing productivity, quality, and resilience. Biotech tools like tissue culture and molecular markers enable efficient breeding programs, accelerating varietal development. Furthermore, genetic engineering facilitates the creation of novel cultivars with enhanced nutritional profiles and reduced environmental footprints. Despite the promising prospects, challenges such as public perception and regulatory frameworks must be addressed. Overall, biotechnology offers unprecedented opportunities for sustainable fruit production in tropical and subtropical regions.

Keywords*:* Biotechnological, approach, tropical, subtropical and fruit crops

HITASA/AB/2024/115

Precision Agriculture, AI, and Water Efficiency: The Future of Farming

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The convergence of Precision Agriculture, Artificial Intelligence (AI), and water efficiency heralds a transformative era in farming practices. This interdisciplinary approach leverages advanced technologies to optimize resource utilization and enhance overall agricultural productivity.

Precision Agriculture integrates data from satellite imagery, sensors, and machine learning algorithms to provide farmers with real-time insights into crop health, soil conditions, and weather patterns. AI algorithms analyze this vast dataset to generate actionable recommendations, enabling farmers to make informed decisions on irrigation, fertilization, and pest control. Central to this paradigm shift is the pivotal role of water efficiency in sustainable agriculture. AI-driven systems enable precise irrigation management, tailoring water delivery to the specific needs of crops, thus preventing over-irrigation and minimizing water wastage. This not only conserves a scarce resource but also contributes to environmental sustainability. The synergy of Precision Agriculture and AI not only enhances crop yield but also minimizes environmental impact, promoting eco-friendly farming practices. As the agricultural sector faces the challenges of a growing global population and climate change, the integration of Precision Agriculture and AI-driven water efficiency emerges as a beacon of innovation. This holistic approach not only ensures food security but also lays the foundation for a sustainable and resilient future in agriculture.

Keywords: Precision, Agriculture, AI, Water Efficiency and Farming

HITASA/AB/2024/116

Integrated Pest Management Concepts in Organic Farming Systems

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Integrated Pest Management (IPM) is a holistic approach employed in organic farming systems to manage pests effectively while minimizing environmental impacts and promoting sustainable agricultural practices. IPM in organic farming emphasizes preventive measures such as crop rotation, intercropping, and habitat manipulation to create balanced ecosystems that naturally suppress pests. Cultural practices such as proper irrigation, soil management, and selecting pest-resistant crop varieties are integral components of IPM strategies in organic systems. Biological control methods, including the introduction of beneficial insects, predators, and microbial agents, play a crucial role in regulating pest populations while maintaining ecological balance. Additionally, IPM encourages the use of physical barriers, such as row covers and traps, to reduce pest infestations without relying on synthetic pesticides. Monitoring and scouting techniques are essential for early pest detection, allowing farmers to implement timely interventions while minimizing the need for chemical treatments. Furthermore, IPM encourages continuous learning and adaptation to local conditions, integrating traditional knowledge with modern scientific advancements to optimize pest management strategies. By embracing the principles of Integrated Pest Management, organic farming systems can effectively mitigate pest pressures while fostering biodiversity, soil health, and long-term agricultural sustainability. This abstract highlights the significance of IPM in promoting resilient and environmentally-friendly farming practices within organic agriculture.

Keywords: Integrated, Pest, Management and Organic Farming Systems

HITASA/AB/2024/117

Effect of Different Intercropping Systems on Growth Attributes and Yield of Cotton and Intercrops

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A field experiment was conducted to study the growth attributes and yield of cotton and intercrops due to different intercropping systems at Cotton Research Unit, Department of Agronomy, Dr. PDKV, Akola during *kharif* season of 2021-22. The experiment was laid out in Randomized Block Design with nine treatments and three replications. The variety of cotton PDKV JKAL-116 *Bt* (BG-II) was used for sowing with 120-60-120 cm paired row spacing and intercrops like greengram (Kopergaon), blackgram (AKU -10-1), soybean (JS 9305), and pigeonpea (PKV-TARA) genotypes were used as intercrops for sowing. Experimental results revealed that sole *Bt* cotton registered significantly higher growth parameters viz., plant height, number of functional leaves, leaf area, dry matter accumulation, number of monopodia and sympodial branches and yield attributes viz., number of picked boll per plant (26.95), average boll weight (4.28 g), seed cotton yield per plant (131.23 g) as compared to other paired row planting of cotton with different intercrops and some intercropping treatments being at par with sole cotton. The seed cotton yield (1962 kg ha^{-1}), lint yield (713 kg ha^{-1}), cotton stalk yield (3231 kg ha^{-1})and biological yield per hectare (5193 kg ha^{-1}) were also recorded significantly higher in sole *Bt* cotton than the paired row planting of cotton with different intercrops. Among the various treatments, the paired row planting of *Bt* cotton with two rows of greengram registered significantly highest seed cotton equivalent yield (2385 kg ha^{-1}) followed by cotton + greengram intercropping system at 1:1 row proportion (2357 kg ha^{-1}) and being at par with sole *Bt* cotton in respect to seed cotton yield.

HITASA/AB/2024/118

Effect of Intercrops on Weeds and Nutrients uptake and Post-harvest Nutrient Status of Cotton under Vidarbha condition

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A field experiment was conducted to study the effectiveness of intercrops on weeds and nutrients uptake and post-harvest nutrient status of cotton at Cotton Research Unit, Department of Agronomy, Dr. PDKV, Akola during *kharif* season of 2021-22. The experiment was laid out in Randomized Block Design comprising nine treatment combinations which were replicated thrice. The cotton genotype PDKV JKAL-116 *Bt* (BG-II) was used for sowing with 120-60-120 cm paired row spacing. Experimental results revealed that there is an influence of grain legumes as intercrop with paired row planting of cotton on weed population. As cotton is slow growing in nature and widely spaced too, it creates suitable conditions for an increased weed competition in the crop. As a result, during the investigation sole cotton grown at 90x60 cm^2 spacing recorded significantly a greater number of weeds from initial stage (37.05) up to harvest (49.18) as compared to other intercropping system in paired row cotton except cotton + pigeonpea (6:2) might be due to wider spacing. Weed population comprising of grasses, sedges and broad-leaved weeds were found to be significantly reduced under different intercrops grown in paired row cotton due to suppressive effect on weed growth and smothering effect of different intercrops. In intercropping system there was 10.76% to 72.88% weed reduction as compared to sole cotton. Lowest weed population (10.18 to 20.05 weeds per m^2) was recorded in cotton+ greengram at 1:1 row proportion from initial stage up to harvest. Greengram and blackgram showed superior in reducing weed population as compared to soybean and Pigeonpea. Weed smothering efficiency was influenced by multitier intercropping system. During the year of study, cotton intercropped with one row of greengram registered the maximum weed smothering efficiency of 53.91% to 68.93% followed by the treatment paired row planting of Bt cotton with one row of blackgram and one row of soybean (47.76% to 66.74%). Paired row planting of Bt cotton with two rows of greengram also having good weed smothering efficiency (46.49% to 64.91%) than other combination of intercrops. High foliage producing capacity of intercrops, suppressed the weed growth. The minimum weed smothering efficiency was recorded in the treatment of cotton + pigeonpea in (6:2) row proportion from 9.28% to 18.08%. On an average 55.29 kg nitrogen, 12.08 kg phosphorus and 35.80 kg potassium were removed by *Bt* cotton from the soil. The uptake of major nutrients by the crop is a function of crop dry matter accumulation and nutrient

availability and nutrient concentration in plants. Multitier intercropping systems are highly intensive in nature and their impact on productivity of the soil needs to be assessed. During the study, it was found that nutrient uptake and post-harvest nutrient status were varied significantly. Higher total nitrogen (65.95 kg ha^{-1}), phosphorus (15.58 kg ha^{-1}) and potassium (42.73 kg ha^{-1}) uptake were significantly recorded higher in sole cotton than other combination of intercrops.

HITASA/AB/2024/119

Cross Legume Species/Genera Transferability of SSR Markers Polymorphic to Parents of F2 Mapping Population in Blackgram (*Vigna mungo* L. Hepper)

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Three hundred and ninety-five cross legume species/ genera SSR markers (65 from soyabean, 12 from medicago, 9 from chickpea, 105 from adzukibran, 70 from cowpea and 134 from mungbean) were used to identify those polymorphic to parents of F_2 mapping population *viz*., TAU-1 and LBG-17 in Blackgram, a genomic resource limited crop. Of these 395 SSR markers, 315 SSR markers (79.50%) amplified and 71 of them (22.62%) were polymorphic between the parents of F_2 population. Among the 71 cross legume polymorphic SSR markers, those based on, di-nucleotide repeat motifs exhibited highest polymorphism (67.60 %), followed by tri- (18.30 %), complex-(9.85 %) and tetra- nucleotide repeat motifs (4.22 %). The identified polymorphism cross legume SSR markers is suggested for use in various applications in Blackgram breeding research. The present study showed possibility of using cross legume species/ genera SSR markers in Blackgram for genotyping the F_2 mapping

population for gene mapping and subsequently for marker assisted selection.

Keywords: Vigna mungo, Blackgram, Transferability, Simple Sequence Repeat, Repeat Motifs, F_2 population

HITASA/AB/2024/120

Characterization and Pathogenicity of Fungal Isolates Associated with Brinjal Wilt in India

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Brinjal wilt is a significant disease in India with a complex and variable etiology. This study aimed to identify and characterize fungal isolates associated with the disease using morphological, phylogenetic, and pathogenic analyses. Fungal isolates were recovered from brinjal samples collected across India and identified based on morphological characteristics and sequencing of the *tef-1α* gene. Phylogenetic analysis revealed six distinct species belonging to four taxonomic groups: *Fusarium oxysporum* species complex (FOSC), *Fusarium solani* species complex (FSSC), *Fusarium incarnatum-equiseti* species complex (FIESC), and *Fusarium fujikuroi* species complex (FFSC). *F. solani* (50%) and *F. oxysporum* (23%) were the most prevalent species, while *F. falciforme* (FSSC), *F. incarnatum* (FIESC), and *F. proliferatum* (FFSC) were identified for the first time in India. All isolates exhibited pathogenicity under controlled conditions but with varying degrees of virulence. Isolates BRFO-VRF-8 (Fo) and BRFS-OD (Fs) displayed the highest virulence, inducing characteristic wilt symptoms. Further investigation into the genetic basis of virulence revealed limitations in using previously reported markers. While avirulence (SIX) and virulence (*Fow1* and *Fow2*) genes were not reliable indicators due to their inconsistent presence and expression across isolates, simple sequence repeat (SSR) markers provided some level of differentiation. Although SSR clustering did not directly correlate with virulence, it revealed significant intraspecific variability (40% each) within Fo and Fs isolates. This study provides valuable insights into the diversity

and virulence potential of fungal isolates associated with brinjal wilt in India. Further research is needed to identify robust molecular markers for efficient disease diagnosis and management.

Keywords: - *Fusarium*, Effector gene, Pathogenicity gene, Virulence, SSR marker

HITASA/AB/2024/121

Synthesis and Characterization of Nano Zinc Oxide for Linseed: Assessing the Impact of Nano Zinc Oxide on Growth, Yield, and Nutrient Uptake by Linseed

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The study focused on assessing the impact of nano zinc oxide on growth, yield, and soil fertility after linseed harvest in the 2019-20 rabi season at AICRP Linseed Farm, College of Agriculture, Nagpur. Using a Randomized Block Design with seven treatments replicated three times, the research involved synthesizing zinc oxide nanoparticles through direct precipitation and characterizing them via FTIR and Dynamic Light Scattering. Nano ZnO particle size ranged from 45.18 to 48.50 nm, showing consistent dispersion (Polydispersity Index 0.224 to 0.250), and zeta potential values of -27.2 ± 7.6 mV, indicating stability in aqueous suspension. Treating linseed seeds with 1000 ppm nano ZnO resulted in the highest germination rate (88%) and improved plant attributes. Notable outcomes included increased plant stand, branches, capsules, and substantial seed yield. Soil parameters were also affected, especially with a treatment involving $ZnSO_4$ at 15 kg/ha and foliar spray of nano ZnO at 0.25%. This led to elevated soil pH, enhanced nutrient availability (nitrogen, potassium, sulfur), improved electrical conductivity, increased zinc availability, and positively influenced soil organic carbon and phosphorus content.

Keywords: Nano ZnO, growth, yield, linseed

HITASA/AB/2024/122

Parasitisation of jackfruit shoot and fruit borer, *Diaphania caesalis* (Lepidoptera: Pyralidae) by *Apanteles* sp

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The jackfruit shoot and fruit borer, *Diaphania caesalis*, is a significant pest of jackfruit, causing economic damage to both shoots and fruits globally. For the eco-friendly management of any pest, biological control agents are promising element. Studies were undertaken to find the natural parasitisation efficiency and population dynamics of *Apanteles* sp. (Hymenoptera: Braconidae) at the Department of Entomology, GKVK, Bangalore during 2022-23. *Apanteles* sp was a specific larval parasitoid of jackfruit shoot and fruit borer, *Diaphania caesalis,* which *is* found to be an abundant parasitoid in jackfruit ecosystem. During field observations, no parasitiasation was observed in field collected pupae. However, field collected larvae were found parasitized by the larval parasitoid *Apanteles* sp. (Hymenoptera: Braconidae) that is an endoparasitiod, feeding internally on 3rd to 5th instar larvae. Weekly observations showed that, the activity of parasitoid, *Apanteles* sp. was highest (44.50%) on 21st Julian day and the lowest activity (10.00%) was recorded on the 42nd Julian day. An attempt was made to confirm the relationship between the larval density and the percent parasitism, as the highest percent parasitization corresponded with the highest incidence date. The association between the larval burden and parasitization appeared to be increasing, although it was determined to be statistically non-significant ($r = 0.546$; $n = 10$; $p > 0.05$).

Key words: Jackfruit shoot and fruit borer, Parasitoid, Parasitization, Julian days

HITASA/AB/2024/123

Brown manuring: A potential tool for weed control and sustainable rice production

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Aerobic rice cultivation, an alternative to flooded paddy fields, reduces water usage by 45 per cent. In this innovative approach, rice is cultivated in well-drained, non-waterlogged soils, substantially mitigating water usage and environmental impact. offer a transformative solution amid climate change and resource scarcity, with high input efficiency. However, widespread adoption faces hurdles such as increased weed infestation. Brown manuring is a "no-till" variation of green manuring involves growing rice and Sesbania spp or Sun hemp together. Green manure has limitations, requiring a lengthy crop cycle for breakdown. Brown manuring emerges as a viable option, supplying essential nutrients to crops, aiding weed management, and enhancing soil properties. Brown manuring, co-cultivating rice with sun hemp and later desiccating it after 20-25 days of sowing with selective herbicides like 2, 4-D ester. It enriches soil, addressing nutrient deficiencies and promotes microbial activity. It enhances soil structure and water retention. Optimizing these practices can maximize productivity and sustainability in aerobic rice farming. This study examines brown manuring and herbicides impact on growth and yield.

Keywords: Aerobic rice, Brown manuring, Green manuring, Weed infestation, Sun hemp, Sesbania

HITASA/AB/2024/124

Yield and Cost Economics of Brinjal Under Drip Fertigation.

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Although the agriculture sector plays an important role in the Indian economy, it is constantly declining, while the agriculture service sector is improving. Therefore, there is a need to enhance the yield and cost economics of farming. The present study was conducted in the field section of the Department of Irrigation and Drainage Engineering, Dr. P. D. K. V., Akola, to increase the yield of the brinjal crop. The experiment was set up in a randomized block design (RBD) with five treatments: four drip fertigation levels (75, 100, 125, and 150% Recommended Dose of Fertilizer (RDF)) and a control treatment of 100% RDF traditional fertilizer application, all of which were replicated four times. The study revealed that there was a significant increase in plant growth, number of branches and number of fruits per plant, resulting in enhancing the yield of brinjal production. The highest yield of brinjal, i.e., 557 q/ha, was observed in the treatment of drip fertigation at 150% RDF, which was on par with drip fertigation with 125% RDF, which recorded a 554 q/ha yield of brinjal. Whereas, traditional fertilizer application with 100% RDF produced the lowest yield of brinjal, i.e., 428 q/ha. Given that treatment with 125% RDF requires less fertilizer and a lower cost of cultivation than treatment with 150% RDF fertigation, it may be stated that treatment with 125% RDF is the best option for the application of drip fertigation for maximum B:C ratio and higher net monetary returns.

Keywords: Brinjal, Recommended Dose of Fertilizer, Benefit Cost Ratio, Fertigation

HITASA/AB/2024/125

Evaluation of Compatibility and Bio-Efficacy of Selected Agrochemicals against Thrips, *Thrips palmi* Karny (Thysanoptera: Thripidae) in Soybean

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Recent days there is a demand for tank mixing of different agrochemicals in order to manage both insect pests and diseases and also to reduce application costs. Incompatibility of mixed agrochemicals can reduce the effectiveness, cause damage to plants or contribute to the development of insecticide resistance in pests. To address these issues, a laboratory and field experiment was conducted at Agricultural Research Station (UAS, Dharwad), Sankeshwar, Karnataka to assess compatibility and bio-efficacy of selective insecticides (Diafenthiuron 50 % WP @ 1.25 g l^{-1}, Dinotefuran 20% SG @ 1 g l^{-1}, Thiamethoxam 25 % WG @ 0.3 g l^{-1} and Spiromesifen 22.9 % SC @ 1 ml l^{-1}), fungicides (Propiconazole 25 % EC @ 1 ml l^{-1} and Tebuconazole 50 % + Trifloxystrobin 25 % WG @ 0.5 g l^{-1}) and water-soluble fertilizer (19:19:19, N:P:K @ 5 g l^{-1}) mixtures at their recommended doses in soybean. The results showed that out of different combinations tested diafenthiuron 50 % WP + propiconazole 25 % EC + 19:19:19, dinotefuran 20 % SG + propiconazole 25 % EC + 19:19:19 and diafenthiuron 50 % WP + tebuconazole 50 % + trifloxystrobin 25 % WG +19:19:19 showed sedimentation levels of 2 ml l^{-1}, 1 ml l^{-1} and 2 ml l^{-1}, respectively which was less than the limits of 2ml/100ml as specified by Indian Standard Institute, 1973. The pH of test solutions was in the range of 6.44 to 8.36 and none of the solutions was extremely acidic nor extremely alkaline. Among different treatments imposed in field diafenthiuron 50 WP was recorded as the best effective treatment in controlling thrips by showing the highest per cent reduction of 74.25 % followed by

diafenthiuron 50 WP + propiconazole 25 EC + 19:19:19 (72.01 %), diafenthiuron 50 WP + tebuconazole 50 + trifloxystrobin 25 WG + 19:19:19 (70.13 %) and none of the combinations exhibited phytotoxic symptoms. Hence, test combination treatments were physically, chemically and biologically compatible.

HITASA/AB/2024/126

Evaluation Of Extrudates Prepared From Legume Based Composite Flour Blended With Kokum Rind Powder

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Extrusion cooking is one of the most efficient and versatile food processing advance technology that is used to produce pre-cooked and dehydrated foods. The aim of the present investigation is to develop the extrudates using cereal- maize as base material; experiments were formulated for rice, horse gram as legume and blended with kokum rind powder. Maize flour level was kept constant as 50 per cent and Rice and horse gram flour level was changed vice versa. Such as Rice flour decreased from 40, 30, 20 and 10 % and simultaneously horse gram flour level increased from10, 20,30and 40 %. The 100 % mixed composite flour of maize, rice and horse gram flour is again blended with 0, 3, 5,7,10 and 15 % kokum rind powder. Extrudates were preapared at 130^{0}C,Screw speed 275 rpm and 5 mm die diameter with a constant feeder rpm 35. The extrudates were analysed for its functional, nutritional properties and organoleptic evaluation.

It was found that extrudates prepared by using 50 per cent maize, 40 per cent rice , 10 per cent horse gram flour and blended with 5 per cent kokum rind powder have secured high score for overall acceptability (6.74)

during organoleptic evaluation of extrudates. Considering the optimum functional properties and based on the maximum score for overall acceptability, the extrudates expansion ratio (3.09), water absorption index (8.84), water solubility index (7.42) , hardness (42.19 N) and bulk density (101.10kg/m^3) of the extrudates prepared by using 50 per cent maize flour, 40 per cent rice flour,10 per cent horse gram flour and 5 per cent kokum rind powder are accepted as nutritious and of best quality extruades.

Keyword: extrusion cooking, extrudates, composite flour, functional properties, nutritional properties, organoleptic evaluation, overall acceptability, expansion ratio, hardness, bulk density.

HITASA/AB/2024/127

Evaluation of Antibacterial activity of Ethyl acetate and Acetone extracts of *Terminalia chebula* fruits

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Terminalia chebula, is well-known for its wide range of therapeutic benefits in the treatment of numerous dangerous illnesses and ailments. Because *T. chebula* can still effectively treat numerous clinical infections, it remains an essential medicine for many common health conditions. The antibacterial activity of *Terminalia chebula* fruit extracts, both ethyl acetate and acetone, was investigated in this work against a few clinical isolates, including *Salmonella typhi*, *Escherichia coli*, *Staphylococcus aureus*, and *Klebsiella pneumonia*. The minimum inhibitory concentration (MIC) was ascertained using the Strip dip method, Strip dip method was developed as

a part of this study, and antibacterial susceptibility was evaluated using the well diffusion method. Both *T. chebula* fruit extracts produced positive results, however the ethyl acetate extracts were reported to be more effective than the acetone extract. The ethyl acetate extract exhibits the maximum growth inhibition, measuring 98.77% and 98.59%, while the acetone extract of *T. chebula* fruits demonstrated 94.25% and 91.08% growth inhibition against *E. coli* and *K. pneumonia*, respectively. Furthermore, at a 4 mg concentration, *S. aureus* and *S. typhi* demonstrated 87.69% and 74.40% growth inhibition with ethyl acetate extract, respectively, and 85.69% and 66.60% growth inhibition with acetone extract. Based on the data, *T. chebula* continues to exhibit encouraging effects against a variety of harmful microorganisms and may prove to be a useful treatment for several emerging diseases.

Keywords: *Terminalia chebula*, Strip dip method, minimum inhibitory concentration (MIC), Antibacterial susceptibility.

HITASA/AB/2024/128

Analyzing the Impact of Drought Stress on Biomass and Yield Characteristics in Different Sorghum Varieties.

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Sorghum, a crucial staple crop in India and the world's fifth most important cereal, faces significant challenges in production due to drought stress. To address this issue, a comprehensive study was conducted at the University of Agricultural Science, Dharwad, spanning two *rabi* seasons (2021-22 and 2022-23). The investigation aimed to identify drought-

tolerant sorghum genotypes through field experiments under both irrigated and rainfed conditions, employing a split-plot design with two replications for twenty sorghum genotypes. The study unveiled the profound impact of moisture stress on various aspects of sorghum performance, grain yield per plant, total dry matter accumulation, stover yield, and the harvest index. Notably, BJV-4 and M-35-1 emerged as highly resilient genotypes, showing minimal reduction (approximately 15g) in total dry matter under rainfed conditions compared to irrigated conditions. Basavan moti and Phule Anuradha excelled under irrigated conditions, with biomass yields of 233.50 and 282.62 g plant^{-1}, respectively. Conversely, M 148-138 experienced a substantial reduction of 66g in total dry matter per plant under rainfed conditions. In terms of grain yield per plant, M 148-138 and Tandur L exhibited significant reductions under rainfed conditions, with decreases of 34.3 and 30.9 grams, respectively, compared to irrigated conditions. On the other hand, BJV-44 and M-35-1 demonstrated minimal drops in grain yield under rainfed conditions. Basavan moti and BJV-44 genotypes maintained reduced stover yield under rainfed conditions, with yields of 5900 kg ha^{-1} and 6115 kg ha^{-1} in irrigated conditions and 4461 kg ha^{-1} and 4621 kg ha^{-1} in rainfed conditions, respectively. The harvest index, a critical parameter reflecting biomass allocation efficiency, highlighted Basavana pada as the highest performer at 35.25%, followed by Tandur L, Phule Vasudha, and SVD-1403R with harvest indices of 33.26, 31.70 and 31.46%, respectively. In conclusion, this study provides valuable insights into sorghum genotype performance and resource utilization under varying moisture conditions, identifying BJV-44 and M-35-1 as promising drought-tolerant genotypes with sustained grain yields. Basavana pada exhibited the highest harvest index, indicating its efficiency in converting biomass into grain yield. These findings enhance our understanding of sorghum genotype performance and resource utilization under varying moisture conditions in drought-prone regions.

Keywords: sorghum, drought, rainfed, biomass, grain yield and harvest index

HITASA/AB/2024/129

Evaluation of Physico-Chemical properties of lemongrass flavoured milk

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Milk is considered a complete human food because it provides high-quality proteins, lactose, flavour-enriching fat, calcium and other minerals. Flavoured milk is one of the special milk prepared which contains all the milk constituents like proteins, carbohydrates and minerals. In the present investigation, lemongrass extract from lemongrass leaves has been incorporated to prepare flavoured milk. The lemongrass extract was prepared using fresh and clean lemongrass leaves and added to fresh cow milk in different concentrations [T1- 2% (98:2), T2- 4% (96:4), T3- 6% (94:6), T4- 8% (92:8) and T5-10% (90:10) (v/v)] to prepare lemongrass flavoured milk. In all treatments, sugar was added @ 8% (w/v). After mixing the flavoured milk was analysed for different chemical attributes viz., total solids, fat, protein, ash, titratable acidity and pH. The total solids, protein, fat and pH were maximum in T1 (19.11%, 3.31%, 3.42% and 6.46 respectively) and were found to decrease with increasing concentration of lemongrass extract. While, ash content and titratable acidity had shown an increasing trend (highest in T5; 0.84% and 0.208%, respectively) with increasing levels of lemongrass extract. Considering the medicinal and flavouring properties of lemongrass, this experiment was conducted to increase the consumption of flavoured milk and improve human health.

Keywords: Physico-chemical, flavoured milk, proteins, lactose

HITASA/AB/2024/130

Screening of maize hybrids against fall armyworm *Spodoptera frugiperda* (J. E. Smith) and isolation of associated endophytes

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The screening experiment was conducted in Zonal Agricultural Research Station, Mandya and isolation of endophytes was conducted in department of Agricultural Microbiology, College of Agriculture, Mandya. Preliminary screening of 30 maize hybrids against fall armyworm (FAW), *Spodoptera frugiperda* was recorded on FAW incidence from 15 days after sowing at fortnightly intervals up to 60 days. From the observed data, it was noticed that, out of 30 hybrids, 6 were grouped under least susceptible, 19 under moderately susceptible and 5 under highly susceptible category. Based on this resistant category, hybrids were selected for isolation studies. A total of 5 fungal endophytes namely, *Trichoderma* spp., *Metarhizium* spp., *Penecillium* spp., *Fusarium* spp. and *Aspergillus* spp. were isolated at 20 and 60 DAS. Among these, two fungal species (*Aspergillus* spp. and *Penecillium* spp.) from leaf, one *Fusarium* spp., from root tissues and two fungal species (*Metarhizium* spp. and *Trichoderma* spp.) from both whorl leaf and root samples were isolated from the selected maize hybrids. At 20 DAS, *Aspergillus* spp., *Metarizhium* spp., *Penicellium* spp., *Trichoderma* spp., were isolated where, the colonization was more in whorl leaf samples (20.37%) when compared to root tissues (9.25%). Out of which *Trichoderma* spp., showed highest colonization with 6.48% followed by *Aspergillus* spp., with 3.7%, *Metarhizium* spp., (2.77%) and *Penicellium* spp., (2.70%). At 60 DAS, *Aspergillus* spp., *Metarizhium* spp., *Penicellium* spp., *Trichoderma* spp. and *Fusarium* spp., were isolated where, maximum colonization was seen in whorl leaf samples (14.81%) in comparison with root tissues (11.11%). Out of the endophytes isolated *Trichoderma* spp. showed highest colonization (5.55%) followed by genera *Aspergillus* spp., *Metarizhium* spp., *Penicellium* spp. and *Fusarium* spp. showed 1.85% each.

Keywords: Screening, fall armyworm (FAW), hybrids, endophytes and colonization

HITASA/AB/2024/131

Evaluation of Mulberry Species (*Morus* spp.) as a Potential Source of Bioenergy through Thermochemical Characterization and Gasification

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This study investigated the thermochemical properties and gasification potential of three mulberry species (*Morus laevigata*, *Morus nigra*, and *Morus australis*) as potential sources of renewable energy. The analysis revealed that all three species possessed favourable characteristics for fuelwood, including low moisture content (8.43% - 8.65%), moderate ash content (1.26% - 2.00%), and high volatile matter content (81.67% - 82.10%). The calorific value and higher heating value ranged from 18.04 MJ Kg^{-1} to 19.87 MJ Kg^{-1} and 18.73 MJ Kg^{-1} to 20.64 MJ Kg^{-1}, respectively, indicating their suitability for energy generation. Gasification analysis showed that the syn-gas composition primarily consisted of CO (24.3% - 27.9%), H_2 (12.0% - 12.7%), CH_4 (2.1% - 2.3%), CO_2 (10.2% - 10.9%), and N_2 (47.2% - 50.7%). The syn-gas calorific value ranged from 5.51 MJ m^{-3} to 5.97 MJ m^{-3}, and the thermal conversion efficiency varied between 59.18% and 62.18%. These findings suggest that mulberry species hold promise as a sustainable and efficient source of bioenergy.

Keywords: Mulberry, thermochemical properties, gasification, syn-gas, bioenergy

HITASA/AB/2024/132

Biological management of Phomopsis blight (*Phomopsis vexans*) of brinjal (*Solanum melongena* L.).

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Trichoderma spp. is the biological fungicide which is found naturally in the soil and rhizosphere of the plants and trees. Phomopsis blight (*Phomopsis vexans*) is disease of brinjal (*Solanum melongena*) which is causing disease of all the part of plant (fruit, leaves and stem) and it is also known as fruit rot of the brinjal. Therefor, it is most important to find as a new substitute for chemical control of Phomopsis blight. The present study was aimed to investing the in vitro. Mycoparasitic ability to control of Phomopsis blight. In this study we used the monoculture of the pathogen (*Phomopsis vexans*) and biological control (Trichoderma spp.) test rate and dual confrontation assays to control the Phomopsis blight of Brinjal. In this experiment we found that *Trichoderma viride* posses the strongest mycoparasitic ability with (85.05%) followed by *Trichoderma harzianum* (82.96%) and the minimum percent (%) growth inhibition was recorded in case of *Trichoderma asperellum* (68.62%). (all the treatment found significant compared with control.)

HITASA/AB/2024/133

Nano-Biofertilizers and Nano-Biopesticides for Food Safety and Security

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Agriculture plays a major role in global economy. Chemical fertilizers are widely and continuously used in agricultural systems to boost yields, but this practice has several negative health and

environmental impacts. Decrease in crop productivity, increase in nutritional scarcity due to rapid increase in population and climate change are the biggest challenges in agriculture. To increase agricultural output and environmental sustainability, a new system must be developed. The utilization of nano-biofertilizers is one of the best solution for agricultural challenges because they are eco-friendly, increase seed germination, soil fertility, nutrient utilization efficiency and yields. Nanobiofertilzers also combats abiotic and biotic stress. Chemical pesticides are sprayed directly on plants, toxins may be transferred into the food chain, can cause environmental issues and climate change. Nano-biopesticides and nano-biofertilizers are encapsulated in carriers that allow the active ingredients to be released gradually to achieve the desired results in a particular environment. Nano-clay materials provide high aspect ratio interaction surfaces for encapsulating "agrochemicals such as fertilizers, plant growth stimulants, and insecticides." Nano-biopesticides are gaining popularity due to their tiny size, high surface-area-to volume ratio, stability, enhanced efficacy, better solubility, mobility, and decreased toxicity. Nano-biofertiliers and nano-biopesticide are also developed by using organic nanomaterials such as lignin, lipids, starch, chitosan, cellulose, zeolites, polymers, and others. Though nanotechnology for nanobiofertilizers and nanobiopesticides is infancy, yet it is promising potential for transforming traditional farming techniques into smart and sustainable agriculture and also helps in climate resilience. Nano-biofertilizers enhances plant growth and yield, whereas nano-biopesticides prevents pest and pathogen attack which promotes food safety and security.

Keywords: Nano-biofertilizers, Nano-biopesticides, Climate change, Sustainable agriculture, Climate resilience.

HITASA/AB/2024/134

Metagenomics in Microbiome Manipulation for Increased Disease Resistance in Plants

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Metagenomics is a powerful tool in studying genetic makeup of microbial community and holds significant promise for advancing plant health and disease resistance through manipulation of the plant microbiome. Microbiome manipulation involves altering of genome of microbes and utilizing for disease, pest resistance and bioremediation processes. Functional metagenomic screening identifies genes associated with disease resistance within the microbiome. It contributes in analyzing temporal dynamics in reaction to external stimuli, offering perceptions into the stability and durability of the manipulated microbiome. Metagenomics depends mainly on DNA sequencing techniques such as 16S rRNA gene sequencing, ITS sequencing, particularly shotgun sequencing to unravel the diversity and functional potential of the plant microbiome. Shotgun sequencing involves shot gun blasting for DNA fragmentation followed by sequencing by Sanger or NGS method. The contigs and scaffolds are assembled by De Bruijn graph or Overlap-Layout-Consensus (OLC) method. Post assembly, annotation is done for identifying genes for disease resistance. This information becomes pivotal for identifying key microbial contributors to disease resistance. Metagenomics enables not only the isolation and cultivation of beneficial microorganisms but also the development of synthetic microbial consortia through synthetic biology approaches. Moreover, meta transcriptomics and meta proteomics provide potential view of gene expression and protein production within the microbiome, enlightening the functional activity of microorganisms. After sequencing and identifying favorable microbiome, gene editing techniques like CRISPR-Cas is used for targeted manipulation of specific microbial groups. The manipulated microbiome is introduced into plants through methods like seed inoculation, soil drenching, foliar spray of microbiome, root dipping in water containing inoculum and hydroponics. Thus, microbiome manipulation helps in developing immune response in plants and disrupts the colonization and spread of disease-causing organisms.

Keywords: Metagenomics, Microbiome manipulation, shotgun sequencing, Meta transcriptomics, Meta proteomics

HITASA/AB/2024/135

Molecular Mapping of a Novel Brown Planthopper Resistance Gene *bph46* in Rice (Oryza sativa L.)

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Brown Planthopper (BPH), scientifically known as *Nilaparvata lugens* (Stål), poses a significant threat to rice producing countries. Utilizing host-plant resistance is a highly effective, eco-friendly, cost-efficient, and sustainable strategy for managing BPH infestations. Wild rice species, which contain beneficial alleles capable of improving rice, were utilized in identification and mapping of the BPH resistance gene from *Oryza nivara* accession IRGC 93198 using BC_2F_2 and BC_2F_3 progenies. Among 239 BC_2F_2 plants, a segregation ratio of 3:1 (Susceptible: Resistant) was observed with 65 displaying resistance and 174 being susceptible. The segregation pattern of BC_2F_3 progenies in 1:2:1 ratio, affirmed that the resistance from *O. nivara* is governed by a single recessive gene. Bulk segregant analysis (BSA) identified a genomic region on the short arm of chromosome 4 associated with BPH resistance. Further molecular mapping conducted on the BC_2F_2 population identified a quantitative trait locus (QTL) within the marker interval RM16285 and RM6314, explaining 27% of the phenotypic variance at LOD 22.34. The linked marker RM6659 proved effective in distinguishing susceptible from resistant lines when applied to a panel of rice cultivars, making it suitable for marker-assisted selection in crop breeding programs. Notably, previously identified BPH-resistant genes located on chromosome 4 were found to be susceptible to the BPH biotype 4 screening test, underscoring the novelty and potential utility of *bph46* as a valuable donor.

HITASA/AB/2024/136

Effect of different agronomic practices on yield and quality of chia (*Salvia hispanica* L.)

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A field experiment was conducted during *kharif* 2021 to study the effect of spacing, organic nutrient management and jeevamrutha in chia at Zonal Agricultural Research Station, V. C. Farm, Mandya. The experiment was laid out in Factorial RCBD comprising two factors *viz*., two spacings (45 cm × 15 cm and 60 cm × 15 cm) and six organic nutrient management practices (application of 75 and 100% RDN equivalent compost + application of jeevamrutha at the time of sowing and 30 DAS). Spacing had shown significant influence on yield of chia, while it had non-significant effect with respect to quality parameters *viz*., crude protein, oil, zinc and iron content. Significantly higher seed and haulm yield (844 and 2635 kg ha^{-1}, respectively) was obtained with the spacing of 45 cm × 15 cm compared to 60 cm × 15 cm (753 and 2292 kg ha^{-1}, respectively). Application of 100% RDN equivalent compost + jeevamrutha at the time of sowing and 30 DAS recorded significantly higher seed yield (974 kg ha^{-1}), haulm yield (3050 kg ha^{-1}), crude protein (23.45 %), oil (31.53%), zinc (3.97 mg $100g^{-1}$) and iron content (6.99 mg $100g^{-1}$) and lower values was registered with 75% RDN equivalent compost (608 kg ha^{-1}, 1808 kg ha^{-1}, 20.56%, 27.21%, 2.86 mg $100g^{-1}$ and 5.03 mg $100g^{-1}$, respectively).

Keywords: Chia, Crude Protein Content, Haulm Yield, Oil content and Seed Yield.

HITASA/AB/2024/137

Studies on spacing and nutrient management on performance of chia (Salvia hispanica L.)

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An experiment entitled "Studies on spacing and nutrient management on performance of chia (*Salvia hispanica* L.)" was carried out during the year 2020 (*kharif* season) at ZARS, V. C. Farm, Mandya. The treatments comprised of two levels of spacing (S_1: 45 × 15 cm^2 and S_2: 60 × 15 cm^2) and six levels of organic nutrient management practices (N_1: 75% RDN equivalent compost, N_2: 100% RDN equivalent compost, N_3: 75% RDN equivalent compost + jeevamrutha application at the time of sowing, N_4: 100% RDN equivalent compost + jeevamrutha application at the time of sowing, N_5: 75% RDN equivalent compost + jeevamrutha application at the time of sowing and 30 DAS and N_6: 100% RDN equivalent compost + application of jeevamrutha at the time of sowing and 30 DAS). These were laid out in 2 × 6 Factorial-RCBD with three replications. The data revealed that, among spacing S_2 recorded higher absolute growth rate (0.98 and 1.89 g/day, respectively at 30 – 60 and 60 – 90 DAS) and biomass duration (219.93, 879.36 and 2170.54 days, respectively at 0 – 30, 30 – 60 and 60 – 90 DAS). While relative growth rate (1.67 and 1.21 g/g/day × 10^{-2}, respectively at 30 – 60 DAS and 60 – 90 DAS) and leaf area ratio (2220.18, 1996.40 and 1522.29 cm^2/g × 10^{-2}, respectively at 30, 60 and 90 DAS), higher values were obtained with S_1. Among organic nutrient levels, maximum absolute growth rate (1.04 and 2.07 g/day, respectively at 30 – 60 and 60 – 90 DAS) and biomass duration (256.48, 979.90 and 2376.35 days, respectively at 0 – 30, 30 – 60 and 60 – 90 DAS) was recorded with N_6, while higher relative growth rate (1.88 and 1.20 g/g/day × 10^{-2}, respectively at 30 – 60 DAS and 60 – 90 DAS) and leaf area ratio (2665.12,

2209.73 and 1723.26 $cm^2/g \times 10^{-2}$, respectively at 30, 60 and 90 DAS) was found with N_1. Interaction between spacing and organic nutrient levels was found non-significant.

Keywords: Chia, Absolute Growth rate, Biomass Duration, Leaf Area Ratio and Relative Growth Rate.

HITASA/AB/2024/138

Initiative towards doubling the medium scale farmers output by innovative irrigation method

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Over the past few decades, technology in agriculture has advanced significantly. However, small and medium-sized agricultural enterprises cannot always afford to have access to these technological advances. The output of agricultural systems in this category is low compared to large-scale irrigation systems. Therefore, the input requirements of small-scale farming systems need to be fully controlled to provide maximum benefits to these farmers.

The design and development of innovative irrigation methods to support smallholder farmers was presented. Irrigation is the most important requirement for all types of agriculture and the most important input for all types of crops. Proper, cost-effective irrigation methods help farmers maximize production. In general, manual irrigation methods are often used in small-scale farming systems to minimize costs. Therefore, technology-based manual irrigation systems will help marginal and small farmers.

In this study, a new irrigation system with a simple gear train arrangement is introduced. The designed system must be installed on a hand pump on the farm. Plunger rod with piston is an important part of hand pump. This reciprocating motion draws water from underground. As

the number of reciprocating movements of the plunger rod increases, the amount of water that can be pumped from the well is maximized.

Engineered models with hand pumps provide maximum output with less manual effort. The designed system is environmentally friendly and works without external sources.

Running this event can involve a very wide range of people. In addition to the typical strong man and woman, everyone from children, the disabled and infirm to the average person can take part in this work. In short, physical fitness is not considered as a constraint for implementing this mechanism.

Keywords: Simple gear train, hand pump, mechanism, farming, effort.

HITASA/AB/2024/139

Development of flat bread by incorporating moringa leaves powder

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Moringa oleifera is a multipurpose and exceptionally nutritious vegetable tree with a variety of potential uses and its leaves are most nutritious and drying of Moringa leaves powder not only increases the micronutrients but also it increases the shelf- life of its powder. In this study three types of drying methods are used sun drying, tray drying and shade drying to improve nutritional property of flat bread. Proximate composition of three methods of dehydrated leaves were determined and compared. Four sensory attributes of appearance, aroma, texture, taste and overall acceptability using 9-point hedonic scale. Nutritional value of dehydrated Moringa leaves added sample was compared with a control. Result revealed that a significant increase in ash and carbohydrate content. Further, obtained a significant improvement in beta- carotene content and mineral content of leaves. 90:10, wheat flour: dehydrated Moringa leaves incorporated flat bread was best considering all sensory attributes. Hence, incorporation Moringa leaves into flat bread has improved nutritional profile and reduced calorie value.

HITASA/AB/2024/140

Study of Productivity and Quality of Mango + Pineapple Agroforestry System under Nutrient and Irrigation Management Practices for Sustainable Livelihood Security

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The fruit-based agroforestry system, a sustainable and self-reliant approach, is being explored for its potential to enhance land productivity and meet population needs. A field experiment was conducted at AICRP on Agroforestry Research Farm, OUAT, Bhubaneswar, Odisha during May 2020 to June 2021, to study the impact of irrigation on the mango-pineapple agroforestry system. The experiment comprised of three main plots including three irrigation systems i.e., sprinkler, drip & ridge furrow and four subplots including nutrient management such as organic [FYM + Dry leaf mulch + biofertilizer (Azotobacter: Azospirillium: PSB in 1:1:1){4 kg each/ha}], recommended dose of fertilization (RDF) (75%) + FYM, RDF (100%) + FYM, RDF (125%)+ FYM. The experiment replicated treatments in a split plot design, with mango trees placed 6x6m^2 apart and pineapple plants planted 75x60 cm^2 between 20-year-old mango trees.

The results of the study indicated that, regardless of nutrient management techniques, drip irrigation produced the highest growth metrics in both species for mango trees and pineapples, which showed the highest growth parameters with RDF (125%) + FYM. The total soluble solid, acidity, reducing, and non-reducing sugar of pineapple and mango fruit were all greatly improved by the application of organic nutrients whereas RDF + FYM produced the worst results. The maximum yields of mango and pineapple were obtained using the RDF (125%) + FYM fertilization approach, which produced a gross return of Rs 5.65 lakhs per year per ha and a net return of Rs 4.02 lakhs per year per ha. In terms of gross return, net return and BCR values per year per ha, the drip system performed better than the sprinkler and ridge furrow irrigations.

Among the seventeen sustainable development goals set forth by the United Nations is the achievement of zero hunger (SDG 2). The UN resolved to accomplish it by 2030 after flagging it off in 2015. By using the fewest resources possible while maintaining soil health, which eventually results in the production of crops with higher quality, my research will open the door to realizing this dream of maximum output.

Keywords: Sustainable production, agroforestry system and integrated nutrient management

HITASA/AB/2024/141

Spectral Analysis of Pink Mealy Bug Damaged Mulberry Plants Using Hyperspectral Radiometry.

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At the mulberry garden of the Department of Sericulture, Tamil Nadu Agricultural University (TNAU), Coimbatore, studies were conducted on spectral analysis of pink mealy bug damaged mulberry plants using hyperspectral radiometry. In these trial, at 15-day intervals during the active damage stage, the percentage damage was observed in plots infested with pink mealy bugs and those that were healthy. Measurements of spectral reflectance across various wavelengths and vegetation indices (VIs) were taken using a hyperspectral radiometer. The analysis included evaluating the sensitivity of different spectral bands and VIs to pink mealybug damage, along with employing correlation and regression

analyses between the extent of pest damage and the VIs, and constructing correlation intensity curves.

The findings revealed distinct differences in the spectral reflectance profiles of mulberry plants compared to their healthy counterparts. Typically, affected plants exhibited increased reflectance in the red (620–680 nm) and green (520–590 nm) bands and reduced near-infrared (NIR) reflectance (770–860 nm). The average values of the Normalized Difference Vegetation Index (NDVI), Green Red Vegetation Index (GRVI), and Ratio Vegetation Index (RVI) were significantly lower in the pink mealybug-damaged plants across all measurements. Notably, red reflectance demonstrated the greatest sensitivity to pink mealybug-induced damage.The study highlighted the Simple Ratio (SR) index as particularly effective for identifying pest damage. Damage estimation by pink mealybugs was refined using linear regression models based on spectral indices, specifically NDVI, RVI, and GRVI. The correlation intensity analysis pinpointed the green region at 516.73 nm as showing the most significant negative correlation (r = -0.02), whereas the highest positive correlation with pink mealybug damage was observed in the NIR region (r = 0.77), underscoring the precise wavelengths and indices most indicative of pest impact. Thus, using hyperspectral radiometry identification damage caused by pink mealy bug possible, through analysis of spectral bands and indices.

Keywords: Pink mealy bug, spectral reflectance, vegetative indices, Spectral bands.

HITASA/AB/2024/142

Microplastic contamination in commercial fish species of Pattinapakkam Fish Landing center, Tamil Nadu, India

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Microplastic contamination in commercial fish species is a growing concern due to its potential impact on food safety and human health. This study aims to assess the prevalence and effects of microplastics in marine fishes at the Pattinapakkam Fish Landing Center in Tamil Nadu, India. A total of 50 fish samples were collected for the analysis of microplastic. A new and enhanced alkaline digesting method based on alcoholic potassium hydroxide (KOH) was utilized to digest the organic components. About 21 fish, which includes species viz., *Rastrilleger kanagurta, Arius maculatus,* **Nemipterus japonicus,** *Saurida tumbil and Terapon jarbua* showed the presence of microplastic particles in their GI tract. The Fourier Transform Infrared Radiation (FTIR) analysis identified the presence of polymers, notably Polyethylene and Polyamide, in the gastrointestinal tracts of marine fish. The results clearly revealed the widespread occurrence of microplastic pollution in economically significant fish species caught in the coastal regions near Chennai. The detection of microplastics in fish highlights concerns regarding potential effects on both the ecosystem and human health. Immediate and thorough interventions are crucial to tackle plastic pollution and safeguard the coastal environment against additional contamination.

HITASA/AB/2024/143

Characterization of millets endophytes for the antimicrobial properties

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Millets are small seeded grasses, widely grown in arid and semiarid regions throughout the world for food, feed, fuel and fodder purpose. To increase the production and productivity, an investigation has been carried out to identify the bacterial endophytes for the management biotic stress and growth promotion in millets. The root and shoot portion of the samples were used for isolation of bacterial endophytes through sterility check method. Total of 228 bacterial endophytes have been isolated from sorghum (94 Nos.), finger millet (42 Nos.), little millet (37 Nos.) and kodo millet; (39 Nos.). The endophytic bacterial isolates were screened against the *Macrophomina phaseolina* under *in-vitro* condition. Among the tested isolates, 10-R-1 recorded maximum mycelia growth inhibition of 56.66% against the pathogen. The bacterial isolates of all small millets were screened against the banded sheath blight pathogen (*Rhizoctonia solani*). Among the finger millet isolates, FM18 recorded 61.11%, little millet isolate LM42 recorded 57.78% and Kodo millet isolate LM24 recorded 60.37% of mycelial inhibition of *Rhizoctonia solani* under *in-vitro*. Selected endophytes were identified through molecular characterization by using 16*S* rRNA gene sequence. The amplified endophytes at 560bp were confirmed with sequencing. The selected 47 bacterial endophytes tested for plant growth promotion activates. Out of which, 26, 34, 6 and 7 number reported positive for Ammonia production, Phosphate solubilisation, Siderophore production and HCN production respectively. Seed treatment with elite bacterial endophytes was carried in millets for effective seedling length. The maximum seedling length of 64.32cm (SEB15), 37.96cm (FMEB13), 35.39 cm (KMEB12) and 48.61cm (LMEB40) in Sorghum, Finger millet, Kodo millet and Little millets respectively compare to control.

Keywords: Millets, Antimicrobial, Endophytes, millets, growth promotion

HITASA/AB/2024/144

Impact of Nutrient Management on Economics of Field Pea (*Pisum sativum* L.)

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The experiment conducted at Lovely Professional University's Agriculture Research Farm in Phagwara, Punjab, India, during the rabi season of 2022–2023 aimed to investigate the impact of nitrogen management on the growth and yield of field peas. Utilizing a randomized complete block design with three replications, fifteen treatment combinations involving the application of chemical fertilizers (NPK) and micronutrients (boron and zinc) were tested. Among these combinations, the application of foliar spray with 0.2% B and 0.5% Zn, along with 100% recommended dose of fertilizer (RDF), resulted in high costs of cultivation (₹48,626.7 ha^{-1}), gross returns (₹1,62,180 ha^{-1}), net returns (₹1,13,553.30 ha^{-1}), and recorded a high benefit-cost ratio (2.33). This indicates that the application of 100% RDF along with micronutrients B and Zn outperformed the control, suggesting that this approach is recommended for maximizing production and net profit in field pea cultivation.

HITASA/AB/2024/145

Climatic And Edaphic Influences on Productivity and Carbon Sequestration Of Farm Grown Teak (*Tectona grandis*, Linn.f) In Tamil Nadu, India

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Teak (*Tectona grandis,* Linn.f) is one of the most demanded tree crops owing to the exemplary quality and market value of its timber, presently Indian sub-continent is importing Teak in a larger quantity. The growth and wood quality of Teak changes with edapho climatic variations between the sites which was a least addressed concept in the area of research. So in order to address this phenomenon, this study is taken up in three agroclimatic zones especially pertaining to farmland conditions viz., North Eastern Zone (NEZ), North Western Zone (NWZ) and Cauvery Delta Zone (CDZ) of Tamil Nadu to analyze the biometric attributes, volume and carbon sequestration of farm-grown teak under different age class conditions. The present study revealed that, among the three different agroclimatic zones, the maximum biometric attributes viz., mid diameter (0.193 m), volume (0.379 m^3), heartwood proportion (0.239 m^3) and carbon sequestration (0.683 Mg/acre) is recorded under NEZ 15-20 years. On concluding the overall performance of the study the trees are grown under 15-20 years age class showed higher heartwood under farmland conditions, hence 15-20 years age class can be recommended in farmland conditions of Tamil Nadu.

Keywords: Agroclimatic zones, carbon sequestration, Farmland, Heartwood volume, Teak, Wood quality, Biometric attributes, Age class, Timber

HITASA/AB/2024/146

Taxonomic characterization of invasive thrips species, *Thrips parvispinus* and its host range in Telangana, India

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South East Asian thrips *Thrips parvispinus* is an invasive alien insect species and it was introduced into our country during 2015 and caused havoc with an estimated yield loss of 50-75% in chilli crop during 2021-22 and its infestation is increasing at an alarming rate in major chilli growing areas of Telangana. To assess the incidence of the thrips infestation on chilli and other alternate host plants, the thrips population were collected from six major chilli growing areas of Telangana state *viz.,* Jagtial, Peddapalli (Northern Telangana Zone), Khammam, Mahabubabad (Central Telangana Zone), Nagarkurnool and J. Gadwal (Southern Telangana Zone) during *kharif* 2022-23 & 2023-24. The collected samples were identified using the standard taxonomic keys which confirmed the existence of *T. parvispinus*as the major thips species on chilli. The incidence of the exotic thrips species was recorded on a total of 38 alternate hosts. Among them, 9 were vegetables (brinjal, wild brinjal, tomato, bottle gourd, bitter gourd, ridge gourd, onion, amaranthus and drumstick), 6 were pulses (dolichus beans, garden pea, red gram, green gram, black gram and cow pea), 5 were oil seeds (sunflower, sesamum, groundnut, mustard, safflower), 12 were ornamental plants (marigold, chrysanthemum, nerium, ornamental sunflower, plumeria, periwinkle, rose, cosmos, corn flower, Indian shot, gallardia and singapore daisy) and 4 were weed species (congress grass, Indian abutilon, mexican poppy and lantana), 1 commercial crop (cotton) and 1 fruit crop (mango). The number of *T. parvispinus* per flower recorded in the alternate hosts ranged from 1.48 to 4.12/flower in vegetables, 1.12

to 3.84/flower in pulses, 0.80 to 25.20/f;ower in ornamentals, 0.96 to 17.32/flower in oil seeds, 1.24 to 2.64/flower in weed plants. The highest number was recorded in marigold (25.20/flower) and the lowest in periwinkle (0.80/flower). The results concluded that, *Thrips parvispinus*t has not noly established as the major thrips species infesting the chilli , but it is also spreading to major other cultivatedas well as weed crops necessitating the need to develop crop specific suitable IPM packages as it is very difficult to manage the pest with chemical pesticides.

Keywords: Thrips parvispinus, chilli, taxonomic, alternate hosts, IPM

HITASA/AB/2024/147

Development, characterization and in-vitro gastrointestinal release studies of flaxseed oil microcapsules

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The objective of this study was to develop microcapsules of flaxseed oil using a combination of skim milk powder (SMP) and Hi-Cap 100 (HC100) in a 75:25 ratio as coating material. Flaxseed oil emulsions were prepared by combining flaxseed oil (20-35% of total solids), SMP and HC100 to achieve 20-35% total solids (TS) in the emulsion. Stable emulsions were prepared using high speed shear mixer which were subsequently spray dried. Response surface methodology with a two-factor central composite rotatable design was employed for experimental design. The identified dependent variables were oil load (20%, 25% and 30% of TS) and TS concentration in the emulsion (20%, 25%, 30% and 35%) while microencapsulation efficiency (ME), moisture content, bulk density, peroxide value (PV) of powder and zeta potential (ZP) were analyzed as responses. Flaxseed oil microcapsules prepared from an emulsion with 35% TS and 20% oil load exhibited maximum ME and ZP with minimum PV. Particle size distribution analysis revealed that particles were polydispersed, with a mean particle diameter varying from 2.16 to 11.17

μm. Scanning electron micrographs of the microcapsule powder showed spherical shapes without any apparent fissures on surfaces. Under simulated gastrointestinal conditions 65% of the oil was released from the flaxseed oil microcapsules. PV indicated high oxidative stability of microcapsules for up to six months of storage at room temperature (35±1°C). The microcapsules could serve as a food fortificant for the delivery of omega -3 fatty acids in vegan diet.

Keywords: Flaxseed oil; microencapsulation; omega – 3 fatty acids; spray drying

HITASA/AB/2024/148

Effect of different culture media on growth and sporulation of *Fusarium udum:* Causing wilt in Pigeonpea

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Pigeon pea is a significant pulse crop cultivated in India, contributing to 90% of the global production. India holds a dominant position, occupying more than 50% of the total pulse cultivation area and contributing 60% to the overall pulse production. Pigeon pea serves as a primary protein source in the human diet, playing a crucial role in food security and subsistence agriculture. Its versatile applications include use in food, fodder, fuel, integrated farming systems, soil conservation, and biological nitrogen fixation. However, the pigeon pea yield is adversely affected by biotic stresses such as diseases and insect pests. Among these, Wilt, Sterility mosaic, Phytophthora blight, and Alternaria blight are identified as major and destructive diseases. This study was conducted during the 2022-23 in the Phyto bacteriology laboratory, Department of Plant Pathology, GBPUAT, Pantnagar to assess in vitro efficacy of various culture media on the mycelial growth and sporulation of *Fusarium udum*, the causative agent of Pigeonpea wilt. The pathogen was isolated from pigeonpea fields and identification based on morphological characteristics.

Petri plates containing different culture media viz., Glucose peptone agar media, Host root extract media, Czapek dox agar media, Oat meal agar media, Potato Dextrose agar (PDA) media, Carrot dextrose agar media, Malt extract agar media, Richards's agar (RA) media, T2 media, and Corn meal agar media were inoculated with the test pathogen to study *Fusarium udum's* growth characteristics. The maximum colony diameter (90.0mm) and abundant sporulation were observed on PDA, while the minimum colony diameter and poor sporulation were noted in T2 medium. This research sheds light on the relationship between *Fusarium udum* and synthetic substrate, providing valuable insights for better cultural growth idea in in-vitro experiments.

Keywords: *Fusarium udum,* Pigeonpea, Media, Growth, sporulation.

HITASA/AB/2024/149

Microbial Processing of Horse Gram (*Macrotyloma uniflorum*) for Reduction of Antinutritional Factors

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Horse gram is one among the legume crops with rich source of protein that offers an alternate meat source to the vegans and poorer section people as well. However, it remains underutilized by reason of antinutritional factors such as tannins, phytates and oxalates etc. which can bind /precipitate proteins /other organic compounds /positively charged mineral ions (calcium, magnesium, copper, iron and zinc) making them unavailable for absorption thereby showing adverse effects on human health. However, processing is a well established strategy for lowering cooking time and antinutrients thereby add-on to its acceptability and nutritional quality. Simultaneously, it can even alter the chemical and functional properties of food positively, desired for transforming raw into

acceptable form, thereby promoting its commercial utilization. Hence, an attempt was made to investigate suitable processing method to develop horse gram *dosa* with minimum antinutritional content. The seeds were subjected to various processing methods like soaking, roasting, cooking and germination combined with/ without fermentation and analysed for antinutritional factors. A total of 13 lactic acid bacterial isolates (HLB-1, HLB-2, HLB-3, HLB-4, HLB-5, HLB-6, HLB-7, HLB-8, HLB-9, HLB-10, HLB-11, HLB-12 and HLB-13) were obtained from whole horse gram seeds and were characterized. Results showed that soaking in combination with fermentation was found to be effective in reduction of antinutritional factors and was utilized further to develop horse gram *dosa*. The protocol was standardized as 2:1:0, 2:0:1, 2:0.5:0.5, 2:0.25:0.75 and 2:0.75:0.25 ratio of rice, black gram and horse gram dhal inoculated with HLB-3, HLB-9, HLB-10, HLB-11, HLB-12 and HLB-13 isolates at 6, 8 and 10 % inoculum, incubated and fermented at 25, 30 and 35^0 C for 8, 12 and 16 h using *Lactobacillus acidophilus* – NCIM 2903 as reference. The substrate ratio of rice, black gram and horse gram (2:0:1) inoculated with HLB-12 isolate at 10 % inoculum incubated at 35^0 C for 12 h duration was found to be the best for effective reduction of tannin (72.25 %), phytate (59.50 %) and oxalate content (62.05 %) with good sensory score (7.88 out of 9.00). The efficient isolate HLB-12 was molecularly characterized and identified as *Leuconostoc mesenteroides*.

HITASA/AB/2024/150

Isolation, Selection and Characterization of Salt and Temperature Tolerant Plant Growth-Promoting Rhizobacteria for Enhancing Tomato Plant Growth in Saline Environments.

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The present study was focused on isolation, selection and characterization of salt and temperature tolerant plant growth promoting rhizobacteria from rhizosphere soil of tomato. A total of 46 isolates were developed on Ashby's Mannitol agar media in the laboratory of department of Agricultural Microbiology, MPKV, Rahuri, Maharashtra during year 2020-2023. The medium was supplied with various NaCl concentrations, $MgCl_2$ concentrations, and pH levels to examine the tolerance to salt and temperature. All the forty six isolates showed promising salt tolerance. Out of forty six isolates, nine isolates were extremely salt tolerant (more than 5.4 % salt tolerance limit). Two isolate were tolerant to NaCl concentration (2.10- 3.6 % salt). Nine isolates were moderately tolerant to NaCl concentration (0.09-1.50 % salt). Twenty six isolates were moderately sensitive to NaCl concentration (0.15-0.60 % salt). On the basis of the salt tolerance limit, rhizobacteria that promote plant growth in salt and temperature-tolerant environments were categorized. Out of forty six isolates, eight isolates showed growth at $MgCl_2$ concentration of 4.0 %, two isolates showed growth at 3.0 % $MgCl_2$ concentration, thirteen isolates showed growth at 2.0 % $MgCl_2$, fifteen isolates showed growth at 1.0 % $MgCl_2$ andeight isolates showed growth on 0.5 % $MgCl_2$ concentration. Out of the 46 isolates, eight showed growth at pH of 9.0, whereas the other 38 showed development at pH of 7.0. The plant growth promoting activity check was positive for 4 isolates (*Pseudomonas furukawaii* STT-A8, *Achromobacter* sp. STTA-12, *Agrobacterium pusense* STT-A24, and *Agrobacterium pusense* STT-A39) out of the forty six total isolates. *Pseudomonas furukawaii* STT-A8 (NCBI Accession no-OR432529), *Achromobacter sp.* STT-A12 (NCBI Accession no-OR432558) Shown temperature tolerance limit at 60^0c and *Agrobacterium pusense* STT-A24 (NCBI Accession no-OR428230) and *Agrobacterium pusense* STT-A39 (NCBI Accession no-OR428223) shown temperature tolerance limit at 50^0c. The experiment was done to characterize salt and temperature tolerant PGPR that would be a crucial inoculum to enhance tomato plant growth and development in a salty environment.

Keywords: Isolation, selection, characterization, salt and temperature tolerant, plant growthpromoting rhizobacteria

HITASA/AB/2024/151

Biochemical basis of chemically induced disease resistance against ergot of sorghum caused by *Sphacelia sorghi*

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Sorghum is a multipurpose food crop that is ranked among the top five cereal crops in the world. Sugary disease is a threat to sorghum production and causes significant yield loss ranging from 20 to 80 per cent in hybrid seed production. The induced resistance concept has been receiving a lot of attention in recent years as a non-conventional method of improving plant disease resistance. Hence an investigation was carried out to determine biochemical basis of disease resistance induced by chemical compounds like chitosan, salicylic acid, acibenzolar-s-methyl, beta-aminobutyric acid, ethylene, jasmonic acid, benzoic acid, indole 3 butyric acid, benzothiadiazole and zinc oxide against ergot of sorghum caused by *Sphacelia sorghi.* The result revealed that all the ten chemical inducers at 1, 10, 100 and 1000 ppm concentrations significantly increased the phenylalanine ammonia lyase (PAL) and polyphenol oxidase (PPO) as compared to control at 3, 6 and 9 days of pathogen inoculation. The maximum PAL was found in chitosan @1000 ppm treated sorghum leaves which was 0.049, 0.094 and 0.103 µmol/min/g/FW at 3, 6 and 9 days of pathogen inoculation, respectively whereas, salicylic acid @1000 ppm treated sorghum leaves recorded maximum PPO of 0.101, 0.145 and 0.149 min^{-1} g^{-1} FW at 3, 6 and 9 days of pathogen inoculation. The lowest quantity of PAL and PPO was observed with control treatment (pathogen inoculated). It is evident that all treatments at different concentrations increased the activity of PAL and PPO at 6 days of pathogen inoculation then started declining. Enhanced activity of the PAL and PPO in the treated plants may be responsible for the defensive response in the sorghum against *S. sorghi*. Integration of disease tolerance genotypes combined with

prophylactic sprays of chitosan or salicylic acid proved to be very economical for managing ergot of sorghum.

HITASA/AB/2024/152

Studies on the Effect of Integrated Nutrient Management (INM) on Growth and Yield Parameters of Carrot (*Daucas carota* L.) cv. Kuroda Improved under Southern Telangana Conditions

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A field experiment was conducted during rabi 2017-2018 at Vegetable Research Block, College of Horticulture – Mojerla, SKLTS Horticultural University, Hyderabad, Telangana, India, to study the effect of integrated nutrient management (INM) on growth and yield parameters of carrot (*Daucas carota* L.) cv. Kuroda improved. The experiment was carried out with the nine integrated nutrient management treatments i.e. T1 - RDF (NPK @ 50:40:50 kg/ha), T2 - FYM 12 t/ha, T3 - Vermicompost @ 6 t/ha, T4-- Rhizosphere Bacteria (AZB + PSB each @ 7 kg/ha), T5 - 50 % RDF + 50 % FYM @ 6 t/ha, T6 - 50 % RDF + 50 % Vermicompost @ 3 t/ha, T7 - 50 % RDF + 50 % Rhizosphere Bacteria, T8 - 25 % RDF + 50 % FYM @ 6 t/ha + 50%Vermicompost @ 3 t/ha, T9 - 25 % RDF + 50 % FYM @ 6 t/ha + 50 % Vermicompost @ 3 t/ha + 50 % Rhizosphere Bacteria, in Randomized Block Design and replicated thrice. Among the treatments, T9 (25 % RDF + 50 % FYM @ 6 t/ha + 50 % Vermicompost @ 3 t/ha + 50 % Rhizosphere Bacteria) registered significantly higher plant height (53.50 cm), more number of leaves per plant (16.40), maximum leaf length (38.20 cm) and fresh weight of leaves (62.46 g), least number of days taken to harvest

(75.33 days), maximum root length (19.76 cm), root diameter (3.96 cm), fresh weight of root (81.33 g), root yield per plot (5.60 kg) and root yield per hectare (18.60 t).

Key words: Carrot cv. Kuroda improved, INM, Growth, and Yield.

HITASA/AB/2024/153

Effect of container and storage condition on longevity of wheat seed

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The present investigation entitled, "Effect of container and storage condition on longevity of wheat seed" was conducted during 2020-21 at Seed Technology Research Unit (STRU), M.P.K.V., Rahuri. The experiment consist of four varieties *viz*., Godavari (V_1), Panchavati (V_2), Tapovan (V_3) and Trimbak (V_4), two storage condition *viz*., Ambient storage (S_1) and Storage at low temperature (20^0C) (S_2), Five storage container such as Gunny bag (C1), Cloth bag (C_2), Polythene bag (C_3), HDPE bag (C_4) and Pro-grain bag (C_5) and three seed type age fresh seed (A_1), Rvd Ist seed (A_2) and Rvd IInd seed (A_3).

The study revealed that, among the varieties, significant differences were observed. The seed quality parameters *viz.,* germination percentage (88.04 %), root shoot length (32.30 cm), seedling dry weight (0.300 g) vigour index I (2844.33), vigour index II (23.72), Electrical conductivity (0.444 dSm^{-1}) and field observation *viz*., field emergence (75.55 %) was better in respect of variety Godavari followed by Panchavati, Tapovan and Trimbak. Among the storage condition, storage at low temperature (20^0C) i.e. cold storage, condition was formed better for seed longevity of wheat. The seeds stored in polythene bag were better for maintained the better seed quality parameters (germination (88.16 %),

(root-shoot length (32.29 cm), (seedling dry weight (0.30 g), (vigour index I (2849.41), (vigour index II (25.51), and low electrical conductivity (0.240 dSm^{-1}) up to 12th months under cold storage conditions.

Among storage containers, seeds stored in polythene bag showed good storability followed by pro-grain bag and HDPE bag. However lowest quality performance was observed from gunny bag storage container. Seed quality parameters *viz.,* germination percentage (93.20 %), root-shoot length (32.16 cm), seedling dry weight (0.29 g), vigour index I (2967.53) and vigour index II (26.32) were formed better in the fresh seed. However, electrical conductivity was recorded higher in Rvd IInd aged and Rvd Ist. The wheat seeds can maintain the 85.68 per cent germination percentage from the Table 3, at the age of 34th months which is above IMSCS (85%).

HITASA/AB/2024/154

In vitro exploration of biological control against Alternaria leaf spot of cabbage incited by *Alternaria brassicae* (Berk.) Sacc.

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Cabbage (*Brassica oleracea* var *capitata* L.) crop is affected by several pathogens/diseases, of which Alternaria leaf spot (*Alternaria brassicae* (Berk.) Sacc.) is dreaded fungal disease, causing accountable quantitative and qualitative losses. Though, chemicals can manage the disease but due to their harmful effects on ecosystem and human health, alternative ecofriendly biological options need to be explored. Therefore, present study was attempted to assess the bioefficacy of six fungal and three bacterial bioagents against *A. brassicae*, applying dual culture technique with CRD and all treatments replicated thrice, during *Rabi*, 2020-21, at the Department of Plant Pathology, College of Agriculture, VNMKV, Parbhani. The results revealed all of the test biocontrol agents as potential antagonists, which significantly inhibited mycelial growth of *A. brassicae*,

over untreated control. However, *Trichoderma harzianum* resulted with significantly highest mycelial inhibition (78.08 %), followed by *T. asperellum* (77.62 %), *Metarhizium anisopliae* (67.36 %) and *Aspergillus awamori* (67.33 %). The least inhibition was found in *Pink pigmented facultative methylobacteria* (44.12 %), followed by *Pseudomonas fluorescens* (45.10 %). Thus, antagonistic microorganisms can be used as an alternative to the chemicals, to manage Alternaria leaf spot of cabbage.

Keywords: *Alternaria brassicae*, Biocontrol agents, Cabbage, Alternaria leaf spot.

HITASA/AB/2024/155

Design and Development of a Semi-Automatic Drying System for grain

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This study aimed to assess the design and development of a semi-automatic drying system for wheat. Wheat (*Triticum aestivum*) is a staple food for the majority of the population of India and is grown in about 37 % of the cropped area. It is sown during November-December (Winter season) and harvested around April-May when rain normally occurs, so the natural drying on the field becomes difficult. Drying reduces the amount of water contained in the crop after harvest to an acceptable level. Both grain temperature and moisture content are critical in maintaining quality. It is estimated that 60-70 % of food grain produced in the country is stored at a home level in traditional storage structures. It requires constant inspection of the surrounding atmosphere and the need to maintain grain environmental conditions otherwise infestation may take place. With the application of automation technology in grain drying and storage systems the losses incurred every year due to seasonal variation in physical parameters such as variation in temperature, grain moisture, and relative

humidity, can be minimized to quite a low extent. A semi-automatic dryer was developed with a batch size of 50 kg of threshed wet wheat. It involves the use of sensors, relay, heater, inlet and outlet fan, and LCD. The developed drying system was tested for the drying of wheat at five moisture levels to achieve desirable moisture content, temperature, and relative humidity conditions. The design dryer was used in the laboratory for experimental purposes and it can be used for commercial purposes.

HITASA/AB/2024/156

Residue Kinetics of Insecticide Pymetrozine in Rice Field Soil

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Soils are the most diverse and complex ecosystem in the world. In addition to providing humanity with 98.8% of its food, soils provide a broad range of other services, from carbon storage and greenhouse gas regulation, to flood mitigation and providing support for our sprawling cities (Hu *et al.,* 2008). Therefore, protection of soil health from various pollutants including pesticides is important for its future sustenance (Gong *et al.,* 2019). The pesticide Pymetrozine widely used in rice fields for the control of aphids and whiteflies is also registered in India for crop protection in Paddy (Deekshita *et al.,* 2018). The present study was, therefore, conducted to understand the persistence behaviour and residue kinetics of the pesticide Pymetrozine in new alluvial and red lateritic soils of West Bengal using Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS). The laboratory experiment in the soils was conducted under the Department of Agricultural Chemicals, Bidhan Chandra Krishi Viswavidyalaya, Nadia in West Bengal using two treatment doses of Pymetrozine @0.75 µg/g (T_1) and 1.50 µg/g (T_2). Soil samples in triplicate

were analysed at 0, 1, 3, 5, 7, 10, 15, and 30 days intervals by extraction with acetonitrile and cleaned up using PSA, C18 , and Florisil following QuEChERS technique. The Limit of Detection (LOD) of Pymetrozine was 0.005 µg/ml and the limit of quantification (LOQ) was 0.02 µg/g. The initial concentration of Pymetrozine in the soils (0.61-1.43 µg/g) was dissipated by 95-97% (0.02- 0.07 µg/g) after 15 days of application and reached below LOQ (0.02 µg/g) after 30 days. The dissipation followed 1st Order reaction kinetics and the dissipation rate was higher in new alluvial soil (0.104-0.106) compared to the red lateritic soil (0.087-0.096). Consequently, the calculated half-life value was lower in new alluvial soil (2.8-2.9 days) compared to red lateritic soil (3.1- 3.5 days). The observed higher dissipation rate in new alluvial soil than red lateritic soil might be due to the significant variation in the soil physio-chemical properties. Higher organic carbon and water holding capacity might have favoured faster dissipation of Pymetrozine in New alluvial soil compared to the red lateritic soil.

HITASA/AB/2024/157

Revolutionizing Carbon Sequestration Through Commercial Agroforestry: Insights from Poplar and Eucalyptus Case Studies in India

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Climate change, land degradation, and desertification result in the depletion of carbon in soil and plants. The atmospheric concentration of carbon dioxide (CO2) has surged to 412 ppm, marking a 47% increase since the onset of the industrial era when levels were around 280 ppm. Consequently, there is a critical need to sequester carbon from the atmosphere to the Earth's surface. Many scientists advocate for agroforestry as a powerful tool for mitigating climate change and generating economic benefits. The Indian government is actively promoting tree-based systems to achieve a 33% tree cover across the total geographical area for climate change mitigation. The expansion of

commercial agroforestry, particularly with fast-growing tree species that yield higher biomass, is seen as a sustainable and environmentally friendly method to sequester carbon, enhance green cover, and boost farmers' financial well-being.

Tree species like poplar, nilgiri, subabul, tree of heaven, willow, malabar neem, cadamba, and white teak are identified as suitable for carbon sequestration in agroforestry. Poplar and eucalyptus stand out as major agroforestry tree species widely adopted by millions of Indian farmers since the 1990s, particularly in the Indo-Gangetic plains where commercial agroforestry originated. The review indicates that poplar and eucalyptus have the capacity to sequester carbon stocks of 212.7 Mg C ha−1 and 237.2 Mg C ha−1, respectively. In conclusion, while the commercial agroforestry system has been notably successful in the Indo-Gangetic regions, there is a pressing need for its expansion with compatible crops in different parts of the country.

Keywords: Biomass production; Climate change; land degradation; Poplar and eucalyptus

HITASA/AB/2024/158

Impact of drip irrigation system on profitability of Chilli in Maharashtra

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Vegetables are most commercial cultivated and consumed across the world. The chilli is considered as one of the most commercial vegetable crop and he cultivated in tropical and subtropical region throughout in year as purpose of vegetable in the India. The chilli cultivation through drip irrigation method, as an efficient water-saving irrigation technology, has been widely used in crop production, but its effects on crop yield, irrigation water productivity (IWP) and water productivity (WP) vary with field managements, climatic conditions and soil properties.

The studies on four levels of irrigation *viz.,* I_1-0.7 ETc, I_2-0.8 ET_C, I_3-0.9 ET_C and I_4- 1.0 ETc by drip irrigation as main plot treatments
The treatment combination i.e. scheduling of irrigation through drip at I_2-0.8 ETc along with fertigation level F_2-100 % RDF through WSF to chilli crop was obtained maximum gross monetary returns of Rs. 247195 and 246142.2 ha^{-1}, net-income Rs.144685.6 and 357923 ha^{-1} and maximum B:C ratio of 1.75 and 2.59 was obtained I_2F_3-0.8 Etc and 75% RDF than rest of the treatment combinations and control during summer and *late kharif* 2018-19, respectively. It confirmed the returns per rupee invest is more from the scheduling of irrigation coupled with fertigation.

From the present findings, considering the two season study and B:C ratio, it can be concluded that the scheduling of irrigation level through drip I_2- 0.8 ETc along with fertigation level F_3-75 % RDF through water soluble fertilizer to chilli crop cv. hybrid was found better in obtaining higher yield and quality fruits for during summer and *late kharif* season.

Keywords: Irrigation, Fertigation, Chillli, B:C ratio.

HITASA/AB/2024/159

Response of Greengram [*Vigna Radiata* (L.) Wilczek] Cultivars to Integrated Nutrient Management Practices in *Kharif* Season

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A field experiment was conducted during *kharif*, 2014 at Agronomy Instructional Farm, C.P. College of Agriculture, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, to study the "Response of greengram [*Vigna radiata* (L) Wilczek] cultivars to integrated nutrient management practices in *kharif* season." The soil of the experimental field was loamy sand in texture. 14 treatment combinations comprising of two varieties of greengram viz., Meha(V_1) and GM 4(V_2) and seven treatments of integrated nutrient management viz., N_1(100%

RDF(20:40:0 kg NPK/ha), N_2(75% RDF + 2 t FYM/ha), N_3(75% RDF+Rhizobium+PSB), N_4(75% RDF+ 2 t FYM/ha + Rhizobium+PSB), N_5(50% RDF+ 4 t FYM/ha), N_6 (50% RDF + *Rhizobium* + PSB) and N_7 (50% RDF + 4 t FYM/ha + Rhizobium+PSB) were evaluated in factorial randomized block design replicating three times.

Variety GM 4 (V_2) registered maximum values of plant height and fresh & dry weight of root nodules, pod length, number of seeds/pod and 1000 seed weight compared to variety Meha. While, variety Meha found superior by recording maximum value of number of branches per plant, days to maturity, number of pods/plant and seed yield/ plant over GM 4 which ultimately reflected in higher seed (656 kg/ha) and stover (1693 kg/ha) yields.

Application of 75% RDF+ 2 t FYM/ha + *Rhizobium* + PSB(N_4) enhanced the plant height, number of branches, fresh & dry weight of root nodules, pod length, number of seeds/pod, number of pods/plant and seed yield/plant of greengram. This reflected in marked effect in increasing seed (746 kg/ha) and stover (1806 kg/ha) yield. Thus, from the present study it can be concluded that higher seed yield and net return can be secured by growing greengram variety Meha fertilized with 75% RDF (15:30:0 kg NPK/ha)+2 t FYM / ha + *Rhizobium* + PSB in loamy sand soil of North Gujarat.

HITASA/AB/2024/160

Biological Control of Sheath Blight of Rice

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The use of bio-control agent as plant growth promoting rhizobacteria (PGPR), which are capable of suppressing or preventing the phytopathogen damage. Use of plant growth promoting rhizobacteria (PGPR) as bio control agents is gaining popularity in managing rice diseases and in enhancing growth and grain yields. Strains of *Bacillus subtilis* and *Bacillus megaterium* have shown significant inhibition of *Rhizoctonia solani.*

Evaluation of *Bacillus subtilis* for the management of rice sheath blight under field condition revealed that T0 (*Bacillus subtilis ZB87-1/2*, 25DAT @1.5gm/lit + *Bacillus subtilis ZB87-1/2,* 50DAT @2.5gm/lit)andT10 (*Bacillus subtilis ZB87-1/2,* 25DAT @2.5gm/lit + *Bacillus subtilis ZB87-1/2*, 50DAT @1.5gm/lit+Hexaconazole-5%EC 25DAT +Hexaconazole-5%EC 50DAT) was best treatment for the management of sheath blight disease which reduce 60.50 and 68.92 % disease respectively over control and increase the grain yield.

Keyword – Rice, Biological control, *Bacillus subtilis, Rhizoctonia solani, Bacillus megaterium*

HITASA/AB/2024/161

Emission of Green House Gases From Rice Field and there Mitigation

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Rice (*Oryza sativa L.*) is a major staple food crop for half of the world's population. In India, rice cultivation occupies the largest area of 43.8 million hectares with production of 115.6 million tonnes during 2018-19 (Sangeeta Soi, 2019) and ranks number one crop among the crops grown in the country occupying one-fourth of the gross cropped area of the country. In Tamil Nadu, rice is being cultivated in an area of 2.0 million hectares, production of 6.59 million tonnes. The production of rice rose from 74.3 million tons in 1990-91 to 120 million tons in 2020-21(Madhu S *et al.,*2023). Global warming is an important issue that threatens human life on the earth. A major attributor of global warming is increases in greenhouse gases in the atmosphere. Carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) are considered as major greenhouse gases. The global warming potential of CH4 and N_2O are 21 and 296 times more than CO_2 respectively, so that CH_4 and N_2O are important gases. Rice fields are a major source of agricultural methane (CH_4) emissions contributing 20–40 Tg CH_4 $year^{-1}$ with a global emission of 52% (Sun *et al*., 2016). Rice

cultivation is also a significant source of greenhouse gas emissions, primarily methane (CH_4) and nitrous oxide (N_2O). Methane emission from paddy field makes up 29% of the total of CH_4. Also N_2O emission from agricultural land makes up 52% of the total of anthropogenic N_2O.Reducing greenhouse gas emissions from paddy fields is very important to stabilize atmospheric concentration of the greenhouse gas, which can contribute significantly to mitigate global warming. Because of the possibility of controlling the emissions by agronomic practices, paddy field management must be one of the most likely means of mitigating CH_4 emissions.

Keywords: Rice cultivation , GHG Emission, Mitigation

HITASA/AB/2024/162

Efficacy of organic amendments and hydrophilic polymer hydrogel on growth and yield of sunflower in *Kharif* season

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The present investigation "Efficacy of organic amendments and hydrophilic polymer hydrogel on sunflower production in *Kharif* season" was carried out at the farm of Oilseed Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *Kharif* season. The experiment was laid out in a randomized block design with three replications and seven treatments. The treatments consist of RDF (80:60:30) (T_1), RDF + 5 t FYM ha^{-1} spreading across field (T_2), RDF+2.5 t FYM ha^{-1} in seed furrows (T_3), RDF + Hydrogel @ 2.5 kg ha^{-1} in seed furrows (T_4), RDF + Humic acid @ 2.5 kg ha^{-1} in seed furrows (T_5), RDF+Vermicompost @ 2.5 t ha^{-1} in seed furrows (T_6), RDF + Fly ash @ 2.5 t ha^{-1} in seed furrows (T_7).

Growth characteristics like plant height, number of leaves $plant^{-1}$, leaf area $plant^{-1}$ and dry matter accumulation $plant^{-1}$ were significantly

influenced by different organic treatments at all the growth stages except at 20 DAS. The treatment RDF + Vermicompost @ 2.5 t ha^{-1} in seed furrows recorded improved growth characteristics which were at par with RDF+ Hydrogel @ 2.5 kg ha^{-1} in seed furrows, RDF + Humic acid @ 2.5 kg ha^{-1} in seed furrows, however it was significantly superior over rest of the treatments.

All yield attributes were significantly highest in the case of RDF+ Vermicompost @ 2.5 t ha^{-1} in seed furrows which was significantly superior over RDF + Fly ash @ 2.5 t ha^{-1} in seed furrows, RDF + 2.5 t FYM ha^{-1} in seed furrows, RDF + 5 t FYM ha^{-1} spreading across field. Significantly highest seed yield (2153 kg ha^{-1}), straw yield (3718 kg ha^{-1}) and oil yield (919 kg ha^{-1}) was recorded with RDF + Vermicompost @ 2.5 t ha^{-1} in seed furrows.

Keywords: Organic amendments, hydrophilic polymer hydrogel, humic acid, fly ash, Sunflower, *Kharif*.

HITASA/AB/2024/163

Effect of castor and cassava foliage on growth and cocoon characters of Eri silkworm (*Samia ricini* D.)

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Eri silkworm *S. ricini* is semi-domesticated and polyphagous. The present study aims to evaluate the effect of castor (*Ricinus communis*) and cassava (*Manihot utilissima*) leaves on the growth and cocoon characteristics of *S. ricini.* The observed results on the economic parameters are larval duration (20 days), larval weight (4.083±0.06), cocoon weight (2.2±0.03), pupal weight (1.85±0.01), shell ratio (22.27±1.02) and effective rate of rearing (77.19±1.97), survival rate (84.21%) and mortality rate (15%) were noted in eri silkworm. However, the analyzed economic parameters are found to be higher in eri silkworms fed with castor leaves when compared to cassava leaves. *S. ricini* highly prefers the castor leaves for their growth and development.

Keywords: Eri silkworm, castor, cassava leaves, economic parameters.

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Innovations in Food Processing: Enhancing Quality, Safety, and Sustainability

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Innovations in food processing have significantly transformed the landscape of food production, addressing critical challenges such as ensuring quality, safety, and sustainability throughout the supply chain. This abstract explores the latest advancements in food processing technologies and techniques, highlighting their impact on enhancing nutritional value, prolonging shelf life, and minimizing environmental footprint.

The emergence of novel processing methods, such as high-pressure processing (HPP), pulsed electric field (PEF) technology, and ultrasound-assisted processing, has revolutionized the preservation of food products while retaining their sensory attributes and nutritional content. These non-thermal technologies offer an alternative to conventional thermal processing, reducing energy consumption and preserving heat-sensitive compounds in foods.

Furthermore, the integration of artificial intelligence (AI), machine learning, and robotics in food processing facilities has optimized production efficiency, predictive maintenance, and quality control. AI algorithms analyse vast amounts of data to predict equipment failures, optimize processing parameters, and ensure compliance with regulatory standards, thus enhancing food safety and reducing production costs.

Moreover, advancements in sustainable packaging materials, such as biodegradable films, edible coatings, and smart packaging technologies, contribute to reducing food waste and environmental pollution. These innovations extend the shelf life of perishable foods, enhance their visual appeal, and provide consumers with real-time information about product freshness and safety. Additionally, the adoption of precision agriculture techniques, including vertical farming, hydroponics, and aquaponics, ensures a consistent supply of high-quality, locally grown produce while minimizing resource inputs such as water, land, and pesticides. These sustainable farming practices support food security and resilience in the face of climate change and global food demand.

Keywords: Food Processing, HPP,PEF,Agriculture Techniques etc.

HITASA/AB/2024/165

Integrated disease management of Phytophthora foot rot of black pepper under field conditions

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Black pepper (*Piper nigrum* L.) is one of the most often used spice crop and considered as ''The King of Spices'' among other spices. The present research was undertaken with sensitivity of *P. capsica* causing footrot of black pepper towards commonly used fungicides and to identify effective integrated management approaches. An integrated management study conducted in Kharif 2020–21 at KVK Farm in Hiriyur found that applying T. harzianum to the soil at a rate of 50 g/vine + 1 kg of neem cake before the monsoon began, followed by a drench and spray with Fenamidone + Mancozeb at a rate of 2 g/lit three times a month, resulted in the least amount of leaf infection (6.27%), less foliar yellowing (3.70%), less defoliation (1.17%), and the highest yield of 5.15 kg/vine with a higher benefit–cost ratio (1:3.80) than other treatments, which were then applied to the soil at a rate of 50 g/vine + neem cake @ 1 kg /vine, followed by a

drench and spray with Metalaxyl + Mancozeb @ 2 g /lit. Compared to the untreated control, where leaf infection, foliar yellowing, defoliation, vine death, and yield of 41.08, 32.43, 37.83 percent, and 1.25 kg were recorded respectively with the lowest benefit cost ratio of (1:1.71), in leaf infection, foliar yellowing, defoliation, and dry pepper yield of 11.03, 8.90, 4.03 percent, and 4.44 kg were recorded respectively.

HITASA/AB/2024/166

Effect of fertigation levels on leaf nutrient content, yield and quality of Nagpur Mandarin in high density planting

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The field experiment was carried out in Hatla village on farmers field, Taluka Katol, District Nagpur on 10 years old Nagpur mandarin. There are five fertigation treatments i.e. 85, 100, 115, 130 and 145 per cent of recommended dose NPK of fertilizers. The experiment was laid out in Randomized Block Design with four replications.

It was observed that, number of fruits per plant highest under fertigation with 145 % of RDF (314.25 fruit plant^{-1}) which was at par with fertigation with 130 % of RDF (304.50 fruit plant^{-1}). Whereas, it was found that, fertigation with 145 % of RDF recorded highest average weight of fruit (171.98 g) which was at par with fertigation with 130 % of RDF (170.30 g). Also, highest yield (54.03 kg plant^{-1}) and (29.98 t ha^{-1}) was observed in treatment fertigation with 145 % of RDF. Further, the result also indicated that, superior fruit quality parameters such as juice content (51.77 %), TSS (11.03 ^{0}brix), brix acid ratio (13.49) and ascorbic acid (35.79 mg 100 ml^{-1}) found in treatment fertigation with 145 % of RDF. The physical parameters of fruit such as fruit diameter (6.66 cm), peel weight (20.46 g), peel thickness (2.80 mm) and volume of fruit (155.63 m^{3}) found higher in treatment fertigation with 145 % of RDF.

The result revealed that, soil reaction of study area exhibited slightly acidic to slightly alkaline in nature. In all treatments, there were no much variation in electrical conductivity of soil and these soils were non-saline in nature. Soils were medium to high for organic carbon content and slightly calcareous to calcareous for calcium carbonate content. The higher available nitrogen (231.63 kg ha^{-1}), available phosphorus (18.39 kg ha^{-1}), available potassium (419.37 kg ha^{-1}) and available sulphur (13.50 mg kg^{-1}) found in treatment fertigation with 145 % of RDF. The result revealed that, soil micronutrients such as Fe, Zn, Mn and Cu found higher in treatment fertigation with 145 % of RDF (4.67 mg kg^{-1}), (0.63 mg kg^{-1}), (9.79 mg kg^{-1}) and (1.38 mg kg^{-1}) respectively. Leaf nutrient viz. total nitrogen (2.59 %), total phosphorus (0.17 %), total potassium (1.54 %) and total sulphur (0.13 %) observed higher in treatment fertigation with 145 % of RDF. According to result, total micronutrients such as iron (78.05 mg kg^{-1}), zinc (17.93 mg kg^{-1}), manganese (64.28 mg kg^{-1}) and copper (13.80 mg kg^{-1}) observed higher in treatment fertigation with 145 % of RDF.

HITASA/AB/2024/167

Cultural and Physiological characterization of *Pestalotiopsis* sp. causing grey leaf blight of coconut

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Coconut (*Cocos nucifera* L.) is referred to as a 'KalpaVriksha' in ancient Indian literature, which implies a tree that gives all of life's basic necessities. Grey leaf blight, caused by *Pestalotiopsis* sp., is one of the most serious fungal diseases affecting coconut. Grey blight symptoms include minute yellow or brown dots encircled by a greyish ring on the leaflets.

Based on cultural studies, *Pestalotiopsis* sp. exhibits the greatest myceial growth and sporulation on Potato dextrose agar (90 mm), Oatmeal agar (90 mm), and Sabouraud's dextrose agar (90 mm), and the least myceial growth on host leaf extract agar (84 mm) and Richard's agar (67.50 mm). Among the different levels of pH and temperature tested, the optimal pH and temperature for the growth of *Pestalotiopsis* sp. were 5 to 6 and 20 to 25^{o}C, respectively obtained through physiological studies.

Keywords: *Pestalotiopsis,* Agar, pH, Mycelia, temperature

HITASA/AB/2024/168

Role of integrated nutrient management in sustainable oil seed production

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Oilseeds include a group of annuals whose dried pods or seeds are used for oil production. Oilseed crops play a crucial role in meeting global demands for edible oils, biofuels, and animal feed. Intensive agricultural practices, overexploitation of natural resources and climate change patterns have adverse impacts on soil health, thus becoming a serious concern for oilseed crop production and livelihood security of farmers. Excessive use of chemical fertilizers harms soil fertility, productivity, and micronutrient levels. Integrated nutrient management is crucial for sustained high crop output, improved soil health, and a safer environment. (Anchal Singh *et al*., 2023) Soil organic amendments could substitute nearly 25–50% of synthetic fertilizers, enhance nutrient use efficiency and influencing oilseed yield response. Soil amendments may sustain or increase oilseed productivity at reduced production and environmental cost, thus, improve soil health and water use efficiency and its quality. Soil health improvement is pre-requisite for sustaining soil health and crop productivity. Agricultural management practices can reduce delivery of normal ecosystem services and functions, for instance by intensive use of chemical fertilizers can increase nutrient losses (Rashmi *et al*., 2022) Considering the accessibility of the significant components in the soil and proper method and nutrients application are requirements of great importance. Hence there is a need for progressively

powerful usage of nutrients in partitioned doses like basal and top dressing, optimization of nutrient requirement and to study the role of organic and in organic fertilizers in oil seed crops.

Key words: INM, Oil seed crops, Yield.

HITASA/AB/2024/169

Impact of *Panchagavya*, *Jeevamruta* and Micronutrients on Bitter Gourd (*Momordica charantia* L.)

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The present investigation was conducted during *kharif*, 2021 at College farm, College of Horticulture, SDAU, Jagudan, Mehsana, Gujarat. Experiment include seventeen treatments with randomized block design with three replications viz., Control (T_1), *Panchagavya* @ 3 % (T_2), *Panchagavya* @ 5 % (T_3), *Jeevamruta* @ 5 % (T_4), *Jeevamruta* @ 7.5 % (T_5), *Panchagavya* @ 3 % + Micronutrient mixture Grade IV @ 0.25 % (T_6), *Panchagavya* @ 3 % + Micronutrient mixture Grade IV @ 0.50 % (T_7), *Panchagavya* @ 3 % + Micronutrient mixture Grade IV @ 0.75 % (T_8), *Panchagavya* @ 5 % + Micronutrient mixture Grade IV @ 0.25 % (T_9), *Panchagavya* @ 5 % + Micronutrient mixture Grade IV @ 0.50 % (T_{10}), *Panchagavya* @ 5% + Micronutrient mixture Grade IV @ 0.75 % (T_{11}), *Jeevamruta* @ 5% + Micronutrient mixture Grade IV @ 0.25 % (T_{12}), *Jeevamruta* @ 5 % + Micronutrient mixture Grade IV @ 0.50 % (T_{13}), *Jeevamruta* @ 5 % + Micronutrient mixture Grade IV @ 0.75 % (T_{14}), *Jeevamruta* @ 7.5 % + Micronutrient mixture Grade IV @ 0.25 % (T_{15}), *Jeevamruta* @ 7.5 % + Micronutrient mixture Grade IV @ 0.50 % (T_{16}), *Jeevamruta* @ 7.5 % + Micronutrient mixture Grade IV @ 0.75 % (T_{17}).

Among them, *Panchagavya* @ 5 % + Micronutrient mixture Grade IV @ 0.75 % (T_{11}) is best for growth and yield parameters.

Keywords: *Panchagavya*, *Jeevamruta* and Micronutrient mixture Grade IV

HITASA/AB/2024/170

Mapping of supply chain and assessment of pre and postharvest losses of Alphonso mango in India

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The Alphonso mango, a highly sought-after commercial variety in India, garners significant attention in supply chain management research due to its specialized production zone. Despite limited literature on the topic, a survey was conducted to delve into supply chain management and losses associated with Alphonso mangoes. Gathering data from 123 participants including farmers, FPOs, retailers, exporters, and government officials, the study unveiled key socioeconomic factors influencing mango quality and export commitment. It identified pre-harvest losses primarily stemming from climate change, global warming, diseases, pests, spongy tissue, and fruit fly infestation, while harvest season challenges included spongy tissue and untimely rain impacting quality and supply. Post-harvest losses were attributed to factors such as mechanical damage, storage, transportation, and handling. Pre-harvest issues accounted for 30-40% of losses, while post-harvest handling contributed 15-20%. The study highlighted the persistent low revenue of farmers due to existing trade channels and insufficient value addition facilities. These findings underscore the need for interventions to improve farmer incomes, stabilize market supply, and reduce losses, not only for Alphonso mangoes but also for other perishable fruits.

HITASA/AB/2024/171

Development of processing technology for formulation and quality evaluation of millet based pasta

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Millets are high energy, nutritious foods comparable to other cereals and some of them are even better with regard to protein and mineral content. They are rich in dietary fiber, iron, calcium and B vitamins. In present research work efforts were made to evaluate a various quality attributes of millets viz., physical properties, proximate composition, mineral composition. Effect of roasting as a dry heat processing method on the nutritional and anti-nutritional components of amaranth millet and barnyard millet. The roasting resulted in favourable changes in nutrients with effective reduction of anti-nutritional factors like tannin, saponin and phytic acid. Moreover the recipe was standardized for formulation of pasta. For standardization of pasta four treatments were made with different proportion of amaranth and barnyard millet. It was evident from the present research work that pasta prepared with 30% level of millet flour scored highest in terms of colour and appearance, flavour, texture and overall acceptability. Furthermore prepared pasta was assessed for physical properties, chemical composition, mineral composition, textural, functional properties and microbial analysis. Storage stability of prepared pasta was assessed by microbial examination over 180 days and their cost of production was also comparatively cheaper as compared to market samples. As a result, it may be suggested that these particular millet-based food products would work best in the next food market, where nutritive value and techno-economic viability are of utmost importance.

Keywords: Amaranth and Barnyard Millet, Roasting, Pasta, Quality assessment.

HITASA/AB/2024/172

Studies on Drying Characteristics of Pineapple Pomace Powder and Semolina Blend Flour Pasta Making

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The purpose of this research was to present an overview of high-quality extruded pasta created from healthy elements such as, pineapple pomace powder and semolina, with the substitution of pineapple pomace powder for semolina occurring at percentages of 100, 95, 90, 85, 80, and 75% respectively. The formulations for the pasta (pineapple pomace powder: semolina) were taken as T_0 (100), T_1 (95: 5), T_2 (90: 10), T_3 (85: 15), T_4 (80: 20), and T_5 for both the tray dryer and the hot air oven (75:25).

The drying characteristics of pineapple pomace powder were studied for fibre content in the diet overall, as well as soluble and insoluble fibre content of tray (80 ^oC) and hot air oven (90 ^oC) dried pineapple pomace. Maximum dietary fibre was found in tray dried pineapple pomace powder of 10 % at 80 ^0C and for hot air oven dried of 15 % at 90 ^0C. According to the results of the proximate analysis of pasta, the fiber content of pasta increased with pineapple pomace powder incorporation.

Keywords: Pineapple pomace powder, Semolina, Single screw extruder, Tray dryer, Hot air oven.

HITASA/AB/2024/173

The Changing Perspectives of Agricultural Marketing in India

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Agricultural Marketing helps in meeting the demand and expectation of the consumers. Agricultural marketing plays important role in the Indian economy and it engaged 45.76 percent of the workforce in the country. The primary, secondary and terminal market functions are the three main marketing functions or it is three stages of the agricultural marketing. This paper is based on secondary data information which is collected from a different source of information like various Journal research paper, annual reports on agricultural marketing in India. To highlight the new initiatives taken by the government and major reform of new trends in the agriculture marketing is the main objectives of the paper.

The demand for the food commodities is increasing in the country. The projected demand of the food commodities during the year 2022-23 (estimated) compare with food commodities demanded in the year 2018-19. Seeds, machinery, farm implements, pesticides, insecticides, and fertilizers are an important input for agriculture and modern agriculture. The transfer of ownership, physical movement and facilitating of the product is the major functions agricultural marketing, Agricultural Produce Market Committee act introduce by the state government for the regulation of the Mandi. APMC act also facilitates the contract farming in the country, infrastructure development and it encourages public-private partnership in marketing yard. Agriculture marketing reform and integration of the agriculture market is some new avenue like e-NAM (electronic-National Agriculture Market) in the country will come major reform in the agriculture marketing. Shri Manoj Ahuja, Secretary, Ministry of Agriculture & Farmers Welfare in his address today here stated that till 31st August 2023, 1361 APMCs were integrated on e-NAM, encompassing 23 States and 4 UTs , where in 209 commodities are being traded altogether,

with a farsighted vision, to provide multifaceted benefits to the country. The highest number of Mandi are linked with e-NAM in Rajasthan followed by Uttar Pradesh and Gujrat.

HITASA/AB/2024/174

In-vitro Assessment of Fungicides and Their Compatibility with Neem Oil Against *Alternaria porri* Causing Purple Blotch of Onion

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Alternaria porri causes purple blotch, a disease that significantly impacts onion production and productivity. For effective management *in-vitro* evaluation of fungicides that are effective against *A. porri* were tested and compatibility of *Trichoderma harzianum* with neem oil was also carried out under *in vitro* condition. Contact fungicides like mancozeb, propineb at 2500 ppm, and systemic fungicides such as tebuconazole, difenoconazole and hexaconazole at 1000 ppm were tested. Contact fungicides *viz.,* Mancozeb and propineb at 2500 ppm and systemic fungicides such as tebuconazole, difenoconazole and hexaconazole at 1000 ppm showed 100% inhibition of mycelial growth. Once the optimal concentrations were determined, a contact fungicide at 2500 ppm and a systemic fungicide at 1000 ppm were used for field management. Additionally, the compatibility of *T. harzianum* with neem oil at 2.5% and 5.0% was observed with complete mycelial growth of 90 mm observed in a Petri plate after 10 days of incubation in both concentrations. Further, *T. harzianum* showed more

sporulation and profuse growth at 5% concentration, so this concentration was used in the field experiment.

Keywords: Purple blotch, fungicide compatibility, Neem oil and *Alternaria porri*

HITASA/AB/2024/175

Efficacy of Different Chemical Fungicides, Bioagents and Botanicals Against *Pythium aphanidermatum* Causing Rhizome Rot of Ginger Under *In Vitro* Condition

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Ginger (*Zingiber officinale* Rosc.) is an herbaceous, rhizomatous, flowering perennial plant grown across India. It is commonly used as a spice, food, flavouring agent and medicine. Rhizome rot of ginger is a devastating disease caused by *Pythium aphanidermatum* leading to more than 60 per cent mortality of seedlings and about 50-80 per cent losses during storage. In concern to manage, A total of 16 fungicides, 11 biocontrol agents and 15 plant extarcts were screened in *in-vitro* condition. In case of different fungicides tested, contact fungicide like antracol was significantly superior with 88.02 per cent inhibition, whereas in systemic fungicides, metalaxyl 35% WS was found superior with 67.23 per cent inhibition and in combi products zineb 68%+hexaconozole 4% and fluxapyroxad 21.26% + pyraclostrobin 21.26% were significantly superior with 100 per cent inhibition. Out of the 7 fungal biocontrol agents, the maximum inhibition of mean mycelial growth was observed in *T. viride* (Tv-3) (65.19%) followed by *T. harzianum* (Th- 41) (60.37%) and *T. harzianum* (Th- 79) (59.63%) whereas, the other bio-agents showed partial inhibition; In bacterial bio-agents, maximum per cent inhibition of mean mycelial growth was by *Bacillus velezensis* (Bv-A6) (88.89 %) and the remaining bio-agents showed varied inhibition from 27.78 - 33.33 per cent. Among the

different botanicals, highest significant mean per cent inhibition of mycelial growth was recorded in calotrophis (59.81 %), whereas least inhibition was noticed in periwinkle (1.28 %), coat buttons (8.07%), simaruba (8.13%) and ocimum (8.17%). While, other plant extracts showed moderate and variable inhibition.

Keywords: Ginger, Rhizome rot, *Pythium aphanidermatum*, Fungicides, Biocontrol agents and botanicals.

HITASA/AB/2024/176

Effect of Mulching in Pomegranate

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Pomegranate (*Punica granatum* L.) is a fruit tree that is globally distributed, especially in warm areas with low annual rainfall and limited water availability. This species exemplifies the critical role of water in agriculture and the need for efficient irrigation practices due to its characteristics, cultivation requirements, and geographic diffusion. Mulching is the process of covering soil around the plants with an organic or synthetic material to create congenial condition for the plant growth, development and efficient production (Bakshi et al.2015). The term mulch was probably derived from the German word “molsch” which means soft to decay. Different mulching material are use like black polyethylene, newspaper, arecanut husk, coconut husk, sawdust, maize stover, leaf litter, peanut hulls, pebbles and control (without mulch). Mulch plays an important role to regulate soil temperature, conserve moisture, restrict evaporation losses, and suppress weed growth, reducing the number of dirty and diseased berries, enhancing nutrient uptake, and improving water use efficiency and yield (Sharma and Goel, 2017). Borthakur and Bhattacharya (1992) observed that the continuous use of organic mulches also helpful in improving beneficial soil microbial flora, organic matter content and better soil aeration. Plastic mulch application is effective in increasing soil temperature, conserving soil moisture and weed control (Zhang et al., 2007). The most popular plastic mulch worldwide is black,

though white-on-black and clear mulches are also used (Schales, 1990). Ham et al. (1993) reported that White-on black and silver mulches reflect 48 and 39% of shortwave radiation, respectively. Mulching, on the other hand, led to a significant increase in the fruit yield, primarily attributed to an increase in fruit size. Furthermore, the analysis indicated that irrigation and mulching treatments had distinct effects on fruit traits such as the fruit length, width, volume, and rind thickness.

Keywords : *Punica granatum*, mulching, nutrient, organic, aeration, straw.

HITASA/AB/2024/177

Evaluation of Lawn Grasses on The Basis of Morphological and Physiological Parameters

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The current study, "Evaluation of lawn grasses on the basis of morphological and physiological parameters," was conducted in the Horticulture Section of the College of Agriculture, Pune, in the academic year of 2015–2016. Nine lawn grass species, including Argentine grass, Korean grass, Pensacola grass, American blue grass, Weeping love grass, St. Augustine grass, Bermuda grass, Phosphelone grass, and Taiwan grass grass, were tested in this experiment using three replications using a Randomized Block Design layout.

Based on the overall/ per se performance, it was concluded that, American blue grass and Bermuda grass were regarded as the best lawn species for early and maximum ground covering, chlorophyll content and root count among the grasses that were tested. The highest shoot elongation was seen in Phosphelone grass, which was followed by Bermuda and American blue grass. The maximum leaf length, stem thickness, root length, fresh and dried weights of the shoots and roots, root-shoot ratio, and ground coverage were measured in weeping love grass, Argentine grass, and Pensacola grass. Compared to Phosphelone, St. Augustine, Argentine, and Pensacola grass,

Taiwan, Korean, American blue, and Bermuda grass exhibited finer leaf texture. The fastest-growing lawn grass species were American blue grass and Bermuda grass; Taiwan grass, on the other hand, spread the slowest.

HITASA/AB/2024/178

Cultural and Bio-Chemical Characterization of bacterial canker disease caused by*Xanthomonas axonopodis* pv. *citri* in acid lime

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The *Xanthomonas axonopodis* pv. *citri* causing bacterial canker of acid lime was isolated from different acid lime growing locations of Ahmednagar district of Maharashtra state and were used for these tests. Biochemical tests and Cultural characteristics *viz.*, colony shape, margin, elevations and pigmentation help to identification of bacteria. In biochemical tests Gram staining, Potassium hydroxide (KOH) test, Catalase test, Starch hydrolysis test were performed to characterize the *Xanthomonas axonopodis* pv. *citri*. Different ten test isolates were studied using Nutrient Agar as basal culture medium. In that most of isolates showed yellow pigmentation and all the test isolates showed filiform colony shape, convex elevation and entire colony margin. Morphologically all the test isolates were found single rod shaped. In biochemical test *Xanthomonas axonopodis* pv. *citri* isolates were found to Gram negative staining test while and observed positive to Catalase test (H_2O_2), Potassium hydroxide test (KOH) and Starch hydrolysis test. The results of all morphological, biochemical and cultural tests were confirmed the *Xanthomonas axonopodis* pv. *citri* a Gram-negative bacterium.

Keywords: Acid lime, Bacterial canker, *Xanthomonas axonopodis* pv. *citri,* Morphology, Cultural characters, Biochemical tests

HITASA/AB/2024/179

Performance of Apple cultivation under Tropical climatic conditions of Maharashtra

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The present experiment entitled "Performance of Apple cultivation under tropical climatic conditions of Maharashtra" was carried out at Horiculture Farm, Dept of Fruit Science, College of Horticulture, Malegaon Camp Dist-Nashik (MH) from the 2021.Apple (Malus domistica) is an deciduous plant and it is also knows as king of Temperate fruit crop.it is mainly growing in cold region of india. The low chilling varieties of apple like HRMN-99, Anna, Dorset Golden evaluated under Malegaon conditions of Maharashtra. Conduct field trial and plant growth, Plant stability, Date of Flowering, Date of Fruit Set, Days to Fruit Set, Colour of Inflorescense(Whitish to Pink colour Flower), Days to Maturity, Number of Fruit per plant was observed promising Low chilling varieties for tropical condition of Maharashtra.

Keywords: Apple, Varieties, Fruit Set.

HITASA/AB/2024/180

Effect of in situ moisture conservation techniques on the growth and development of *Acacia auriculiformis*- A case study from the hilly region of Karnataka, India

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Acacia auriculiformis one of the successful, quickly growing exotic species that was brought to India three or four decades ago. It is a versatile and multi-utility tree species, mainly used for pulp and furniture. It can also fix nitrogen and can help in improving soil health. The better growth and development of this species depend on the soil moisture and fertility. In the present scenario In Karnataka's hilly regions, high rainfall combined with poor management techniques contributes to excessive soil erosion, which in turn causes land degradation and a loss in the productivity of plantation. Effective watershed-based land and water resource management reduces the danger of soil erosion hazards while simultaneously boosting land productivity. Hence the present study was conducted to evaluate the effect of different moisture conservation on the growth and development of *Acacia auriculiformis* plantation planted at 2×2 m spacing. Different soil moisture conservation treatments were imposed when the plantation was of four year old. There are five different types of treatments: ring basins with a diameter of 1.2 meters around the tree (T1), half-ring basins with a radius of 0.6 meters made at the downhill side of the tree (T2), pitting (30 cm × 30 cm × 30 cm) made at 30 cm away from the base on the uphill side of the tree (T3), trenching (1.4 meters length × 0.5 meters width × 0.5 meters depth) prepared in between tree rows (T4), and trapezoidal basins measuring 1.8 meters in the top width, 1.2 meters in bottom width, and length of 0.6 meters prepared 0.6 meters away from the base at the uphill side of the tree (T5). Three trees were randomly selected for observation in each treatment, which has a plot size of 36 meters. The results from the study showed that maximum CAI (m^3 /ha) and MAI (m^3 /ha) has recorded in (T1) Ring basin 10.13 m^3 /ha and 26.34 m^3 /ha respectively, while minimum was recorded in Half ring basin. Hence moisture conservation techniques help in retain as much water as possible in the root zone, which aids the plant in overcoming the state of water stress.

Keywords: *Acacia auriculiformis,* In situ moisture conservation, hilly area, soil erosion, watershed

HITASA/AB/2024/181

Evaluation of Cultural ecosystem services from the pulpwood-based agroforestry System – A study from the foothills of Nilgiri, Western Ghats, India

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Around the world, the Forest has played a vital role in not only meeting the demand of wood and non-wood resources but also providing intangible services like cultural, supporting and regulating services. However, the implementation of the Forest law and policy limited the availability of raw materials from the Forest. These developments led to the promotion of alternate land use systems, which not only provide wood but also other intangible benefits. Agroforestry is traditionally valued for its direct benefits like wood and food, but agroforestry's broader ecosystem services and benefits have not been extensively studied. The significance of the cultural ecosystem services of the different agro landscapes is increasingly recognized as a non-material benefit linking humans and nature. However, studies on the valuation of cultural ecosystem services (CES) of agroforestry landscapes are meagre. Hence in the present study pulpwood-based agroforestry (PA) model was established to quantify the cultural ecosystem services. To evaluate the cultural services several seminars and capacity-building activities were held. In which a total of 112 participants visited the pulpwood-based agroforestry and they were given a questionnaire regarding their experience, perception and understanding of the cultural ecosystem services of PA. The majority of respondents said that they would rather acquire scientific information after spending some quality time in the field. It has been noted that financial status and education level have a beneficial influence on CES with regard to how people perceive their socio-cultural characteristics. Principal component analysis revealed only one component, indicating that one component is

sufficient to explain the variance in the data. The average willingness to pay (WTP) was Rs. 50/visit. The study's findings demonstrated that the concept allows for ecotourism, which will boost small landholders' revenue.

Keywords: Pulpwood based Agroforestry, Ecosystem services, Cultural services, Intangible benefits,

HITASA/AB/2024/182

Screening of Eucalyptus clones for phytoremediation potential – A Case Study from the Western part of Punjab, India

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From year to year the problem of heavy metals is getting worse in the environment. Therefore, heavy metal problem must be handled to ensure maintenance of environmental and ecological restoration. Conventional approaches are commonly regarded as destructive, expensive, labour-intensive and causing secondary problems. Phytoremediation is a new, economical, efficient, environmentally friendly remediation strategy with social acceptance. Woody vegetation is good for phytoremediation as it produces large amounts of biomass, which can be used as an energy source. *Eucalyptus* has a huge shoot system that can bio-accumulate significant concentrations of heavy metals from the soil. The *Eucalyptus* species are efficient accumulators of organic and inorganic compounds. Hence the present e experiment was conducted to evaluate variation in phytoremediation potential among nine *Eucalyptus* clones irrigated with effluents from liquor factory. From an already established 4 year old replicated clonal trial with RCBD design, data were recorded on growth traits and Survival percentage varied from 85-95 and there were no significant difference observed among clones. Clone C-316 was found superior among all the clones for diameter and volume, whereas clone PE-8

recorded maximum height. Clone PE-6 exhibited bottom rank for all growth traits except height. Results from the phytoremediation experiment showed significant variation in phytoremediation potential among *Eucalyptus* clones. Uptake of chromium was found maximum in all clones fallowed by lead and cadmium uptake was recorded only in two clones i.e. PE-5 and PE-7 with lower concentration. The relative ranking of micronutrient uptake by all clones was Fe>Mn>Zn>Cu>Ni. Heavy metal uptake was recorded maximum in stem biomass than branch. Clone C-316, C-411, C-413 and C-2045 reported maximum uptake of heavy metals and found suitable for phytoremediation. Whereas, clone PE-5 and PE-11 recorded minimum uptake of heavy metals. The index score analysis revealed that clone C-316, C-411 and PE-7 may be used for carbon sequestration and phytoremediation under effluent irrigated conditions.

Keywords: Phytoremediation. Eucalyptus, Heavy metals, Effluents, Clones

HITASA/AB/2024/183

Geospatial Approach for Forest Cover Change Detection and Above-Ground Biomass Estimation in Haliyal Forest Division of Uttara Kannada District

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The studies on Geospatial approach for forest cover change detection in Haliyal forest division of Uttara Kannada District revealed that among the forest cover classes in 1999 the maximum area is occupied by moderately dense forest of 11055.33 ha which was decreased to 8426.72 ha in 2022. In 1999, dense forest cover was 8286.59ha which has increased to 10895.47ha in 2022. Whereas open and scrub forest was decreased from 1317.64 ha to 291.59 ha during1999-2022.The study area experienced a significant decrease in forest cover, with a total loss of 1045.78 ha (3.94%). The primary reason for this decline is the expansion of agriculture and

fallow land, which accounted for approximately 3197.92 ha between 1999 and 2022. This factor plays a major role in the loss of forest cover in the study area. So that proper management and accurate monitoring of forest cover need to be taken in the future.

HITASA/AB/2024/184

Change Detection and above Ground Biomass Estimation of Forest Coverusing Remote Sensing and Gis Techniques in Kalghatgi Taluka of Dharwad

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The results of change detection of forest cover using Remote sensing and GIS techniques in Kalghatgi taluka of Dharwad district revealed that among the forest cover classes, the maximum area is occupied by moderately dense forest. It covered 14276.16 ha in 1999 and was reduced to 13751.28 ha in 2022. In 1999, dense forest cover was 4161.51 ha, whereas in 2022, dense forest cover had decreased to 2733.57 ha. In 1999, the area occupied by Open and scrub forest was 5702.15 ha, while it has been reduced to 4316.49 ha. Apart from the forest classes, the major change was seen in agriculture and fallow land, i.e., an increase of 3092.11 ha from 1999 to 2022. The built-up area over time increased from 2668.48 ha to 3094.74 ha. Water bodies decreased by 19.89 ha from 1999 to 2022. 5366.88 ha of forest cover were converted to agriculture and fallow land, 240.3 ha to builtups and 240.30 ha to waterbodies during 1999–2022. Apart from forest cover loss, 2173.23 ha of forest cover was gained from agriculture and fallow land, and 54.77 and 56.07 ha of forest cover were gained from builtups and waterbodies respectively. Socioeconomic factors like population growth, the demand for the expansion of agricultural land, fuel wood, and construction materials were the major driving forces behind

the observed forest cover changes. Therefore, in order to reduce the problem of forest cover change, remedial actions are recommended.

HITASA/AB/2024/185

Bioefficacy of systemic fungicides against *C. capsica*

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Anthracnose of chilli (*Capsicum annuum* L.) caused by *Colletotrichum capsici* (Syd.) Butler and Bisby is one of the major and devastating diseases of chilli and causes severe losses (10–60%) both in yield and quality of the chilli depending upon the varieties (Bansal and Grover, 1969). Therefore, the present study was conducted at the Department of Plant Pathology, V.N.M.K.V., Parbhani, during 2017–2019 with the objective of studying the effect of systemic fungicides on mycelial growth inhibition of *C. capsici*. An experiment was designed in CRD and replicated three times. Seven systemic fungicides of varying concentrations were applied at 500 ppm, 750 ppm and 1000 ppm and tested during the present study. All seven systemic fungicides tested were found effective against *C. capsici.* Among the systemic fungicides, the significantly highest average inhibition of mycelial growth of the test pathogen was recorded by Hexaconazole treatment, which was followed by Difenconazole and Penconazole at 500, 750 and 1000 ppm, respectively. Whereas, lowest efficacy is reported in the fungicide Carbendazim, which was found to be comparatively less effective.

HITASA/AB/2024/186

Integrated Pest Management Strategy for Pest of Cotton

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Cotton, hailed as the "king of fabrics" and esteemed as "white gold," holds substantial global economic significance, with India serving as a major contributor to its production. This research scrutinizes the intricate pest complex affecting cotton, a crucial aspect for the implementation of sustainable crop management practices. The primary pests encompass the bollworm complex (encompassing American, pink, and spotted bollworms), red cotton bug, tobacco caterpillar, jassid, cotton aphid, thrips, whitefly, mealybug, and woolly mites, each inflicting distinctive damage that adversely impacts both yield and quality. The American bollworm, recognized as a cosmopolitan pest, induces damage to leaves and bolls, resulting in shedding and rotting. Management strategies entail systematic pest monitoring, cultural practices, and chemical interventions. Pink bollworms, prevalent in regions such as India, Africa, and Pakistan, cause substantial harm to floral structures, consequently affecting ginning percentage and oil content. Integrated management approaches incorporate cultural practices and judicious pesticide applications at various growth stages. Spotted bollworms, widespread and highly destructive, penetrate stems and bolls, leading to premature opening and diminished lint quality. Control measures canter around sanitation practices and chemical applications, supplemented by the integration of biological agents. The efficacy of pest management hinges on a comprehensive grasp of pest biology, damage patterns, and the integration of diverse control measures. This study furnishes invaluable insights for cotton cultivatorsand researchers, facilitating the development of sustainable pest management strategies that safeguard the perpetual productivity and profitability of cotton cultivation.

Key Words – pest of cotton , Cotton, Gossypium, Insect-pest Management, bollworm

HITASA/AB/2024/187

Exploring the Potential of Biocomposites: A Sustainable Approach to Material Development

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Biocomposites have emerged as a promising alternative to conventional composite materials due to their eco-friendly nature and renewable sources. Biocomposites are composed of natural fibers such as hemp, flax, jute, and kenaf embedded in a biopolymer matrix derived from renewable resources like starch, cellulose, or protein. Various fabrication methods including compression molding, extrusion, and injection molding are employed to produce biocomposites with tailored properties. The mechanical, thermal, and biodegradable properties of biocomposites are influenced by factors such as fiber type, orientation, and matrix composition. Furthermore, the sustainability aspect of biocomposites is highlighted, emphasizing their potential to reduce the environmental footprint compared to traditional petroleum-based composites. Applications of biocomposites span across diverse sectors including automotive, construction, packaging, and consumer goods, driven by their lightweight nature, biodegradability, and enhanced mechanical properties. Despite their numerous advantages, challenges such as moisture absorption, limited mechanical properties compared to synthetic composites, and scalability of production remain areas for further research and development. Overall, biocomposites represent a promising avenue for sustainable material development, offering a viable solution to address the growing environmental concerns and the need for resource-efficient materials in various industries.

HITASA/AB/2024/188

Green synthesis and characterization of ZnO nanoparticles from *Flemingia strobilifera* and its scavenging activity

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Zinc oxide is an inorganic compound and has been *widely* used in many fields like medical chemistry, chemical industry, agricultural, environmental. It finds important applications in antioxidant, anti-inflammatory and anticancer activities. We successfully synthesize ZnO nanoparticles by an easy and low-cost eco-friendly green combustion method using plant extracts (leaf, stem and root) of *Flemingia strobilifera (F. strobilifera)*. *F. strobilifera*, commonly known as wild hops or luck plants belongs to the family fabaceae. Different plant parts like leaf, stem, roots used in traditional systems of Unani, Ayurveda, Homeopathy and Siddha. Plant extracts (Leaf, stem and root) is used to cure epilepsy, hysteria, insomnia. Additionally, ZnO is also used in wound healing, implant coating, tissue engineering, drug delivery system and in toxicological assessment. The structure and morphology of the synthesized ZnO nanoparticles were characterized using different characterization techniques such as XRD, SEM, EDX and TEM. XRD patterns reveal the formation of hexagonal-phase of ZnO. The average crystallite size was estimated by Scherrer's formula and found in the range of 30-80 nm. SEM images clearly indicate the formation of spherical like particles with different size ranging from ~30-80 nm, which is in good agreement with XRD results. The ZnO nanoparticles were evaluated for antioxidant activity using DPPH, ABTS and Reducing power (RP). The ZnO nanoparticles of stem showed maximum inhibition activity with an IC50 values of DPPH (45.306 µg/ml), ABTS (39.166 µg/ml) and RP (18.047 µg/ml) followed by root with an IC50 values of DPPH (49.306 µg/ml), ABTS (50.868 µg/ml) and RP (22.247 µg/ml) and leaf with an IC50 values of DPPH (74.677 µg/ml), ABTS (44.1833 µg/ml) and RP (30.147 µg/ml) respectively. ZnO nanoparticles shows higher antioxidant activity at micro molar concentration hence

synthesized nanoparticles may be used as antioxidant agent. Further investigation has to be carried out for antibacterial and anticancer activity.
Key words: Nanoparticles, Antioxidant, Fabaceae, *Flemingia strobilifera*

HITASA/AB/2024/189

Assessment of Biomass Production and Carbon Sequestration Potential Under Different Forest Typesand Density Classes of Uttar Kannada District

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The present study was conducted in Mundgod and Sirsi taluk of Uttar Kannada district to assess the biomass production and carbon sequestration potential under different forest types and density classes during the year 2021-2022. Quadrates of 20m×20m was laid in each forest types and observations were recoded.The results revealed that in forest types, the maximum total biomass was observed in evergreen forest (444.50 Mg ha^{-1}) followed by moist deciduous forest (339.25 Mg ha^{-1}) and lowest was recorded in dry deciduous forest (303.75 Mg ha^{-1}). In interactions, between forest types and density classes, highest carbon stock was recorded in evergreen very dense forest (291.50 Mg ha^{-1}) followed by moist deciduous very dense forest (260.40 Mg ha^{-1}) and lowest was in dry deciduous open forest (63.75 Mg ha^{-1}). The form factor of different tree species present in evergreen forest ranged from 0.43 to 0.73, in moist deciduous forest is ranged from 0.49 to 0.63 and in dry deciduous forest is ranged from 0.46 to 0.64.This study also revealed that there is a significant difference between forest types and density classes and their interactions

with respect to litter biomass accumulation. In different forest types, highest annual biomass accumulation in litter was observed in evergreen forest (13.50 Mg ha^{-1}) followed by moist deciduous forest (12.40 Mg ha^{-1}) and lowest was recorded in dry deciduous forest (8.40 Mg ha^{-1}). In interactions of forest types and density classes, the highest biomass accumulation in litter was noticed in evergreen very dense forest (18.30 Mg ha^{-1}) followed by moist deciduous very dense forest (16.90 Mg ha^{-1}) and lowest was in dry deciduous open forest (5.20 Mg ha^{-1}). It can be concluded that the tree biomass and carbon stock was recorded higher in evergreen very dense forest as compared to other forest types and density classes.

HITASA/AB/2024/190

Sectorial Improvements for Doubling Farmer's Income

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Agriculture is the largest enterprise in the country. An enterprise can survive only if it can grow consistently. And, growth is incumbent upon savings & investment, both of which are a function of positive net returns from the enterprise. The net returns determine the level of income of an entrepreneur, farmer in this case. This explains the rationale behind adopting income enhancement approach to farmers' welfare. Revenue and profit are often used interchangeably by the average person, profit being an outcome of revenue. Objectives of doubling of farming income is to increase production and productivity of crop, strong measures will be needed to harness all possible sources of growth in farmers' income within as well as outside agriculture sector within the sector farmers has to concentrate on reducing cost of production, Resource use efficiency, Increase in cropping intensity, Diversification towards high value crops and higher price realization by farmers needs to be achieved through various price realization market reforms like e-NAM and various provisions of APMC Act. Concerted and well-coordinated efforts are required to be made between the Centre and the States, policy direction to ramp up physical connectivity

from farm to consumers and easing certain regulatory restrictions are required and also greater access to more markets hedges against selling risks, and adds opportunity to produce more. Outside agriculture sector includes shifting cultivators from farm to non-farm occupations, and improvement in terms of trade for farmers or real prices received by farme

Keywords: DFI, APMC, e-NAM

HITASA/AB/2024/191

Artificial Climate Control Systems in Green House

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Greenhouse crop production was a very significant event in the history of agriculture since it was realized that with the help of it many plants could be protected from different biotic and abiotic stress. It developed as a mechanism to shield crops from harsh and unfavorable environments that hinder plant growth. Because the greenhouse is a non-linear system, regulating it becomes challenging. Temperature, relative humidity, carbon dioxide, nutrition, water availability, and growing media are the factors that impact plant growth. The use of smart greenhouses has significantly increased as automation and artificial intelligence have progressed These greenhouses are equipped with tools and systems that enhance the quantity and quality of the products while minimizing energy consumption.

Modern greenhouses measure, display, and control various parameters that affect the growth of greenhouse products, such as environmental temperature and humidity, light intensity and duration, carbon dioxide level, soil temperature, and other factors. Robust sensors, actuators, and control algorithms are the main components that make artificial temperature control systems function. Together, these parts monitor environmental factors and modify system configurations to ensure

that the environment is customized to meet the unique needs of various plant species. Precise temperature, humidity, and nutrient control are made possible by sophisticated technologies including automated irrigation, heating, cooling, and ventilation systems which are monitored by complex control algorithms and installed with many sensors both inside and outside the greenhouse. These systems maximize plant growth while consuming less resources and having a positive environmental impact. In conclusion, artificial climate control systems play a crucial role in modern greenhouse agriculture, enabling precise regulation of environmental conditions to enhance crop growth, productivity, and sustainability.

HITASA/AB/2024/192

Assessment of Raised Bund Former cum Seeder's Performance for Green Gram Seeding

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In the contemporary era of burgeoning agricultural demands, the adoption of innovative techniques is imperative for sustainable growth, particularly in the agricultural sector. This study focuses on evaluating the efficacy of the Raised Bund Former cum Seeder in comparison to the traditional broadcasting method for seeding green gram in India. The Raised Bund Former cum Seeder presents a multifaceted solution, capable of performing various simultaneous operations, thereby significantly reducing labour requirements and associated costs. Through a comprehensive comparison, it was observed that the Raised Bund Former cum Seeder outperformed the broadcasting method in several aspects. The study revealed that utilizing the Raised Bund Former cum Seeder resulted in a notable increase in field capacity, with an effective rate of 0.615 hectares per hour and a field efficiency of 72.19%. Moreover, it substantially reduced operational time, saving up to 70% compared to the broadcasting method. The precision of the seeder in controlling seed and

fertilizer depth ensured optimal utilization with minimal loss, further enhancing cost-effectiveness. The machinery maintained recommended row spacing and seed rates, contributing to a higher plant population per unit area compared to broadcasting. Financially, the operational cost of utilizing the Raised Bund Former cum Seeder was found to be economically viable at ₹1202 per hectare, representing a significant saving of 39% compared to broadcasting. Additionally, the seeder demonstrated water-saving capabilities, reducing irrigation time by 49% and conserving up to 18,000 liters of water per hectare in green gram cultivation. Statistical analysis confirmed the significant variation in yield among different treatments, with the Raised Bund Former cum Seeder yielding a maximum of 780 kg/ha due to precise seed and fertilizer placement. In conclusion, the assessment underscores the superior performance of the Raised Bund Former cum Seeder for green gram seeding, offering enhanced efficiency, cost-effectiveness, and sustainability compared to traditional methods. By embracing such technological advancements, farmers can effectively address the growing demands of food production while ensuring environmental stewardship and economic prosperity.

Key words: Raised bund former, Plant population.

HITASA/AB/2024/193

Studies on genetic variability, character association and path analysis in Niger (*Guizotia abyssinica* L.) Genotypes

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The present study aimed to assess the genetic variability parameters and understand the associations among key traits influencing grain yield in thirty niger genotypes. The investigation was conducted during the kharif season of 2022 at the Botany division research farm, College of Agriculture Pune, Maharashtra. The genotypes exhibited high estimates of genotypic coefficient of variation and phenotypic coefficient of

variation for important traits such as number of branches per plant, number of capitula per plant, number of seeds per plant, and seed yield per plant.

The study revealed high heritability coupled with substantial genetic advance for traits including number of branches per plant, number of capsules per plant, number of seeds per capsule, and grain yield. This suggests the presence of predominant additive genetic variation, indicating the potential for improvement through direct selection.

Correlation studies unveiled highly significant positive correlations at both phenotypic and genotypic levels between grain yield and plant height, number of capitula per plant, and test weight. These findings highlight the importance of these traits in influencing grain yield.

Path coefficient analysis further identified plant height and number of seeds per capitula as having the maximum direct effects on grain yield, followed by the number of capitula per plant. These results provide valuable insights into the key factors contributing to grain yield in niger genotypes.

In conclusion, the study enhances our understanding of the genetic variability, heritability, and character associations in niger genotypes, providing a basis for effective breeding strategies to enhance grain yield in this important crop.

Keywords: Genetic variability, Heritability, Character association, Path analysis, Niger.

HITASA/AB/2024/194

Organic nutrition package for yield and economic benefits in finger millet (*Eleusine Coracana* L. Gaertn)

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The study entitled 'Response of finger millet (*Eleusine coracana* (L.) Gaertn) to organic nutrition' was conducted at College of Agriculture, Vellayani, Thiruvananthapuram, Kerala during 2021-2023 to assess the effect of organic nutrition on the yield, quality and economics of finger millet. The field experiment followed Randomized Block Design with twelve treatments *i.e.,* T_1 - 50% nutrients through FYM + 50% nutrients through vermicompost, T_2 - 75% nutrients through FYM + panchagavya, T_3 - 75% nutrients through poultry manure enriched FYM + panchagavya, T_4 - 75% nutrients through phosphate solubilizing bacteria (PSB) enriched FYM + panchagavya, T_5 - 75% nutrients through neem cake – Trichoderma (NCT) enriched FYM + panchagavya, T_6 - 75% nutrients through PGPR mix-I enriched FYM + panchagavya, T_7 - 75% nutrients through vermicompost + panchagavya, T_8 - 75% nutrients through poultry manure enriched vermicompost + panchagavya, T_9 - 75% nutrients through PSB enriched vermicompost + panchagavya, T_{10} - 75% nutrients through NCT enriched vermicompost + panchagavya, T_{11} - 75% nutrients through PGPR mix-I enriched vermicompost + panchagavya and T_{12} - Control (Adhoc organic package for crop nutrition envisaged by Kerala Agricultural University Package of Practices (organic), 2017).

Various yield and economic parameters *viz.* number of productive tillers/m^2, number of fingers/ear head, ear head length and ear head weight, grain yield, straw yield, net returns and B:C ratio were recorded during the experiment. Results of the study revealed higher yield parameters and yield of finger millet in treatments supplied with 75% nutrients through enriched vermicompost by neem cake-Trichoderma or poultry manure or PGPR mix-I or PSB, along with foliar spray of 3% panchagavya, compared to other treatments of the study. Whereas, considering the economics of crop production, treatments which supplied nutrients through FYM and vermicompost enriched with poultry manure and neem cake – Trichoderma along with foliar spray of 3% panchagavya resulted in better net returns and B:C ratio. Hence it could be concluded that treatments T_{10} (75% nutrients through neem cake - Trichoderma enriched vermicompost + foliar spray of 3% panchagavya) and T_8 (75 per cent nutrients through poultry manure enriched vermicompost + foliar spray of 3% panchagavya) could be recommended for higher yield and economic benefits in finger millet.

Keywords: Finger millet, Organic nutrition, Vermicompost, Panchagavya, FYM

HITASA/AB/2024/195

Geospatial Mapping of Soil Organic Carbon Using Machine Learning Algorithm in Yellapur Forest Division, Uttara Kannada

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This study aimed to comprehensively assess the soil physiochemical properties and spatially map soil organic carbon (SOC) at two different depths (0-15 cm and 15-30 cm) in five different forest types in the Yellapur forest division. Eight replicated composite soil samples at two depths from five forest types were collected.Results revealed that evergreen forest soils showed higher soil organic carbon content and soil organic carbon stock (t/ha) at both soil depths (4.08 % and 60.80 t/ha in 0-15 cm and 3.14 % and 54.68 t/ha in 15-30 cm). A clear trend was observed, indicating a decline in soil organic carbon content and stock with increasing soil depth. In bulk density, pH and EC the highest values observed in teak plantation at 15-30 cm soil depth (bulk density- 1.51 g/cc, pH- 6.53 and EC- 0.12 dSm^{-1}) and lowest values in evergreen forests at 0-15 cm soil depth (bulk density- 0.74 g/cc, pH- 5.46 and EC- 0.05 dSm^{-1}).Soil organic carbon density maps were produced using three distinct MLAs. The SOC stock estimated using the RF model ranged from 69.81 t/ha to 123.44 t/ha, while for SVM and ANN, ranged from 93.64 t/ha to 96.55 t/ha, and 72.64 t/ha to 132.54 t/ha, respectively. Overall, the results suggest that the RF model outperformed both SVM and ANN models in predicting soil organic carbon, supported by its higher R^2 value (0.628), lower RMSE value (29.509), lower MAE (26.983), and higher CCC value (0.792). These findings signify the

reliability and accuracy of the RF model in predicting soil organic carbon distribution and stock in the Yellapur forest division.

HITASA/AB/2024/196

A micro study about Constraint Analysis of Rice Cultivation in Korba District of Chhattisgarh

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Rice is an important staple food in Chhattisgarh. Therefore, this paper aims to discuss the issue and problems faced by rice farmers in Korba District of Chhattisgarh. The respondents were selected in Korba district consist of five blocks Pali, Korba, Katghora, Kartala, Podi-Uproda out of which Katghora block was selected purposively as in this block all the five paddy and there many cultivation related issues. And also the Vijaypur village selected purposively for the study. 50 respondents were selected i.e. 22 percent of total farmers for the study. Obtainined data, qualitative research methods through in-depth interview techniques, group discussion and observation were utilized and the data were analyzed using content analysis. The results showed that the rice cultivation area faced major problems such as Lack of knowledge about recommended package and Practices(rank I) followed by Problem of high cost of Fertilizer and plant protection chemicals(rank II) and Lack of Irrigation water(rank III). And marketing side the result showed major constrains such as Problem of Means of Transportation (rank I) followed by Reason for selling of produce to a particular agency due to very low amount of production farmers forcefully sell to local market (rank II) and Problem facing by Farmers because the Quantity of Produce is small (rank III). And also discussed

Problem of Disease, Insect pest of Crop, Poor knowledge of improved and high yielding and disease resistant Varieties, Lacking of Institutional Support during Production and Marketing.

Keywords: Rice, Constraints, Katghora, Rank.

HITASA/AB/2024/197

Carbon Stock Measurement in Organic Farming

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The process of enriching soil organic carbon (SOC) stocks in arable systems to sequester carbon (CS) is becoming more and more important due to its potential to mitigate climate change and its associated benefits for crop productivity and sustainability. By increasing soil fertility with organic matter and diversifying farms, Organic Agriculture (OA) systems have a great potential to create resilient food systems in the face of uncertainty. When compared to the current Conservative farming (CF), OA systems in developing nations yield yields that are equal to or higher, making them a potentially significant option for food security and sustainable livelihoods for the impoverished in rural areas during climate change. Because certified organic products give farmers more income options, they can encourage the use of climate-friendly farming methods around the globe. for carbon sequestration firstly maximizing of carbon inputs use like selection of efficient plant, species, rotation sequence, fast growing crops, tillage manipulations, frequency of tillage, manuring, types of organic manure, botanical extract in pest control can be used secondly minimizing carbon loss from soil like reducing soil disturbance, less intensive tillage, controlling soil erosion, judicious use of available soil water, promoting plant growth, reducing weed pressure, conservation tillage, maintaining soil surface cover, enhance plant water use and production, cultivation of cover crop and lastly microbial dominance in soil are major activities for increasing carbon stocks. a simple methodology can be applied for determination of soil carbon stocks in mg per hectare the soil organic carbon can be multiplied by bulk density and soil depth and multiplied by 10 the result presents in g $kg^{-1.}$ the organic farming is a sustainable system-based approach which not only mitigate from GHGs but also sequestrate more

carbon in soil which would be benefited to cope with climate change, enhance biodiversity and soil conservation simultaneously improve rural livelihoods at the same time.

Keywords: Carbon sequestration, Carbon Stock Measurement, Organic Farming

HITASA/AB/2024/198

Integrated Weed Management Practices in Rice (*Oryza Sativa* L.) for Higher Yield and Profitability under Medium Land Situation.

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Rice (*Oryza sativa* L.) is the staple food for more than 60% of world population. Next to China, India contributes 21.5 percent of global rice production and plays an important role in the economic development of our country. Rice is cultivated in an area of 44 million hectares in India and 4.18 million hectares in Odisha. Rice suffers from severe weed competition both in direct seeding and transplanted condition under changing climatic situation. Productivity of wet season rice in particular is very low due to introduction of short statured high yielding varieties having erectophyllic leaves where there is acute weed. The diverse weed floras (grasses, sedges and broad leaf weeds) grow profusely and reduce rice yield considerably upto 28-45 % in transplanted condition. To reduce the harmful effects of weeds on rice, the weeds population must be kept under economic threshold level to optimise the yield. Due to scarcity of labour, weed management in transplanted rice by cultural and mechanical means is tedious and expensive, mainly at peak period. The major grasses comprised of *Echinochloa colona, Digitaria sanguinalis* (L.)**,** *Elusine indica*(L.),*Leptochloa chinensis* and the important sedges were *Cyperus difformis* Linn and *Cyperus iria* . Among broad leaved weeds *Ammania bassifera, Alternanthera philoxeroides* and *Marsilea quadrifolia* were perennial weeds whereas, *Eclipta alba* (L.) and *Ludwigia parviflora* were annual.

A participatory on-farm trial was conducted during two consecutive wet seasons of 2018–19 and 2019-20 at farmer's fields in Sansailo village of Sukinda block and Choramuha village of Dharmsala block of Jajpur district of Odisha to assess the effect of pre emergence herbicide Bensulfuron methyl 0.6% + Pretilachlor 6% GR and post emergence herbicide Penoxsulam on weeds and growth and yield of rice. The application of post emergence herbicide Penoxsulam @20 g/ha gave 19.47 per cent higher seed yield as compared to farmer's practice. Further, application of pre-emergence Penoxsulam @20 g/ha along with manual weeding at 30 days after transplanting treatment gave significantly higher grains per plant, plant height and yield of rice(4.98 t/ha.) and significantly reduced the weed density and weed dry matter as compared to all other treatments tested.

HITASA/AB/2024/199

A Study on Factors Effecting Labour Efficiency in Performing Some Fodder Production Operations

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The present study was conducted at Livestock Research station, Mahanandi, Andhra Pradesh to know the factors affecting labour efficiency in performing some fodder (Super Napier) production operations such as preparation of stem cuttings, irrigation, inter-cultivation and harvesting of fodder. The factors studied include number of motors (in case of irrigation), age of fodder (in case of harvesting) and identity of labourer (in case of preparation of stem cuttings, irrigation, inter-cultivation and harvesting of fodder). All the labourers are of same age (40 years). The mean time taken for preparation of stem cuttings, irrigation, inter-cultivation (application of adjusted cultivator) and harvesting of fodder was 16.52 ± 0.62, 8.45 ± 0.31, 0.64 ± 0.07 and 96.81 ± 9.39 man-hours per acre respectively. The study

revealed that the identity of labourers had no significant effect on efficiency in preparation of stem cuttings and harvesting of fodder, but it had significant effect in application of adjusted cultivator ($P < 0.01$) and irrigation ($P < 0.05$). The age of fodder was found to have significant effect ($P < 0.01$) on the labour efficiency in harvesting of fodder and the average time taken for harvesting the young fodder (< 60 days of age) was 45.06 ± 6.88 man-hours per acre and that of the old fodder (> 60 days of age) was 106.65 ± 4.43 man-hours per acre. The number of motors used for irrigation had no significant effect on time taken for irrigation although the mean time taken for irrigation was slightly lower with two motors (7.29 ± 0.58 man-hours per acre) when compared to one motor (8.45 ± 0.31 man-hours per acre). Based on the results, it was concluded that the efficiencies of performing inter-cultivation and irrigation vary significantly with the identity of labour, and the efficiency of harvesting of fodder varies significantly with the age of the fodder.

Keywords: Irrigation, inter-cultivation, fodder, labour efficiency.

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Changes in Soil Biological and Chemical Properties Amended with Enriched Compost and Chemical Fertilizers

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To adopt effective nutrient management strategies for sustainable mustard (*Brassica juncea*) production, it is crucial to understand the nutrient-supplying potential of enriched composts. In this study, we conducted a field experiment with five treatment combinations; control (T1), (100% RDF recommended dose of fertilizers (T2), enriched compost

at 6 t ha^{-1} (T3), 100% RDF + enriched compost at 6 t ha^{-1} (T4), and 50% RDF + enriched compost at 6 t ha^{-1} (T5). Results showed that soil treated with 100% RDF together with enhanced compost at 6 t ha^{-1} maintained significantly higher available NP and K as compared to alone use of compost and chemical fertilizers. Soil organic carbon (SOC) was more influenced by enriched composts as compared to chemical fertilizers. Soil treated with enriched compost and chemical fertilizers, remarkably improved in SOC (0.56%) as compared to the sole application of chemical fertilizers and enriched compost. Soil amended with enriched compost and chemical fertilizers improved soil alkaline phosphatase activity (ALPA), microbial biomass carbon (MBC), and dehydrogenase activity (DHA), in comparison to 100% RDF. Application of Enriched compost at 6 t ha^{-1} along with 100% RDF resulted in significantly higher mustard grain yield (2.93 Mg ha^{-1}) compared to alone use of 100% RDF. Mustard grain yield was 16.7% higher on soil treated with 100% RDF compared to control. The results showed that enrichment of processed compost (6 t ha^{-1}) with chemical fertilizers (100% RDF) is a good strategy to improve soil health and available nutrients in soil-plant systems and sustain mustard yields in degraded ecosystems.

Keywords: Soil fertility; Microbial Biomass Carbon; Enriched Compost; Enzyme activity; Mustard yield

HITASA/AB/2024/201

Management Practices Followed Towards Prevention and Control of Mastitis in Mumbai Metropolitan Region

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An experimental study was conducted to explore the management practices followed towards prevention and control of mastitis by dairy farmers of Mumbai metropolitan region in Maharashtra state. Totally one hundred and eighty farmers from thirty veterinary clinics were selected for this study by random and purposive sampling methods. Farmers having history of mastitis in herd in last one year and possessing atleast five milch animals in herd and dairy experience of five years were selected. More tha three fourth (79.44%) of farmers were aware about terminology mastitis and 76.67 were aware of cleanest possible environment given to dry cows and heifers two weeks prior to calving. More than three fourth (75.56%) were aware of cutting nails to prevent injury to udder. Farmers were not aware of contact period of dipping solution with the teat (89.45%), most common form of mastitis (81.67%) and effect of antibiotic residues in milk on human health (78.89%). Regarding risk factors, aged animals (62.78%) in early lactation (48.89%) and parity of more than 4(35.56%) had more prevalence of mastitis in summer season (56.67%). The management practice of preventing animals from lying down after milking and washing shed twice a day was frequently done by 95.00% and 91.11% farmers whereas regular washing of udder and teats and milking mastitic animals separately or last was practiced sometimes by 23.33 per cent of respondents. Teat dipping and wearing gloves during milking was never practised by 97.22 and 94.44per cent of respondents. Regarding general management practices, 96.67 per cent had followed full hand method of milking and 76.11 per cent drained gutters daily. All the respondents had never followed physical examination of milk, milk culture and somatic cell count whereas 96.11 had never kept animals in quarantine. Lack of information in regional language (64.36%), difficulty in diagnosis of mastitis (63.80%) and lack of training programme towards management of mastitis (62.11%) were major constraints faced by farmers in management of mastitis.

HITASA/AB/2024/202

Factors contributing towards Farmer Suicide Syndrome in Karnataka

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Farmer suicides in India, particularly in states like Maharashtra, Karnataka, Andhra Pradesh, and Telangana, have been a concerning issue for many years. According to the National Crime Records Bureau (NCRB) data, more than 10,000 farmers die by suicide each year in India. These suicides are often attributed to a combination of factors, including debt, crop failure, inability to repay loans, lack of proper support systems, mental health issues, and more. It requires a comprehensive approach addressing the root causes such as debt, crop failure, market uncertainties, and mental health issues. Efforts to improve agricultural practices, ensure timely support, and create a more stable and equitable agricultural ecosystem are crucial to addressing this longstanding issue. In this connection a study was carried out in 2020-21 to understand the factors contributing towards farmer suicide syndrome in Karnataka. The results of the study exhibited that, six independent variables *viz.,* age, farming experience, cosmopoliteness, scientific orientation, information seeking behaviour and deferred gratification have exhibited positive and highly significant ($p<0.01$) relationship with suicide syndrome among the affected farmers at one per cent level. Whereas, two variables *i.e.,* education and extension participation had negative however highly significant ($p<0.01$) relationship with suicide syndrome among the affected farmers at one per cent level of probability. The six variables such as, family size, caste, economic motivation, innovativeness, risk orientation and management orientation had positive and significant ($p<0.05$) at five per cent of probability with the suicide syndrome among the farmers. However, extension agency contact was found to have negative and significant ($p<0.05$) relationship at five per cent level. The other five independent variables, occupational status, farm size, family type, mass media exposure and decision-making ability had no relationship ($p>0.05$) with the suicide syndrome among affected farmers.

Keywords*:* Factors, Farmers, relationship and Suicide Syndrome

HITASA/AB/2024/203

Comparative economics of open and protected cultivation of tomatoes in Karnataka

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The present study was objectivized to compare the economics of open and protected cultivation of tomatoes in Karnataka. The study was conducted during 2021-22 in major tomato growing districts of Karnataka. Belagavi from North Karnataka and Kolar from South Karnataka were the districts considered for the study. The study was depended on primary data which were collected from 60 samples of farmers which comprises of 15 farmers practicing open cultivation and 15 farmers practicing protected cultivation of tomatoes from each district. The capital budgeting techniques and Cobb-Douglas production function analysis were the analytical tools adopted. The results revealed that the 80 per cent of the sampled farmers practicing tomato cultivation under Iron Pole Poly House (IPPH) and the rest were producing in Wooden Pole Shade House (WPSH). Around Rs. 412.54 per m^2 is required for establishment of IPPH and Rs. 58.13 per m^2 is required for establishment of WPSH. The total cost of Rs. 2,43,929 per ha and Rs. 4,11,081 per ha is required for production under open and protected environment respectively. The returns obtained at the benefit cost ratio of 2.36 under open cultivation and 2.43 under protected cultivation. the Cobb-Douglas production function estimated that the R^2 indicated that 84 per cent and 96 per cent of variations in the gross returns of tomatoes under open cultivation and protected cultivation were influenced by independent variables included in the analysis. The results concluded that the protected cultivation of tomatoes in major tomato growing belts of Karnataka provided higher returns than open cultivation practices.

Keywords: Benefit-Cost Ratio, Resource use efficiency, protected structure, tomatoes

HITASA/AB/2024/204

Effect of intra uterine 50% dextrose solution on reproductive performance of endometritis affected postpartum cows.

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The objective of present study was to determine the efficacy hypertonic solution 50% dextrose in post partum cows diagnose with endometritis. A total of 87 cows at 35±2 days were screened for endometritis employing vaginoscopy, white side test, leucocyte esterase and uterine cytobrush cytology. The post partum cows with endometritis (n=16) divided into two treatment groups viz., group I (n=8) treated with 50% dextrose given Intra uterine (IU) and group II (n=8) treated with IU antibiotic (Ceftriaxone + metronidazole). Group III (n=8) was without endometritis kept as control. The prevalence of endometritis was 31.03, 29.88, 24.14 and 32.18% diagnosed by vaginoscopy, white side test, leucocyte esterase and uterine cytobrush cytology, respectively. The most frequently isolated bacteria were 69.23% gram –ve rod (*E. coil* - 10 *Enterobacter sp*-1, *Klebsiella sp*-3, *Pseudomonas sp*-3, *Proteus sp*-1) followed by 26.92% gram +ve cocci (Staphylococcus -5 and *Streptococcus Sp.-2,*) and 6.25% gram +ve rods (*corynebacterium pyogens-1).* Postpartum estrus seen in group I, II and III were 63.33±3.20, 79.2±2.99 and 80±2.56 days respectively upto 90 days postpartum. First service conception rate (FSCR) was improved in group I (83.33%) than group II (80%) and group III (80%). Conception rate was higher in group I (75%) than group I (62.5) and group II (62.5%). Number of days open were more in group II (77.25±2.92), followed by group III (74.75±5) than group I (66.83±6.12). *On conclusion* Cytobrush technique is more efficient technique to diagnose endometritis but leucocyte esterase is simple and quick test to be carried out at field level, so that early curative steps can be initiated to overcome the uterine infection. The intrauterine infusion of dextrose treatment on day 35±2 postpartum had similar cure rate compared to antibiotic (Ceftriaxone + metronidazole) after 14 days post-therapy, but improved FSCR, CR

and number of days open in postpartum crossbred cows gives good alternative for antibiotic treatment to avoid milk rejection during treatment of endometritis.

HITASA/AB/2024/205

Enhancing storability of *Elaeagnus latifolia* by postharvest application of surface coatings

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Hill regions of Northeast India are a hub for a wide range of underutilized crops wherein *Soshang* (*Elaeagnus latifolia*) is one of the crops. It is a nutraceutically rich indigenous fruit crop commonly found in the foothills state of Meghalaya. However, due to its high perishable nature and short season availability it has to be utilized at the earliest, and more commonly done through fresh consumption. Therefore, this study was an attempt to study the effective postharvest treatment for enhancing the shelf life of fresh *Elaeagnus latifolia* fruits in ambient conditions by use of edible coatings by extending its availability in the market and thereby reducing the postharvest losses as well. Postharvest application of polysaccharide based edible coatings *viz.* carboxymethyl cellulose (1%), sodium alginate (2%), chitosan (1%) and guar gum (1%) was given to mature fruits of *Elaeagnus latifolia* and stored at ambient conditions (20±5°C, 80-90% RH). The postharvest shelf life was studied at 2 days intervals from 0 to 6 days. Results revealed that guar gum @1% was found to be the best in enhancing the storage life for up to 6 days followed by chitosan (1%) by significantly reducing physiological loss in weight (6.77, 7.39%), flesh softening (0.84, 0.74 Newton) and lower activity of cell wall degrading enzymes i.e. pectin methyl esterase (0.08, 0.10 µmol/g/min) as compared to other edible coated fruits and uncoated fruits.

Keyword: Storability, *Elaeagnus latifolia*, postharvest, surface coating.

HITASA/AB/2024/206

Path Analysis among Yield and Yield Contributing Traits in Tomato (*Solanum lycopersicum* L.)

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Path analysis was performed on plant and fruit characters of twenty-nine tomato genotypes grown in a two years' field experiments to determine for fruit yield, the direct and indirect effects of the various yield attributing traits: days to first flowering, days to 50% flowering, number of flower cluster plant^{-1}, primary branches plant^{-1}, secondary branches plant^{-1}, plant height (cm), number of fruits plant^{-1} and average fruit weight (g). Fruit yield plant^{-1} was positively and significantly correlated with primary branches plant^{-1} (0.40, 0.39), number of fruits plant^{-1} (0.47, 0.37) and average fruit weight (0.59, 0.49) at both genotypic and phenotypic levels, respectively. Path analysis showed that secondary branches plant^{-1} had the highest positive direct effect (0.89) on fruit yield plant^{-1} followed by average fruit weight (0.87), number of fruits plant^{-1} (0.65), days to 50% flowering (0.19) and number of flower cluster plant^{-1} (0.05), while other traits like days to first flowering, primary branches plant^{-1} and plant height had negative direct effects. The significant positive correlation coefficients of number of fruits plant^{-1} and average fruit weight with fruit yield plant^{-1} were resulted mainly from high and positive direct effects of these traits with fruit yield suggesting direct selection would be rewarding whereas for the characters days to 50% flowering and number of flower cluster plant^{-1} for which correlation coefficients were negative but the direct effect was positive, a restricted simultaneous selection model is to be followed. For the character like plant height, the indirect causal factors *eg.* secondary branches plant^{-1} and number of fruits plant^{-1} are to be considered simultaneously for selection, since indirect effects seem to be the cause of correlation.

Keywords: Path analysis, correlation, tomato

HITASA/AB/2024/207

Validating the Constructs of Organic Cereal Brand Image in Bengaluru City: A Confirmatory Factor Analysis Approach

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The study aimed to explore the facets of organic cereal brand image in Bengaluru City, Karnataka. Primary data were collected from 120 organic consumers using random sampling. Confirmatory Factor Analysis (CFA) was employed to assess reliability and validity, with model fit evaluated using the maximum likelihood (ML) method. Constructs were evaluated for reliability using Cronbach's α and composite reliability (CR) via CFA. The results showed that 56.67 per cent of consumers preferred brand for purchase of cereals was Grami Superfoods Organic, followed by Pro Nature (20.83 %), 24 Mantra (12.50 %), and other brands (10.00 %). The constructs were validated for the brand image of Grami Superfoods Organic, with all factor loadings exceeding one. Cronbach's α values for most constructs exceeded 0.60, except for price sensitivity. CR values met the cutoff criteria (Hair et al., 2010), except for price sensitivity. Correlation analysis revealed strong relationships between Brand Trust and Health Consciousness (0.94**), Sustainability and Purchase Intention (0.96**), and Purchase Intention and Brand Loyalty (0.98). Perceived Quality showed a relatively lower correlation with Brand Loyalty (0.52), suggesting perceptions of quality may not directly influence brand loyalty while, trust and health consciousness influence each other, sustainability positively impacts purchase intention, and high purchase intention is associated with brand loyalty. CFA model fit indicated a chi-square to degrees of freedom ratio of 2.49, CFI of 0.97, and SRMR of 0.08, suggesting reasonably good fit. However, RMSEA (0.15) and Pclose (0.000) values failed to meet the threshold, indicating a poor fit. In conclusion, the measurement model for Grami Superfoods Organic demonstrated strong reliability and validity. High values of perceived quality, brand trust, health consciousness,

sustainability, purchase intention, and brand loyalty suggest positive consumer perceptions across these dimensions.

Keywords*:* Brand Image, Confirmatory Factor Analysis, Constructs, Cereals

HITASA/AB/2024/208

Enhancement of livelihood security of tribal women through KVK activities in Palghar district of Maharashtra state

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Krishi Vigyan Kendra, a planned scheme of the Indian Council of Agricultural Research plays a vital role by organizing various mandatory programmes for the women for their empowerment in respect of knowledge and adoption of technology for the augmentation of crop production, food security, livelihood security, etc. KVK emphasizes women's empowerment through the formation and functioning of SHG and provides training on entrepreneurial training which helps them to develop self-confidence, attitude, motivation, economic independence, decision-making, leadership, social mobility, etc. Therefore, an attempt has been made through this study to find out the enhancement of livelihood security of the tribal farm women through KVK activities. The present study was conducted in purposively selected Palghar district of Maharashtra state which is tribal dominated district. A total of two blocks were selected, and in each block, five villages were selected randomly where KVK has given training to the tribal women who were members of SHGs. Thus, a total of 10 villages were selected and from each selected village 20 respondents were selected. Thus, a total of 200 respondents were selected for the study. To measure the livelihood security of the tribal farm women, an index developed by (Eqbal 2015) was used with modifications. The index was based on 10 sub-indicators of livelihood security *i.e.* food security index, community empowerment index, community educational security index, gender equality index, economic efficiency index, ecological security index,

community participation index, infrastructure security index, employment security index and sustainable farm diversification index. The overall extent of livelihood security was found as majority of the respondents in case of food security (60.00%) , community empowerment (87.50%), community educational security (82.50%), gender equality(47.00%), economic efficiency (58.00%), ecological security (77.50%), community participation (86.50%), infrastructure security (74.00%), employment security (71.00%), sustainable farm diversification (69.50%), all these sub-indicators comes under medium level of livelihood security index. In the case of the Overall livelihood security index, 69.00 percent was observed which comes under the medium-level of category.

Keywords: Livelihood, Empowerment, Sustainable development, Self-help group, KVK, ICAR, Demonstration, Training

HITASA/AB/2024/209

Improving nutrient utilization efficiency and yield of Indian mustard through biofortification with nano-urea spraying

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Project was proposed to improve the nutrient use efficiency in mustard mostly cultivated in arid and semi arid regions are facing poor nutrient availability. To deal with the situation, it's pertinent to develop a smart materials that can be released nutrients to the crop critical stages without adversely affect on the environmental health. Nano- fertilizers are emerging resources in agriculture in order to increase crop yield, quality parameters and improving nutrient uptake in crops. The effect of nano-fertilizer developed by IFFCO (nano-urea) on mustard growth and yield was observed. A field experiment comprises with nine treatments in combination of graded application of nitrogen (N) and foliar spray (FS) of nano urea, i.e. T1 -control; T2 - RDF; T3- RDF- N_{50} + 1 FS Nano-urea; T4- RDF- N_{25} + 1 FS Nano-urea; T5- RDF - N_{50} + 2 FS Nano-urea; T6 - RDF -N_{25} +

2 FS Nano-urea; T7 – RDF-N_{100} + 1 FS Nano-urea; T8-RDF- N_{75} + 1 FS Nano-urea; T9- RDF- N_{75} + 2 FS Nano-urea. The experiment was replicated thrice in RBD design. Foliar spray of nano urea showed a significantly ($p<0.05$) positive response on plant height, main shoot length and number of siliqua on main shoot, total number of siliqua per plant and secondary branches in plant. However, a non- significant effect was observed on primary branches, length of siliqua, and number of seed per siliqua and test weight of mustard seed. Significantly highest seed (24.30 qha^{-1}) and stover (66.62 qha^{-1}) yield were observed under the two foliar spray of nano-urea with 100% N of recommended dose of fertilizer (RDF) was applied. The at par effect was observed under the treatment of two foliar spray of nano-urea with 75% N of RDF was used. A significant improvement in N, P and K content in seed and stover with foliar spray of nano-urea indicated the improvement in nutrient use efficiency resulted to more positive effect on yield and vegetative growth of mustard.

HITASA/AB/2024/210

Population dynamics of major insect pests and their natural enemies in brinjal ecosystem

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The field experiment was carried out at College of Agriculture, Vijayapura to study population dynamics of major insect pests and their natural enemies in brinjal ecosystem. The present study revealed that peak activity of sucking pest viz., aphid (*Aphis gossypii* Glover), leafhoppers (*Amrasca bigutulla bigutulla* Ishida) and white flies (*Bemesia tabaci* Gennadius) was during 9th, 5th and 13th standard meteorological week (SMW) respectively. Per cent shoot damage by *Leucinodes orbonalis* (Guenee) was peak during 3rd SMW (51.72% shoot damage) and minimum incidence (1.26%) was observed during 10th SMW. Per cent fruit damage

was maximum during 13th SMW (58.49%) and minimum (16.8%) during 4 th SMW. The coccinellid population was substantially associated with the aphid population. During 9th SMW, population was at its peak (3.62 adults/ grub/plant), whereas, least activity of coccinellid was noticed during 13th SMW (0.13 adult/ grub/plant). The correlation studies indicated that, maximum temperature had significant positive correlation with per cent fruit damage, leaf hoppers, aphids and white flies (r= 0.961**, 0.682**, 0.725** and 0.933** respectively) and non significantly negatively correlated with per cent shoot damage (r=-0.362NS). Morning relative humidity showed significant negative correlation with per cent fruit damage, leaf hoppers, aphids and white flies (r= -0.879**, -0.789**, -0.883** and -0.887**, respectively). Evening relative humidity showed significant negative correlation with per cent fruit damage, leaf hoppers, aphids and white flies (r= -0.845**, -0.940**, -0.922** and -0.921**). The correlation of aphids, leaf hoppers, white flies and per cent shoot damage with sunshine duration was positive and significant (r=0.677**,0.750**, 0.473*and 0.549* respectively). Per cent fruit damage had shown positive and non-significant correlation with sunshine duration (0.338NS). Rainfall showed negative and significant correlation with aphids, leaf hoppers, white flies (r= -0.500*, -0.565**, - 0.461*) and non-significantly negatively correlated with percent shoot damage and per cent fruit damage (-0.360NS and - 0.340NS).

Keywords: Abiotic factors, Aphid, Brinjal, Leaf hopper, Population dynamics, Whitefly

HITASA/AB/2024/211

Comparative Efficacy of Some Synthetic and Botanical Pesticides Against "*Diamphidia nigroornata*"

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The relative analysis of synthetic and botanical pesticides was run to predict the relative efficacy of Neem oil, Lemon oil, Garlic oil, Tobacco leaves, Dimethoate and Dimeron at farmer field in Dyalbagh, Agra during 2023.

The investigated data on each weekly interval recorded. The least mean infestation recorded in plot treated with Dimeuron (4.91), followed by Dimethorate (9.80). The plant extracts also give satisfactory reduce mean percentage infestation of *D. nigroornata* viz, Garlic oil (12.37), Lemon oil (12.70), Tobacco leaves (15.77) and Neem oil (15.91) as compare to control. The highest infested mean percent was recorded in untreated plot (40.86).

While all synthetic and botanical insecticides decrease infestation and increase crop output, dimeuron, a synthetic pesticide, is advised for better D. *nigroornata* management.

Keywords : Infestation , Efficacy, Synthetic, Pesticides*.*

HITASA/AB/2024/212

Symbiotic microbial diversity in the haemolymph from different developmental stages of *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae)

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The fall armyworm, *Spodoptera frugiperda* is a destructive agricultural pest that causes serious damage worldwide, particularly to maize cultivars. which harbour endosymbionts within their gut, reproductive tract and also in the haemolymph. Microorganisms play a crucial role in the growth and development of the insects. However, the

diversity of microbes with different developmental stages in the haemolymph of *S. frugiperda* remained unclear. To bridge this gap, a study was conducted at UAS, GKVK, Bengaluru during 2022-23. The microbial diversity in the haemolymph of this insect was assessed using a culture-dependent technique based on 16SrRNA gene sequencing. A total of 15 microbes were isolated from the haemolymph of *S. frugiperda*. The microbiome composition put through significant changes across developmental stages fed with maize. The bacterial diversity was more abundant in fifth instar larvae with 46.66 per cent and decreased in pupae and adult stages with 26.66 per cent in each stage. These results indicate that the developmental stage can alter the haemolymph bacteria of *S. frugiperda.* Phylum, Pseudomonadota was dominant (73.34 per cent) followed by Bacillota (26.66 per cent). Order Enterobacterales was found dominat (46.67 per cent) followed by Moraxellales (26.67 per cent). Family Enterobacteriaceae was the dominant accounting 33.34 per cent followed by Moraxellaceae with 26.67 per cent. Total of seven genera were found *viz., Klebsiella*, *Acinetobacter*, *Mammaliicoccus, Enterococcus, Providencia, Kluyvera and Serratia among them Klebsiella and Acinetobacter were found* dominant with 27.08 per cent each followed by Mammaliicoccus with 20.83 per cent. *Klebsiella pneumoniae* and *Mammaliicoccus sciuri* were found common in all three developmental stages (larvae, pupa and adult) by showing 50 per cent transmission from larva to pupa and from pupa to adult which suggest a vertical transmission route of bacteria in *S. frugiperda*. These dynamic changes in bacterial communities led to changes in the metabolic functions of the microbiota across developmental stages. Our findings provide a comprehensive understanding of *S. frugiperda's* haemolymph microbiome in and its dynamic interaction with defensive microbiota.

Keywords: *Spodoptera frugiperda*, haemolymph microbiome, developmental stage and 16S rRNA

HITASA/AB/2024/213

Prediction of Soil Depth in Coastal Region of South Gujarat of India Using Digital Soil Mapping Approach

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Understanding soil depth distribution is crucial for effective land management; regulating soil-plant-water continuum, eco-hydrological modelling, and carbon storage, especially in agriculturally significant regions like India's coastal areas. This study employs a Quantile Regression Forest (QRF) model, integrating local environmental covariates, to predict soil depth in a coastal region. Soil depth measurements and environmental covariates were collected across the coastal area of South Gujarat, India. After variable selection by recursive feature elimination, QRF was employed for spatial modelling, as it could directly provide the 95% prediction intervals (PIs). The cross-validation showed an R^2 of 0.67 and RMSE of 27.63 cm. The CCC of 0.86 was relatively high, indicating good agreement between the predicted and observed SoD values, which also indicated the prediction uncertainty produced by QRF was reasonable. The produced SoD map with 95% PIs makes sense from a soil science and physiographic point of view and exhibited regional patterns as well as local details. Total catchment area (TCA) and Total Wetness Index (TWI) are found to be the most important variables for the prediction of soil depth. The predicted soil depth in this region is ranged from 50 to 143 cm, and the current SoD map (30m) can guide evidence-based decision-making for agricultural land use planning under rainfed conditions and developing irrigation scheduling as per crop water requirements.

HITASA/AB/2024/214

Assessment of growth and egg production performance of Kadaknath poultry breed in different agroclimatic zones and cage system of rearing

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Backyard poultry farming is a potent tool for uplift of rural economy. Non descript local birds are being reared commonly in backyard with very little health care and management, their growth potential is low which affects the quality of meat and egg. To provide good quality meat, egg and to get sustainable income , the growth and egg production performance of Kadaknath poultry breed, under free range system was assessed in different agro-climatic zones of Dharwad district of Karnataka *vis* Northern dry Zone – III (Navalgund taluk), Northern transitional Zone – VIII (Dharwad, Hubli & Kundagol), Hilly Zone – IX (Kalaghatagi taluk) and cage system of rearing was assessed at the ICAR-KVK Dharwad poultry unit for period of 50 weeks. The present study showed that, the Kadaknath breed is very sturdy, it can with stand both cool and hot climate, and highly suitable for free range system rearing as compared to cage system. Mortality percentage (7.5%) was high during first three week old chicks both the system of rearing. Average body weight gain was significantly high in cage system of rearing as compare to free range and feed conversion ratio (FCR) was significantly low in cage system of rearing as compare to free range at 10 th and 15th week age old birds. At the end of study, results revealed that in all agroclimatic zones of free range and cage system of rearing did not show any significant changes in the egg production, egg quality and nutrient parameters. Hence Kadaknath breed is highly suitable for all the three zones in backyard poultry farming and commercial cage system of rearing for meat and egg purpose which helps in providing healthy nutritious meat and egg to the farming community , self empowerment and improves the socioeconomic status.

Key words: Kadaknath, Free Range, Cage, Egg, Meat, Income

HITASA/AB/2024/215

Effect of edible coatings on chemical quality parameters of strawberry *(Fragaria x ananassa* Duch.) under ambient and cold storage conditions

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The present investigation, entitled "Effect of edible coatings on chemical quality parameters of strawberry *(Fragaria x ananassa* Duch.) under ambient and cold storage conditions" was carried out at the post-harvest laboratory, Department of Horticulture and Post-Harvest Technology, Palli Siksha Bhavana (Institute of Agriculture), Visva-Bharati, Sriniketan, West Bengal. The experiments were conducted to observe the effects of different edible coating materials on the quality and shelf life of fresh strawberries under two different storage conditions: ambient and cold storage conditions. We measured the effects of seven treatments on the chemical quality parameters of strawberry. The treatments included different concentrations of $CaCl_2$, salicylic acid (SA), and chitosan, and the uncoated fruits served as a control. After treatment, the effect of edible coatings on chemical quality parameters was evaluated 1 and 3 days after storage under ambient conditions and 3, 6, 9, and 12 days of storage under cold storage conditions (4 ± 1°C, 90 to 95% RH). A better retention of TSS (°Brix), total sugars (%), reducing sugars (%), non-reducing sugars (%), titratable acidity (%), ascorbic acid (mg $100g^{-1}$), anthocyanin content (mg $100g^{-1}$) and antioxidant activity (%) were observed in fruits treated with the edible coatings under ambient and cold storage conditions. The overall result concluded that the strawberry fruits treated with 1.5% chitosan for 1 min showed the best results in terms of chemical quality parameters when compared with other treatments under ambient and cold storage conditions.

Keywords: Strawberry, edible coatings, chemical quality parameters, ambient conditions, cold storage conditions, storage.

HITASA/AB/2024/216

CRISPR Cas 9 :- Unleashing the power of precision genome editing

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CRISPR technologies are presented as a solution to overcome these limitations, offering a faster, more predictable, and cost-effective method of plant breeding. The use of CRISPR in agriculture is framed as a new breeding method that can achieve results comparable to conventional methods but with greater efficiency. CRISPR technology, introduced in 2012, has significantly transformed life sciences research. The two extensively studied and widely used CRISPR systems in plants are CRISPR Cas9 and CRISPR–Cpf1. CRISPR reagents are introduced into plant cells as DNA, RNA, or protein–RNA complexes, forming an active site-directed nuclease (SDN). This nuclease cleaves targeted DNA sequences, creating double-strand breaks (DSBs). Plant cells can repair these DSBs through untemplated annealing, leading to small sequence changes and gene knockouts (SDN-1 editing), or by integrating different DNA pieces to generate short sequence replacements (SDN-2 editing) or longer sequence replacements or insertions (SDN-3 editing). CRISPR technology has demonstrated promising applications in agriculture, particularly in crops like wheat, corn, and tomato. In wheat, SDN-1 is utilized to confer resistance against powdery mildew. In corn, SDN-3 has been applied to improve maize yield during drought stress by modifying the Argos8 gene promoter. In tomatoes, SDN-1 was used to induce mutations in yield gene regulatory regions, enhancing genetic variation and yield more rapidly than conventional breeding methods.

There is a major barrier to efficiently delivering CRISPR machinery to target plant cells and regenerating healthy plants when using CRISPR tools in agriculture.

Even if they are preferable, traditional tissue culture techniques are labor-intensive, time-consuming, and prone to causing random somatic mutations, which reduces the efficiency advantages of CRISPR tools.

Numerous agricultural species are similarly resistant to tissue culture-based regeneration. In order to get over this bottleneck, new delivery strategies must be developed. These strategies may include direct administration to plant apical meristems or pollen grains to produce modified plants without the need for tissue culture, or they may involve regeneration boosters for species that are resistant to the treatment (Liu *et al*., 2021). Because of their simplicity of use and low cost, CRISPR techniques are opening up interesting practical possibilities in sustainable agriculture. Because of its accessibility, creative research is being conducted in both academic and business environments, democratizing agricultural trait development.

Instead of just improving existing crops, researchers may now concentrate on niche crops that were previously ignored. This has the potential to domesticate plant species that are already well-adapted to a variety of habitats and have high-value features (Kumar *et al*., 2023). The public's acceptance of CRISPR technology and government regulation provide the biggest obstacles to their application in agriculture, not scientific ones. Although most anticipated usage will provide "nature-identical" features, or qualities comparable to those obtained via traditional plant breeding, worries are raised about possible uses such as the introduction of foreign genes. Despite this distinction, the unpredictability of the global regulatory environment makes it difficult for farmers to feel confident about using CRISPR techniques. The issue for scientists is to guarantee openness in CRISPR breeding techniques, stressing its significance in fostering public confidence and influencing changing regulatory frameworks for the technology's application in agriculture. Although CRISPR research is still in its early stages, there is a great deal of promise for this effective tool for plant breeding to help ensure a sustainable future for the agricultural industry.

HITASA/AB/2024/217

Exogenous melatonin delays oxidative browning and improves postharvest quality of litchi fruits

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Melatonin functions as an antioxidant molecule enhancing the shelf life of litchi fruits by lowering enzymatic oxidation and preserving the levels of biochemical parameters in litchi fruits. The present investigation was carried out to determine the impact of post-harvest application of melatonin on quality, pericarp browning and shelf life of litchi fruits stored at ambient conditions. To study its impact on weight loss, decay loss, TSS, ascorbic acid content, total phenolic content, total flavonoid content, antioxidant activity (CUPRAC assay), pericarp browning, and enzymes related to pericarp browning (PPO and POD), harvested litchi fruits were submerged in melatonin solution at concentrations of 0.1 mM, 0.25 mM, and 0.5 mM and were stored at ambient storage conditions for 6 days. The findings showed that harvested litchi fruits treated with exogenous melatonin at a concentration of 0.5 mM greatly preserved their quality compared to untreated fruits. On molecular level it was observed that post-harvest melatonin treatment down-regulated the expression of genes linked to pericarp browning, such as *LcPOD* and *LcPPO* and up-regulated anthocyanin related genes, such as *LcUFGT* and *LcDFR*.

Keywords: Litchi, melatonin, pericarp browning, fruit quality, post-harvest

HITASA/AB/2024/218

Response of tomato grafted on wild brinjal rootstocksfor disease incidence and severity in major disease of tomato

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Two experiments were conducted to assess the crop loss in tomato in relation to disease severity and incidence due to early blight,late blight ,tomato leaf curl virus ,fungal & Bacterial wilt in the year 2022-23 and 2023-24 in the Horticulture Research Farm of the Department of Horticulture, Naini Agriculture Institute, SHUATS in Prayagraj (U.P.) The study aimed to investigate the Disease severity and incidence of tomato scions, namely Kashi Anupam, Kashi Sharad, and Kashi Vishesh, with four wild brinjal rootstocks: *Solanum torvum, Solanum violaceum, Solanum xanthocarpum*, and *Solanum incanum* Amog the maximum disease severity early blight T_{14} Kashi Sharad (Non -Grafted) has (14.17%) and minimum (4.83%) in grafting combination of T_1 (*Solanum torvum* + Kashi Anupam). A high incidence of Late blight (15.50%) in case of T_{15} Kashi Vishesh (Non - Grafted) and minimum percentage of severity **(**5.33%) in T_1 ***(****Solanum torvum* + Kashi Anupam) . A high incidence of the disease severity was recorded in tomato leaf curl virus on maximum and minimum was recorded T_1 (*Solanum torvum* + Kashi Anupam) (10.19%) .Fungal disease severities in the highest score was recorded by fusarium wilt in non grafted T_{15} on maximum Kashi Vishesh (Non - Grafted) (3.17%) and minimum (*Solanum torvum* + Kashi Anupam) (0.17%) in graft combination T_1 .Bacterial disease severities in the highest score was recorded by Bacterial

wilt in non grafted T_{15} on maximum Kashi Vishesh (Non - Grafted) (5.83%) and minimum (*Solanum torvum* + Kashi Anupam) (2.50%) in graft combination T_1 . Assessment of disease severity is one of the major challenges which helps in the prediction of yield quantitatively and to decide the control factors that improve the yield of any crop. Hence a perfect system is essential to measure the severity level of the disease in order to improve its productivity .selection and use of highly compatible rootstock.

Keyword: - Assessment, compatible, Disease, Incidence Severity.

HITASA/AB/2024/219

Climate Resilient Agriculture

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Climate-resilient agriculture encompasses a range of practices and interventions aimed at increasing the resilience of agricultural systems to climate variability and extreme weather events. Key principles of CRA include diversification of crops and livestock, improved water management, soil conservation, and adoption of climate-smart technologies. These strategies not only enhance the adaptive capacity of farming communities but also contribute to sustainable resource management and environmental conservation.

Smallholder farmers, who are particularly vulnerable to the impacts of climate change, stand to benefit significantly from climate-resilient agriculture practices. By integrating CRA principles into their farming practices, smallholders can mitigate the risks associated with climate variability, improve their yields and income, and build long-term resilience to environmental shocks.

However, the widespread adoption of climate-resilient agriculture faces several challenges, including limited access to resources, lack of technical knowledge, and institutional barriers. Addressing these

challenges requires a multi-dimensional approach that involves policy support, capacity-building initiatives, and investment in climate-smart technologies and infrastructure.

In conclusion, climate-resilient agriculture offers a promising pathway towards building sustainable and resilient food systems in the face of climate change. By promoting adaptive practices and resilience-building strategies, CRA has the potential to safeguard food security, enhance rural livelihoods, and foster environmental sustainability in agricultural landscapes around the world.

HITASA/AB/2024/220

Impact of climate mitigating technology, natural resource management, industrialisation and population growth on climate change in India

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Climate change, deemed the foremost long-term global threat, poses one of humanity's greatest challenges, profoundly affecting ecosystem functionality, people lives and property, destabilizing economic and social structures. If climate change issues are misunderstood, people may be less likely to participate in adaptation and mitigation efforts and in the co-production of climate services. India announced its environmental ambitions to become carbon neutral by 2070 and significantly reduce its carbon intensity level at the 26th Conference of Parties in Glasgow. Therefore, it is reasonable to expect that India is dedicated to enhancing the quality of its atmosphere over the ensuing several decades. As a result, developing strategies for reducing environmental pollution caused by carbon emissions has grown in importance for the Indian government. This study contributed to the environmental research by analysing the nexus between climate mitigating technology (CMT) and natural resource management (NRM) on climate change in India. The climate mitigating

technology and effective use of natural resource management are significant factors in reducing climate deterioration. The present study measured by GHG emissions, and two predictors, climate mitigating technology, measures by REO and REC, and natural resource management, measured by NRR and NRD. The study also takes two control variables, industrialisation and population. To achieve the purpose of the study, a nonlinear ARDL technique is used to test the link between the data over the period 1993-2022 is collected from India. Based on the model findings, it is inferred that the growth of REC, NRR and Industrialisation in India facilitates (positive) GHG emissions and promotes climate change. Furthermore, Renewable energy output (REO), Natural Resource Depletion (NRD) and Population growth shed inverse impacts (negative) on climate change in India. The findings of this research have significant ramifications for developing countries like India for better strategies and policies that effectively reduce GHG emissions while considering CMT and NRM.

Keywords: Climate change, climate mitigating technology, natural resource management, renewable energy output, natural resource rents, population.

HITASA/AB/2024/221

Production and management of vermi-composting

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Vermi-composting is a eco-friendly waste management technique, which gain significant attention due to its potential in converting organic waste into nutrient-rich compost. This abstract provides a comprehensive review of the production and management aspects of vermi-composting, elucidating its significance in sustainable waste management practices. The

production process involves the cultivation of earthworms, primarily Eisenia fetida and Eisenia andrei, in controlled environments conducive to their growth and reproduction. These earthworms efficiently digest organic materials, converting them into vermin-compost, a potent fertilizer rich in essential nutrients and beneficial microorganisms. Various factors such as temperature, moisture, pH level, and substrate composition affect the efficiency and quality of vermi-compost during preapration. Effective management practices play a important role in optimizing vermi-composting operations. Proper selection of feedstock is crucial, as it directly impacts the nutrient content and stability of the final compost. Furthermore, maintaining optimal environmental conditions within the vermin-composting system ensures the well-being and productivity of earthworms. Regular monitoring of key parameters and adjustment of conditions as needed are imperative to prevent potential issues such as overheating, anaerobic conditions, or pest infestations. Key considerations in vermi-compost management also include harvesting techniques and post-processing procedures to ensure the production of high-quality compost. Additionally, the use of vermi-compost in agriculture provides many benefits, such as improved soil fertility, enhanced plant growth, and reduced use and bad effects of synthetic fertilizers. This abstract discusses various aspects of vermi-composting, including its role in waste reduction, soil enrichment, and sustainable agriculture. Notably, the integration of vermi-compost into agricultural systems has shown significant improvements in soil fertility, plant growth, and yield. Moreover, the production of vermi-compost offers economic benefits, particularly for small-scale farmers and rural communities, by generating income through the sale of high-quality organic fertilizers to other farmers. Furthermore, this review highlights recent research on optimization techniques such as co-composting, microbial inoculants, and supplementation strategies to enhance the nutrient content and microbial activity of vermi-compost.

Keywords: Vermi-composting, Earthworms, Organic Waste Management, Sustainability, Production, Management Practices, Nutrient-Rich Compost, Feedstock Selection, Environmental Conditions, Harvesting Techniques, Agricultural Applications.

HITASA/AB/2024/222

Assessing Nesolynx thymus as a Biological Control Agent for Uzi Fly (*Exorista bombycis*) Infestation in Mulberry Silkworms

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The study explored the natural enemies of the Uzi fly, a harmful pest for mulberry silkworms in Assam, India. The study identified the pupal parasitoid, *Nesolynx thymus*, as the primary predator. This gregarious parasitoid lays eggs on the Uzi fly pupae. The hatched larvae then develop inside the pupae, ultimately killing them. The study found that *Nesolynx thymus* was the most common natural enemy, with a parasitization rate of 63% in autumn and 47% in spring. Additionally, younger Uzi fly pupae, only 1-2 days old, were more susceptible to parasitization compared to older ones. Interestingly, red ants (*Oecophylla smaragdina*) were also observed attacking Uzi fly maggots and eggs. These findings suggest that *Nesolynx thymus* has promising potential as a biocontrol agent for managing Uzi fly populations in sericulture. However, further research is needed to optimize its use in real-world field settings.

Keywords: Uzi fly, Mulberry silkworm, Sericulture, Pupal parasitoid, Natural enemy

HITASA/AB/2024/223

Zinc fertifortification of rice (*Oryza sativa* L.) culitivars

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A Field experiment was conducted in farmer's field during rainy (kharif) season 2020-21 at Southern Coastal Plains of Kerala, to study the enhancement in grain zinc (Zn) content and yield improvement through foliar Zn fertilization. Four medium duration rice varieties viz., Uma, Pournami, Gouri, and DRR Dhan 45, planted in factorial randomised complete block design constituted the first factor treatments. The second factor comprised of four fertilization treatments applied foliar at maximum tillering and milk stages viz., an unfertilized control, and $ZnSO_4$ @ 0.1, 0.5, and 1%. DRR Dhan 45 recorded significantly higher Zn content in rough rice, brown rice, white rice, rice bran, and cooked rice of 28.6, 33.7, 25.3, 97.7, and 16.6 mg Kg^{-1}, respectively. Foliar $ZnSO_4$ @ 0.5% fertilization produced higher grain yield (4.62 t ha^{-1}) that was comparable to $ZnSO_4$ @ 1% and resulted in 12% yield increase over the unfertilized control. $ZnSO_4$ @ 0.5% also resulted in greater Zn content in rough rice, brown rice, white rice, rice bran, and cooked rice of 22, 26, 19.5, 75.3, and 12.8 mg Kg^{-1}, respectively. Foliar $ZnSO_4$ @ 0.5% ferti-fortification in rice was economical since it generated greater net income (₹ 39891 ha^{-1}) and benefit cost ratio (1.43).

Keywords: Biofortification, cooked rice, foliar fertilization, grain Zn, rice, zinc

HITASA/AB/2024/224

Principal Component Analysis of Production and Reproduction Traits in Frieswal cattle under Field Progeny Testing

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Principal component analysis is a mathematical procedure that transforms a number of possibly correlated variables into smaller number of uncorrelated variables leading to dimension reduction. Through principal component analysis, a comprehensive data set encompassing various production and reproduction parameters including milk yield, age at first calving, calving interval etc can be analyzed. The study was conducted with an aim to determine the principal component analysis of production and reproduction traits in Frieswal cattle. Data from 2013 to 2021, pertaining to production and reproduction traits on 1163 Frieswal cattle from six different field units were collected and analyzed by principal component analysis to explain the performance. Factor analysis with varimax rotation revealed three factors which explained 74.304% of the total variation. The first principal component explained 35.544% of the total variance. Similarly, second and third principal components explained variance of 23.378% and 15.383%, respectively. The communality ranged from 0.247 (Fat %) to 0.972 (Calving Interval) for all the different performance traits. Therefore, the result suggested that principal component analysis could be used in breeding programmes with a drastic reduction in the number of production and reproduction traits to explain the performance in Frieswal cattle.

HITASA/AB/2024/225

Studies on the effect of nano urea on Air Pollution Tolerance Index (APTI) in *Philodenron scandens*

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Amidst global concerns regarding air pollution's adverse effects on both outdoor withindoor air often being worse than outdoor, air-purifying foliage plants like Philodendron play a crucial role in enhancing indoor air quality and respiratory health. This study exploresthe impact of nano urea, a product of nanotechnology, on *Philodendron scandens* Air Pollution Tolerance Index (APTI). The objective is to assess how varying concentrations of nano urea influence the APTI in *Philodendron scandens*. The experiment was conducted using a Randomized Block Design with six treatments, including Conventional urea 2 g L^{-1} (N1) and four levels of nano urea: N2 (Nano urea 0.5 ml L^{-1}), N3 (Nano urea 1 ml L^{-1}), N4 (Nano urea 1.5 ml L^{-1}), N5 (Nano urea 2 ml L^{-1}) and a control group (N0) with no spray of nano urea. Six sprays were administered, with the initial application at 35 days after planting, followedby subsequent sprays every 15 days over the course of three months. Using different biochemical parameters such as ascorbic acid, total chlorophyll content, relative water content, and leaf pH, the APTI was calculated according to the formula proposed by Singh and Rao (1983). It was observed that among nano urea levels, Nano urea 2 ml L^{-1} (N5) recorded maximum values for RWC (92.17%), total chlorophyll content (2.49 mg g^{-1}), ascorbic acid content (3.892 mg g^{-1}) and pH (5.43) while no spray (N0) recorded minimum values for RWC (73.97%), total chlorophyll content (0.998 mg g^{-1}), ascorbic acid content (0.811 mg g^{-1}) and pH (4.52) of a leaf at 125 days after planting. Maximum APTI (12.30) wasrecorded with nano urea spray N5 (2 ml L^{-1}) followed by N4 (Nano urea 1.5 ml L^{-1}) (10.54), N3 (Nano urea 1 ml L^{-1}) (9.69) while minimum (7.63) APTI was noticed in N0 (No spray) and it is concluded that nano urea application enhanced *Philodendron scandens* APTI and

physiological traits. Future studies should optimize nano urea concentrations and assess long-term effects. Exploring its impact on diverse foliage species will offer insights into its broader effectiveness in addressing air pollution in plants and indoor environments.

HITASA/AB/2024/226

Dynamic Evolution: Exploring the Potential of 4D Food Printing

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4D (Four-dimensional) printing is an emerging technology and it is the extension of 3D printing. It represents an evolutionary stride beyond conventional 3D printing technology, introducing a temporal dimension as the fourth axis. In the realm of food printing, this method employs food-grade ink to construct dynamic structures responsive to external stimuli, including temperature, pH, water, light, and other factors. The resultant capacity for temporal alterations in the physical state of the printed objects enhances adaptability and innovation in food design. 4D food printing provides a platform for new business ideas to adapt to the current market trends by reducing capital requirements, saving time, reducing inventory space and improving business efficiency. Advantages of 4d printed food is that change of product shape as per the requirement, create innovation, self-assembly, compactness. These attributes present avenues for novel business strategies, marked by reduced capital investment, time efficiency gains, and optimization of inventory space. This review provides an overview of the software, printers, printing ink, and stimuli employed in 4D printing. Additionally, it highlights the rheological effects on printing ink and explores the current applications of 4D food printing, focusing on physical changes over time due to hydration and dehydration. This paper reviews and summarizes the current applications of 4D food printing, focusing on physical changes over time. In the food sector, various shape transformations, such as 1D to 1D, 1D to 2D, 2D to 2D, 1D to 3D, and 3D to 3D, are explored. However, due to the limited availability of smart materials in foods, the research in this area is still in its nascent stages. The fundamental concept of 4D printing, Despite extant challenges, the transformative potential of 4D printing in food production heralds a paradigm shift, promising dynamic experiences.

Keywords: 3D food printing; 4D food printing

HITASA/AB/2024/227

Brown manuring: A potential tool for weed control and sustainable rice production

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Aerobic rice cultivation, an alternative to flooded paddy fields, reduces water usage by 45 per cent. In this innovative approach, rice is cultivated in well-drained, non-waterlogged soils, substantially mitigating water usage and environmental impact. offer a transformative solution amid climate change and resource scarcity, with high input efficiency. However, widespread adoption faces hurdles such as increased weed infestation. Brown manuring is a "no-till" variation of green manuring involves growing rice and Sesbania spp or Sun hemp together. Green manure has limitations, requiring a lengthy crop cycle for breakdown. Brown manuring emerges as a viable option, supplying essential nutrients to crops, aiding weed management, and enhancing soil properties. Brown manuring, co-cultivating rice with sun hemp and later desiccating it after 20-25 days of sowing with selective herbicides like 2, 4-D ester. It enriches soil, addressing nutrient deficiencies and promotes microbial activity. It enhances soil structure and water retention. Optimizing these practices can maximize productivity and sustainability in aerobic rice farming. This study examines brown manuring and herbicides impact on growth and yield.

Keywords: Aerobic rice, Brown manuring, Green manuring, Weed infestation, Sun hemp, Sesbania

HITASA/AB/2024/228

Sugarcane Area Estimation at District Level Using Passive Remote Sensing, Google Earth Engine, and Machine Learning

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Monitoring, estimating, and forecasting agricultural production are very important for the management of world / regional or local food demand and supply balance for social security. Crop production forecasts are generally portrayed as the product of two components: the area to be harvested and the expected yield per unit area. The accurate forecasting of both harvested area and yield is equally important in ensuring the accurate determination of their product. Large-scale crop area estimation is vitally important to agricultural monitoring and management. However, traditional methods cannot well meet the needs of large-scale applications. Technology has greatly aided crop area estimation. Remote sensing has evolved from sporadic aerial over-flights to frequent repeat high-resolution coverage and from black and white film coverage to multispectral digital scanners. Therefore, this study was conducted to compute the cultivated area of sugarcane using remote sensing data acquired from the sentinel-2 satellite with six bands (2,3,4,8,11,12). Here we use Google Earth Engine (GEE) to build "wall-to-wall" 10 m resolution maps of sugarcane area for 2022. Multiple images taken on different days were visually and digitally analyzed for the estimation of the sugarcane-cultivated area. The study discusses the strengths and weaknesses of classifiers, assesses accuracies that can be achieved with different classifiers for the Udham Singh Nagar District and we observed that Google Earth Engine operates admirably when it comes to pre-processing and facilitating cloud platform access to remote sensing products; however, in terms of classification accuracy, Minimum Distance overestimated the sugarcane area while Random Forest (RF), and K-Nearest Neighbors (KNN) performed near to the reported area than Support Vector Machine (SVM), CART, and Minimum Distance

classifiers available in Google Earth Engine. In the regions of the world where sugarcane is cultivated, continuous research and innovation in this area can solve issues related to food security, environmental sustainability, water scarcity, and climate change adaptation. Governments, planners, and decision-makers can use timely and accurate estimation of sugarcane-growing areas and output forecasts to gather vital information for policy-making.

HITASA/AB/2024/229

Effects of $CaCl_2$ and Citric acid on Physio-chemical Changes and Storage at Ambient Temperature of Cherry (Prunus avium) Candy

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Candy processing is essential to create a wide variety of delicious and appealing treats, ensuring quality control, flavor consistency, and efficient production for consumer enjoyment. The present experiment was carried out during 2022-23 in Post Harvest Laboratory of Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Completely Randomized Design with 8 treatments replicated thrice. The treatments were: T0 (Control), T1 (Application of CaCl2 @1% +70 ºBrix sugar), T2(Application of CaCl2 @1.5% + 70 ºBrix sugar), T3 (Application of CaCl2 @ 2%+ 70 ºBrix sugar), T4 (Application of Erythrosine @0.05%+ 70 ºBrix sugar), T5 (Application of Citric Acid @ 1%+ 70 ºBrix sugar), T6 (Application of Citric Acid @ 1.5%+ 70 ºBrix sugar), T7 (Application of Citric Acid @ 2% + 70 ºBrix sugar). On the basis of our experimental findings, it was found that the treatment T2 (Application of CaCl2 @1.5mg/100g + 70 ºBrix sugar) was found to be best in the terms of TSS, Total sugar, Reducing sugar, Moisture content, Ascorbic acid, pH, Acidity %, Taste, Color and appearance, aroma, texture, overall acceptability and benefit cost ratio.

Keywords: Benefit cost ratio, Candy, Cherry, Quality parameters, Organoleptic parameters.

HITASA/AB/2024/230

Impact of biotic and abiotic stresses on the incidence and intensity of Yellow Leaf Disease of Arecanut

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Yellow Leaf Disease (YLD) is one of the most serious diseases of arecanut in Chikkamagaluru and Dakshina Kannada districts of Karnataka causing 50-90 per cent yield loss. The disease symptoms appear as yellowing of older leaves from the tips followed by wilting and drooping. As the disease progress entire crown leaves turns yellow, wilts and fall off leaving a bare trunk. Affected mature and immature nuts turn chlorotic and falls down whereas the kernel become soft and emits foul smell. From the decades, ambiguity is there with respect to the etiology of the disease. Thus, it is necessitated to study the impact of various factors and agents involved in disease development. To confirm the same, present study was initiated and analyzed. Results of metagenomic analysis revealed the presence of *Candidatus* phytoplasma in the YLD affected palms along with endophytic organisms. Molecular characterization of YLD leaf samples using phytoplasma specific primers showed 100 per cent homology with "*Candidatus* Phytoplasma aurantifolia". Soil microbiota and nutrient status of YLD affected gardens revealed the deficiency of major nutrients (potassium and phosphorous) and high micronutrients (copper and manganese) except zinc during August-September whereas their availability was slightly improved during April-May. Microbial analysis revealed that healthy arecanut rhizosphere soils are enriched with higher microbial population than diseased palm. The study concluded that, there is a direct correlation between nutrient status, microbial diversity along with the association of phytoplasma in inducing yellow leaf disease in affected areca palm.

HITASA/AB/2024/231

The role of Speed breeding in accelerating the crop improvement

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The global concern for food security has grown due to the increasing human population and changing environment. The current rate of improvement in essential crops is not sufficient to meet the upcoming demand. In today's era, speed breeding has revolutionized agricultural practices worldwide. This method allows plant breeders to boost crop production by manipulating factors like temperature, light duration, and intensity to promote plant growth. Inspired by NASA, the University of Queensland scientists pioneered the first speed breeding technique (Watson *et al*., 2018). Traditionally, breeding new crop varieties takes years through conventional methods, involving multiple generations of inbreeding and evaluation processes. Speed breeding, which utilizes extended photoperiods to accelerate plant development, can significantly reduce generation time. Key factors altered in speed breeding include light, photoperiod, temperature, and humidity. Utilizing light sources such as LEDs, halogen lamps, or sodium vapor lamps (SVLs) within the 400-700 nm range achieves optimal growth conditions. Control light quality and intensity to maintain a recommended photosynthetic photon flux density (PPFD) of 450-500 µmol/m^2/s. A photoperiod of 22 hours with 2 hours of darkness is advised. Adjust temperature and humidity, aiming for 60-70% relative humidity, to ensure each crop's optimal growth (Begna, 2022). Liu *et al.* (2022) reported that under controlled environments, 420 µmol/m^2/s PPFD and a 12 h photoperiod accelerated the growth and development of pepper and significantly shortened the breeding cycle (up to more than four generations per year). Harvesting of wheat seed before maturity, 14 days post-anthesis in speed breeding conditions and following a 4-day cold treatment seed viability will be high indicating generation time can be further reduced by harvesting premature seed (Zheng *et al.,* 2013). Speed breeding can be used to achieve up to 6

generations per year for spring wheat (*Triticum aestivum*), barley (*Hordeum vulgare*), chickpea (*Cicer arietinum*) and pea (*Pisum sativum*) and 4 generations for canola (*Brassica napus*), instead of 2-3 under normal glasshouse conditions. Integrating conventional, marker-assisted selection and gene editing with speed breeding enhances the selection of elite genotypes with traits such as improved nutrition, yield and resilience to biotic and abiotic stress.

HITASA/AB/2024/232

Fruit Fortification: Elicitors as Key Players in Quality Improvement

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Elicitors are substances that can enhance the defense mechanisms of plants, increasing the levels of phenolic compounds which are beneficial for fruit quality and disease resistance. Elicitors can be either natural or synthetic and can be applied before or after harvest to various fruit crops. Natural examples include salicylic acid, chitosan, and calcium chloride, while synthetic examples include benzothiadiazole, methyl jasmonate, and harpin. Synthetic elicitors can be applied to fruit crops in various ways, including seed priming, foliar spraying, soil drenching, and post-harvest dipping. It's best to conduct trials before applying elicitors on a large scale.

Elicitors improve fruit quality and reduce postharvest losses. They enhance phenolic content, antioxidant activity, color, flavor, shelf life, and resistance to fungal decay. Elicitors also improve fruit texture, aroma, and nutritional value. They reduce the need for chemical pesticides and enhance plant tolerance to abiotic stresses. Synthetic elicitors like BTH, MeJA, and harpin induce plant defense responses without being derived from natural sources.

These three synthetic elicitors work differently. BTH mimics the effect of salicylic acid, a natural plant hormone that regulates immunity. BTH can enhance the resistance of various fruit crops to fungal and bacterial diseases, as well as improve their phenolic content and antioxidant activity. MeJA mimics the effect of jasmonic acid, another natural plant hormone that regulates immunity. MeJA can induce the production of volatile compounds that attract natural enemies of herbivores, as well as increase the levels of phenolic compounds and other secondary metabolites in fruits. Harpin, on the other hand, is a protein derived from a bacterial pathogen that does not cause disease in plants. Harpin can trigger a hypersensitive response, a form of programmed cell death that limits the spread of pathogens, as well as enhance the resistance of fruits to biotic and abiotic stress

Elicitor effectiveness in enhancing fruit crop quality depends on factors such as type, concentration, duration, and frequency of elicitation. Optimal details may vary, making balance crucial for successful application.

HITASA/AB/2024/233

Analysis of diversity of climbers in Banda district, Uttar Pradesh, India

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The study presents a preliminary diversity analysis of climbers in Banda district, Uttar Pradesh, aiming to shed light on taxonomic diversity and ecological significance of this unique group of plants. Climbers with their specialized growth strategies, play an essential role in ecosystem dynamics and offer valuable insights into the region's biodiversity. The district Banda (24^0 53' and 24^0 55' N; 60^0 27' and 84^0 34' E) is one of the seven districts of Bundelkhand region of Uttar Pradesh which is situated at the bank of river Ken. A total of 40 plant samples were collected during the extensive field surveys conducted across the district, embodying diverse

habitats. Detailed morphological studies resulted in the identification of 20 potential taxa valued for their remarkable medicinal, nutritional and ornamental significance. These taxa pertained to 19 genera under nine families. The family Fabaceae and Cucurbitaceae were amongst the dominant families representing four taxa each. Fabaceae was represented by taxa such as *Abrus precatorius,Acacia concinna,Bauhinia vahlii* and *Lablab purpureus,* whereas Cucurbitaceae was represented by *Cucumis maderaspatensis, Diplocyclospalmatus, Luffa acutangula and Momordica charantia.* This was followed by familiesApocynaceae and Convolvulaceae represented by three taxa each. The family Apocynaceae comprised of *Allamanda cathartica, Hemidesmus indicus,* and*Ichnocarpus frutescens* whereas*Convolvulacea*included *Ipomoea cairica, Ipomoea nil* and an *infraspecific taxa Cuscutareflexa var. reflexa.* The species like *Caesampelos purpurea* and*Tiliacora acuminata* were recorded under the Family Menispermaceae whereas taxa *Clematis acuminatus, Gymnema sylvestris* and *Thunbergia acuminatus*were recorded under the family Apocynacea, Ranunculaceae, Asclepediaceae and Acanthaceae, respectively. These climbers exhibit a wide spectrum of morphological traits, including stem structure, leaf shape, flower characteristics and growth patterns. This diversity underscores their adaptability to the myriad environmental conditions found within the district.

The present findings not only contribute to the broader understanding of biodiversity in the region but also emphasize the need for conservation efforts to protect this valuable group of plants for their significant medicinal and nutritional value.

Key words: Climbers, ornamental, medicinal, diversity.

HITASA/AB/2024/234

Development and quality evaluation of multi millet snack enriched with bottle gourd and bitter gourd powder

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The current study entitled 'Development and quality evaluation of multi millet snack enriched with bottle gourd and bitter gourd powder' was carried out in the food technology department of Parul University, Vadodara, Gujrat, India. As millets are Gluten-free and nutrient-dense, they are an effective choice for those with gluten intolerance or looking for other grains to supplement their diet. It has a low glycemic index, making it an ideal diet for diabetes patients. This multi-millet snack was composed of sorghum flour, finger millet flour, and Pearl millet flour which was enriched with bitter gourd and bottle gourd powder and tested for its quality and shelf-life study. Bitter gourd is an excellent source of vitamins B1, B2, B3, Vitamin C, magnesium, folic acid, zinc, phosphorus, and manganese, and has high dietary fiber. Bottle gourd is high in calcium, phosphorus, and dietary fiber and it has a high level of choline. Sensory evaluation depicted no significant change in the color or odor of the test sample. Protein, fat, moisture, ash, crude fiber, sodium, and sugar were 8.2%,19.2%, 4.79%, 2.25%, 5.3%, 0.26%, and <0.1 respectively. Microbial analysis for this product was also conducted. TPC, YMC, salmonella, E- coli, S. aureus, and coliforms were 2.1×10^4, <10CFU/g, absent, absent, absent, and <10CFU/g respectively. TPC count observed in the sample was well within the range of specification during the study Moisture content on day 0, day 3, day 4, day 5, day 6, and day 7 was 8.01, 9.44, 10.24, 11.18, 11.34, not specified respectively. Shelf-life studies of microbiological analysis were also conducted as per the IS 5402:2012. TPC count on day 0, day 3, day 4, day 5, day 6, and day 7 was <10, <10, 80, 1.0×10^2,2.4×10^2, 5.0×10^4 respectively. Yeast and mold count on day 0, day 3, day 4, day 5, day 6, and day 7 was <10, <10, <10, <10, <10, not specified respectively. Coliform count on day 0, day 3, day 4, day 5, day 6, day 7 was <10, <10, <10, <10, <10, 10. Pathogens like *E.coli*, and *S aureus. salmonella sp* and *shigella* were absent. Also, no insect infestation or moldy growth was observed in the test sample. Therefore, according to the above studies shelf life of the above product will be 14 days at room temperature. Therefore it is recommended that the combination of bitter gourd and bottle gourd powder in multi millet snack is highly effective as this product is mainly targeted at diabetes as well as coronary heart disease patients. It can consumed by all the categories of the population on a daily basis.

HITASA/AB/2024/235

Enhancing Growth, Yield, and Quality of Rabi Onion (Allium cepa L.) through the Application of Nano-fertilizers and Mixed Micronutrients

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Two experiments were carried out to evaluate the enhancement of onion crop in relation to the effects of nano fertilizers and mixed nano micronutrients on growth, yield, and quality of Onion (Allium cepa L.) during the years 2021-2022 and 2022-2023 at the Horticulture Research Farm of the Department of Horticulture, Naini Agriculture Institute SHUATS in Prayagraj (U.P.). Nano fertilizers and mixed nano micronutrients play a crucial role in enzymatic activity in plants, thereby significantly influencing growth and the overall quality of vegetables. The research aimed to investigate the impact of nano fertilizers and mixed nano micronutrients on the growth, quality, and yield of the onion variety "Agrifound light red." The experimental setup employed a FRBD (Factorial Randomized Block Design) with two factors: the application of nano mixed micronutrients and the application of nano fertilizers. The nano mixed micronutrients treatments included M0 (control), M1 (0.2ml/L of nano mix micronutrient per liter of water as foliar application), M2 (0.4ml/L of nano mix micronutrient per liter of water as foliar application), and M3 (0.6ml/L of nano mix micronutrient per liter of water as foliar application). The nano-fertilizers treatments comprised F0 (Control without fertilizer), F1 (100% RDF as traditional fertilizer), F2 (5ml/L each of Nano NPK per liter of water as foliar application), F3 (4ml/L each of Nano NPK per liter of water as foliar application), and F4 (3ml/L each of Nano NPK per liter of water as foliar application). In all treatments, 50% of traditional fertilizers were applied except for the control. Based on the experimental findings, it was concluded that the interaction between the two factors revealed that treatment T12 (F2M3), consisting of 5ml/L each of Nano NPK per liter of water as foliar application combined with 0.6ml/L of Nano mix micronutrients per liter of water as foliar application, performed best in

terms of growth, yield, and quality after 30 days after transplanting (DAT). Parameters such as plant height (25.07 cm), number of leaves (5.18), equatorial diameter (7.41 cm), polar diameter (6.36 cm), and quality parameters such as TSS (14.85°Brix) and Ascorbic acid (14.04 mg) exhibited favorable results in onion studies under this treatment.

Keywords: Foliar application , Growth, micronutrient Onion, Polar diameter.

HITASA/AB/2024/236

Gene Editing in Agriculture

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Plant breeders are using genome editing to develop food crops that address the needs of a growing global population and can handle a changing environment. For example, scientists have created cacao plants—the main ingredient in chocolate—with stronger immune systems that can fight a disease that typically kills significant numbers of these crops. Another example is a type of tomato that has shortened stems, so it grows faster and requires less space, making it better suited for indoor and urban farms.

Genome editing allows plant breeders to make very precise changes to DNA. Genome editing can be used to make changes to a plant or other organism by targeting at a specific location in a gene within the DNA. Genome editing can be used to add, remove, or alter DNA in the plant genome.

Gene editing is a method to generate DNA modifications at precise genomic locations. These modifications can result in knockout or knockdown of one or multiple genes without the permanent insertion of any foreign DNA.

Alternatively, genes from within the organism's genepool or from other organisms can be inserted into precise locations within the genome

to knock-in a new trait. Transcription activator-like effector nucleases (TALENs), Zinc Finger Nucleases (ZFNs), and CRISPR/Cas systems have all been utilized to achieve precise gene edits.

The precision and efficiency of generating edits has been tremendously improved by the introduction of CRISPR/Cas systems, although there is certainly still a role for other gene editing technologies. The application of gene editing techniques has generated great potential for developing crops and livestock that can better manage the impositions of climate change.

Here we present an extensive exploration of gene editing-based solutions in response to the daunting limitations to agricultural productivity imposed by climate change. We note that these examples are mostly from public institutions and represent proof-of-concept experiments rather than commercialized technologies.

HITASA/AB/2024/237

Vegetative Growth and Economics of Strawberry under Coastal Climatic Enviornment

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The response of strawberry in terms of "Vegetative growth and economics to different irrigation and fertigation levels under coastal climatic environment" was carried out at Dapoli. The strawberry crop was tested for nine treatment combinations with four replications. The study compares of fertigation levels F1 (75% RDF), F2 (90% RDF), F3 (105% RDF) and irrigation levels I1 (0.6 ETc), I2 (0.8 ETc), and I3 (1.0 ETc) respectively under drip irrigation system. The study evaluates the response of strawberry in terms of number of leaves, plant height, leaf area, %

canopy over, mean weight of single fruit (g), total weight of fruit per plant (g) and total yield (t/ha) were measured and recorded for statistical analysis. The revealed that the yield and vegetative parameters such as number of fruit per treatment, average weight of single fruit, total weight of fruit per plant and Total yield (t/ha) were observed maximum in treatment combination I_2F_3 (0.8 ETc and 105 % RD). The treatment combination I_2F_3 (0.8 ETc and 105 % RD) was found significantly superior over other treatments. The cost analysis was also performed and found that maximum gross monitory retrun, Net retruns and B: C ratio was observed in treatment combination I_2F_3 (0.8 ETc, 105 % RDF) (B: C= 2.40) and I_3F_2 (1.0 ETc, 90 % RDF) (B: C= 2.21) respectively. Based upon the study it revealed that the strawberry crop response very well under coastal climatic environment. To optimum level of irrigation (0.8 Etc) under drip irrigation with higher level of fertigation (105 % RDF) in terms B: C ratio. The B: C analysis was also shown maximum B: C ratio in treatment combination i.e (B: C= 2.40) and (B: C= 2.21).

Keywords: Strawberry, Total yield (t/ha), Benefit-cost ratio, Irrigation treatments, fertigation treatments and quality parameters.

HITASA/AB/2024/238

Evaluation of different culture media for the growth of *Fusarium oxysporum* f. sp. *lentis* causing wilt of lentil

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The present study was aimed to know the effect of different culture media on the growth of *F. oxysporum* f. sp. *lentis* in laboratory conditions. Twelve nutrient media namely, Potato Carrot Agar (PCA), Oat Meal Agar (OMA), Rose Bengal Agar (RBA), Nutrient Agar (NA), Potato Dextrose Agar (PDA), Richard's Agar (RA), Czapeck's Dox Agar (CDA), Yeast Mannitol Agar (YMA), Corn Meal Agar (CMA), Malt Extract Agar (MEA), Peptone Iron Agar (PIA) and V8 Juice Agar (V8JA) were used in this study. The mycelial

growth of the fungus was observed at three and seven days after inoculation. Colony colour, texture, growth, margin and sporulation of pathogen were also observed in this study. All nutrient media showed significantly variation in mycelial growth of *F. oxysporum* f. sp. *lentis*. Among the tested media, Potato Dextrose Agar was superior to other tested media and recorded 55.33 mm and 90.00 mm growth of fungus at three and seven days after inoculation, respectively. The next best medium was Richard's Agar which recorded 51.00 mm and 86.00 mm growth of fungus at three and seven days after inoculation. While as, the minimum growth was observed in Yeast Mannitol Agar (YMA) in this study.

Keywords: *F. oxysporum* f. sp. *lentis*, Culture media, Mycelial growth, Lentil wilt

HITASA/AB/2024/239

Effect of PGRs and Growth Additives on the *In Vitro* Micropropagation of *Aerides odorata* var. Alba from Immature Pods

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A viable protocol has been developed for efficient micropropagation from immature and undehisced pods. The regeneration response was impacted differently by PGRs and growth supplements. The earliest seed initiation (25.5 days) and maximum seed germination rate (72.42%) were both achieved in half strength MS (Murashige & Skoog) media supplemented with 2.0 mg/L BAP and 15% Coconut water. Significant results were seen when PGRs were combined for shoot proliferation. The 1/2 MS supplemented with 4.0 mg/L BAP and 2.0 mg/L

NAA had the shortest duration (17.17 days) for shoot initiation. The largest number of leaves (10), highest number of shoots (6.58), and maximum shoot length (2.18 cm) were seen in 1/2 MS that were given with 4.0 mg/L BAP and 2.0 mg/L NAA. The study revealed that the PGRs and growth additive exhibited a noteworthy reaction to root proliferation. The treatment combinations consisting of 1/2 MS supplemented with 0.5 mg/L NAA and 50 g/L Banana powder produced the greatest number of roots (5), the minimum number of days required for root initiation (31.17 days), and the maximum root length (2.64 cm). The asymbiotic seed germination approach *in vitro* was largely responsible for the rapid mass proliferation of *Aerides odorata* var. Alba.

Keywords: Banana powder, coconut water, growth additives, Murashige & Skoog, pod

HITASA/AB/2024/240

Effect of Nano Foliar Spray of Calcium and Sulphur on Silkworm, (*Bombyx mori* L.) for Growth and Developmental Parameters

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Investigation was carried out to know the effect of green synthesized nano Calcium and Sulphur particles on mulberry silkworm for growth and developmental parameters at Sericulture Unit, Department of Agricultural Entomology, College of Agriculture, Raichur during 2021-2022. Biosynthesized nanoparticles were sprayed to mulberry in different treatment combinations. Ca and S nutrition was provided through foliar

spray at 25 and 35 days after pruning with untreated control. Further, mulberry leaves were harvested from 45th day after pruning and fed to silkworms, replication and treatment wise from hatching till spinning stage as per standard rearing package. The observations were made on different economic parameters and were statstically analysed. The results indicated that the treatment combination of nano Ca + nano S @ 250 ppm each exhibited significantly highest full grown larval weight (30.14 g/10) and survival parameters viz., effective rate of rearing (90.50 %), pupation rate (84.17 %), moth emergence (92.50 %) and fecundity (593.67 eggs/laying) with significantly lower total larval duration (687.83 h) were superior in nano Ca + nano S @ 250 ppm each and was on par with nano Ca + nano S @ 500 ppm. Significantly lowest economic parameters were seen in untreated control.

Key words- Nano Calcium, Nano Sulphur, Silkworm.

HITASA/AB/2024/241

Application of genome editing techniques in crop improvement and climate resilient agriculture

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Advanced biotechnological procedures are made possible by genome-editing technologies, which allow for the precise and effective targeted altering of an organism's genome. Many plant species have had their genomes edited in order to better understand the activities of individual genes and enhance agricultural features. The promise of genome editing in plants is to improve crop resilience, adaptability, and end-use. Functional genomics and crop enhancement both benefit greatly from the relevant, adaptable, and preferred technique that is genome editing. Zinc-finger nucleases (ZFNs), transcription activator-like (TAL) effector nucleases (TALENs), and clustered regularly interspaced short palindromic repeats (CRISPR) linked to the Cas9 and Cpf1 proteins are examples of advances in gene-editing techniques. These

instruments facilitate tremendous prospects for the advancement of plant science in the future and the quick redesign of crops. Since CRISPR has grown to be the most widely used genome-editing technique, it is covered in the most detail. CRISPR has made the genetic structure and function of plants more understandable: For instance, genetic traits and related genome-wide studies have been used to investigate the transcriptional control of Cas9 and Cpf1, genetic locus monitoring, the mechanism and control of promoter activity, and the alteration and detection of epigenetic behavior between single-nucleotide polymorphisms (SNPs).CRISPR/Cas9 systems have the potential to be extremely useful in precisely improving key field crop attributes while also characterizing plant gene functions and genomic rearrangement. To speed up the use of gene-editing technologies for crop enhancement, the speed editing strategy of gene-family members was also introduced. For this, the CRISPR technology has a valuable advantage that particularly holds the scientist's mind, as it allows genome editing in multiple biological systems and helps in climate resilient crop improvement.

Keywords: CRISPR/Cas 9, Crop improvement,Genome editing,climate resilience

HITASA/AB/2024/242

A Study on Achievement Motivation of Rural Youth of Andhra Pradesh

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The present study deals with the achievement motivation of the rural youth. Achievement motivation of the rural youth was the degree to which the rural youth was motivated to achieve success in their livelihood activities. The rural youth cover about seventy-five percent of the total youth population in India. They were the soul of nation's development. It delivers a need to study about the characteristics of the rural youth. An Ex-post facto research design was adopted for the study. Tirupathi and Kuppam mandals from Chittoor district and Kakinada Rural and

Rajahmundry Rural mandals from East Godavari district were selected as they occupy the first two places in the context of rural population of the district. A sample size of 240 was selected for the study. From each district 120 respondents were selected. This orientation towards achievement of the rural youth was measured with a scale followed by Baby (2005) containing six statements. The study revealed that nearly three-fourth of the respondents (72.08 per cent) possessed medium level of achievement motivation followed by little less than one-fifth of the respondents (16.25 per cent) with high level and nearly one-eighth of the respondents (12.67 per cent) with low level of achievement motivation. Among all the statements of the scale majority of the respondents had shown their agreement towards the statement "Youth should enjoy his/her work as much as play."An overview of the study revealed that majority of the respondents (88.33 per cent) had medium to high level of achievement motivation. The reason for this trend might be that they strongly believe that for excelling in life, they need to love their work. Rural youth who were energetic, enthusiastic and excited section of society have craving for achievements and dedicate themselves in the wander of achievement.

HITASA/AB/2024/243

Response of Red Cherry Tomato crop grown in two soilless systems under protected farming

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In modern protected cultivation different methods are being used i.e., hydroponic, vertical farming, aeroponic and aquaponic etc. It is very important to evaluate the high revenue crops under different methods used in protected cultivation to reduce the risk of crop failure. It will not only help the local farmers to adopt appropriate method but also to boost their income through production of good quality and quantity of the produce. In this study red Cherry tomato crop was evaluated in two hydroponic systems developed in the polyhouse of Department of Agricultural Sciences, Dayalbagh Educational Institute situated in District Agra which is known as semi-arid part of state Uttar Pradesh. In local agriculture soil and

water salinity is considered as a major constraint for sensitive crops like red Cherry tomato. The crop plants and their produce grown in soil (control) and two soil less systems i.e., NFT hydroponic, vertical hydroponic were evaluated in terms of their growth (plant height, fruit weight), biochemical (Vit C, sugar level, chlorophyll content) and yield parameters (yield/plant).

The results revealed that tomato plants grown under both hydroponic systems were showed positive results in terms of growth, biochemical and yield parameters as compared to the soil system. On the contrary, ascorbic acid content of the fruits grown under soil system was found higher amount (29.616mg/100gm) and had a slightly sour taste as compared to both soil less systems (22.436mg/100gm). Interestingly high sugar content was found in the fruits grown in both soil less systems i.e., 9.36 ^{o}Brix in NFT and 9.06 ^{o}Brix in vertical systems respectively as compared to the control one (4.33 ^{o}Brix). Growth analysis under soil less system was found to be supportive in terms of average plant height (189.9 cm in NFT and 200.86 cm in vertical), fruit weight (33.24g in NFT and 29.07g in vertical) and fruit size, Length x Diameter (3.23 X 2.66 cm in vertical farming and 2.56 X 1.99 cm in NFT system) respectively as compared to soil less system. Overall maximum total production was observed under NFT (4800.81g/plant) as compared to vertical (3767.13g/plant) and control (1967.57g/plant).

Keywords – NFT hydroponic, Vertical farming System, Growth, Response, Red Cherry tomato, Protected Farming

HITASA/AB/2024/244

Contribution of photosynthetic component traits and ion homeostasis at flowering stage towards salinity tolerance of contrasting chickpea genotypes

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Differences in sensitivity during the reproductive stage account for most of the variation in salt tolerance in chickpea. In the present study, observations were recorded from stressed and control plants at the flowering stage from a hydroponic experimental set-up. Salinity strongly affected most of the measured traits, with significant differences observed between tolerant (ICCV-10 and CSG-8962) and sensitive (DCP-92-3 and Pusa-256) chickpea genotypes. In the study, two tolerant (ICCV-10 and CSG-8962) genotypes maintained vigorous shoot and root growth, with minor reductions in shoot and root length, relative to the reductions in the two sensitive (DCP-92-3 and Pusa-256) genotypes. We found significant variations in the Na^+/K^+ ratio of genotypes differing in salinity tolerance sampled at flowering stage suggesting the variation in tissue tolerance. We demonstrate how the higher pigment content, normalized biomass, photosynthetic component traits, and lower foliar accumulation of Na^+ all contribute to the tolerant cultivar's higher salt tolerance. Furthermore, our findings demonstrate the value of these physiological traits during flowering stage in the selection of salinity-tolerant chickpea genotypes.

Keywords: salinity, chickpea, photosynthesis, tissue tolerance, Na^+/K^+ ratio

HITASA/AB/2024/245

SNP based introgression profiling of hexaploid wheat carrying the introgressions from *Triticum monococcum* and mapping of new leaf and stripe rust resistance genes

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A hexaploid wheat introgression line *PauIL16075* derived from *Triticum monococcum* have 24.8% introgressions distributed on seven chromosomes of A genome of hexaploid wheat revealed from 35 K SNP CHIP data analysis. It also showed seedling resistance against leaf rust and stripe rust pathogens. Genetic analysis in the F_5 and F_6populations derived from the cross *PauIL16075*/*HD2967* showed segregation for single gene each for leaf rust and stripe rust temporarily designated as *LrTm* and *YrTm,* respectively. Molecular mapping of leaf rust and stripe rust resistance genes *LrTm* and *YrTm* was done using SNP based markers derived from 35 K SNP chip by preparing the bulks for Bulked Segregant Analysis (BSA). BSA indicated that the gene for leaf rust and stripe rust resistance in *PauIL16075* is located on chromosome arm 5AL. Final partial linkage map of 22.8 cM distance was constructed using SNP based KASP markers. The flanking SNP marker AX 95115269 is located at 11.1 cM interval to both the leaf and stripe rust resistance genes. The rust reaction and chromosomal location suggested that both *LrTm* and *YrTm* are the new rust resistance genes which may be useful in broadening the genetic base for rust resistance in wheat.

Keywords: wide hybridization, high throughput, SNP markers, BSA, leaf rust and stripe rust

HITASA/AB/2024/246

Cresent bunds- A Third way to address climate change

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Attaining food security is a sign of development in today's world. To ensure food security and tackle the arousing climate change problem we are in need to utilize the uncultivated land (12% of total geographic area)

that should be brough under cultivation. Simple and sustainable techniques like Cresent bunds can be employed. These soil bunds slow down and collect rainfall that would have otherwise run downhill by opening up the hard top layer of the soil. By using this method of collecting rainwater, soil fertility is increased, soil erosion is avoided and ground water recharge is improved. The harvested water can be utilized by the forestry plants and forage crops grown in these bunds. The area's seeded grasses have a greater chance of sprouting, regreening and restoring the plot. Increased soil moisture from bunds not only improves soil conditions but also mitigates temperature rise. The energy balance dictates that solar energy either drives evapotranspiration or heats air and soil. Soil moisture facilitates evapotranspiration, a latent heat flux, redirecting solar energy from heating processes. This alteration cools the landscape, offering a unique climate change adaptation. This alteration cools the landscape, offering a unique climate change adaptation. Cresent bunds is vital in establishing resilient climate buffers through enhanced soil moisture and evapotranspiration, fostering a cooler and greener local environment. Soil bunds, can be exemplified by rural women providing employment during offseason in the threatened areas play a crucial role.

Keywords: Cresent bunds, Soil conservation, Rural employment

HITASA/AB/2024/247

Field Evaluation of Sweet potato Genotypes for Resistance to *Cylas formicarius* (Coleoptera: Apionidae) Infestation in North-Eastern Region of India

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Sweet potato weevil, *Cylas formicarius* is a major insect pest in Siang valley of Arunachal Pradesh which inflicts damage on the leaves, vines, and tubers as part of their normal feeding and survival habit. The

study was conducted to evaluate 29 local genotypes of Northeast India, along with two commercial cultivars, Sree Bhadra and ST-14, for their relative susceptibility to the infestation of different pest under natural infestation conditions. Sweet potato weevil and grasshopper incidence on the vines were lowest in CHFSP-10, while thrips infestations were lowest in CHFSP-07. In terms of tuber incidence, the genotypes CHFSP-10, CHFSP-14 and CHFSP-15 performed better against *C. formicarius*. The substantially decreased sensitivity of CHFSP-10, CHFSP-14 and CHFSP-15 to sweet potato weevil indicates the feasibility of using them in varietal development to improve breeding programmes.

Keywords: *Cylas formicarius*, sweet potato genotypes, tuber and vine incidence, latex, grass hopper, northeast India, correlation

HITASA/AB/2024/248

Assessing Soils Salinity and Sodicity Status of Wetland Soils at Institute of Agricultural Research Farm, Samaru, Zaria. Nigeria.

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The study was conducted at IAR farm located in Samaru, Zaria Kaduna State, Nigeria to assess the salinity and sodicity status of wetland soils. Soil samples were collected from four different profiles within the wetland sites and analyzed exchangeable bases, exchangeable acidity, cation exchange capacity, chlorides, carbonates and bicarbonates, sulphates, boron, pH, electrical conductivity, exchangeable sodium percentage and sodium absorption ratio. The results indicate that the soil

pH (5.80 – 6.30) were moderate to slightly acidic. The exchangeable Na ranged from 0.16 – 0.42 cmol (p) kg^{-1}, Mg 0.87 – 1.67 cmol (p) kg^{-1} and SO_4 15.05 – 75.23 cmol (p) kg^{-1} and were rated medium to high. The Ca ranges from 2.10 – 4.67 cmol (p) kg^{-1} , CEC 5.62 – 6.55 cmol (p) kg^{-1} and B 0.36 – 0.52 cmol (p) kg^{-1}, hence they varied from low to medium. The exchangeable K was rated high (1.08 – 2.40 cmol (p) kg^{-1}) and carbonates was negligible in the soils. The exchangeable acidity (0.4 –2.20 cmol (p) kg^{-1}) and chloride (0.2 – 0.4 cmol (p) kg^{-1}) were very low while bicarbonate (0.2 – 0.8 cmol (p) kg^{-1}) ranged from very low to low in the soils. Electrical conductivity (0.01 – 0.05 dS/m), exchangeable sodium percentage (0.03 – 0.08%) and sodium absorption ratio (0.10 – 0.35) values were rated low indicating that the soils were non-saline and non-sodic.

Keywords: Exchangeable acidity, Exchangeable K, Soil Salinity, Soil Sodicity and Wetland Soil

HITASA/AB/2024/249

Carbon credit and Trade: Option to reduce Greenhouse gas emission

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Carbon credits and trading have emerged as a promising approach to mitigate greenhouse gas (GHG) emissions and address the escalating climate crisis. This market-based strategy assigns a monetary value to the reduction, avoidance, or elimination of GHG emissions, with one carbon credit representing one metric tonne of reduced or offset CO_2 or its equivalent in other GHGs. By incentivizing emission reductions and promoting sustainable practices, carbon credit and trading systems play a crucial role in tackling climate change. Despite facing certain challenges, the overall impact on both the economy and the environment is positive. Carbon credits hold significant potential as a tool in collective efforts to foster a greener and more sustainable future amid the fight against climate change. This overview delves into the current status of carbon credits and trading in India, examining the regulatory

landscape, market trends, and their effects on both the nation's environment and economy, as well as those of other countries.

Keywords: Carbon dioxide, Greenhouse effect, Carbon markets, CDM investments, Environmental protection

HITASA/AB/2024/250

Genetic study of F_3 and F_4 generations in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.)

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The present investigation entitled "Genetic study of F_3 and F_4 generations in bottle gourd (Lagenaria siceraria (Mol.) Standl.)" was undertaken by using fifteen F_3 and F_4 progenies of each cross namely, LTR-1 x LTR-5 (C1: 1 x 5), LTR-2 x LTR-4 (C2: 2 x 4) and LTR-3 x LTR-4 (C3: 3 x 4). The material was evaluated in a Randomized Block Design with two replications during summer 2024 for yield and yield contributing characters. This investigation highlighted the magnitude of variability, heritability, genetic advance and correlation coefficient in F_3 and F_4 generations of bottle gourd. Wide range of variability was observed in all quantitative characters in three crosses of F_3 and F_4 generations. Phenotypic coefficient of variation (PCV) was higher than the respective genotypic coefficient of variation (GCV) for all the characters studied in both F_3 and F_4 generations indicating environmental factors influencing their expression to some extent. In F_3 and F_4 generations in most of the crosses the GCV and PCV were higher for length of vine, number of branches per vine, number of nodes per plant, number of female flowers per vine, number of fruits per vine, fruit yield per vine, fruit yield per plot and fruit yield per hectare. This shows greater phenotypic and genotypic variability among the xiv progenies and sensitiveness of the attributes for making further improvement by selection. High heritability coupled with high genetic advance as per cent of mean was observed for most of the characters i.e. length of vine, number of branches per vine, number of nodes per plant, number of female flowers per vine, number of fruits per vine,

fruit yield per vine, fruit yield per plot, fruit yield per hectare in most of the crosses of F_3 and F_4 progenies which indicates preponderance of additive gene action. These characters could be improved by pure line selection or mass selection method.

Keywords: variability, heritability, genetic advance and correlation coefficient.

HITASA/AB/2024/251

Isolation, purification and screening of Lactic Acid Bacterial isolates for probotic properties from pineapple

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LAB comprises of large and diverse group of Gram positive, non-spore forming, anaerobic or facultative aerobic cocci or rod shaped catalase negative bacteria which are considered as “generally recognized as safe” (GRAS) and can be safely used as probiotics. Isolation of LAB from pineapple fruits was carried out using MRS (de Man, Rogosa, Sharpe) broth and 20 LAB isolates were isolated. Isolates with different shapes such as, rods, cocci, coco-bacilli were found and were Gram positive. They were further screened for their probiotic properties such as pH tolerance, bile salt tolerance, antimicrobial activity and antibiotic resistance. It was found that the isolates were tolerant at lower pH and higher bile salt concentrations. They also exhibited antimicrobial activity against *Escherichia coli* and *Staphylococcus aureus* and also were resistant for different antibiotics. Most notably, isolates PLAB 10 and PLAB 15 displayed promising probiotic properties, making them potential candidates for further investigation.

Keywords: Lactic acid bacteria, pineapple, MRS Broth

HITASA/AB/2024/252

Transforming Food Production: The Rise of 3D Printing in the Food Sector

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In recent years, the exploration of three-dimensional (3D) food printing within the food sector has intensified, driven by the multitude of advantages it offers, including customizable food designs, personalized nutrition, supply chain optimization, and the broadening of available food materials. This technology is currently being applied across various food sectors such as military and space food, elderly nutrition, and confectionery, showcasing its versatility and potential impact. The current scope and approach of 3D food printing involve harnessing its capabilities to produce intricate three-dimensional food items of diverse shapes, sizes, flavors, and nutritional compositions. This innovative technique is poised to revolutionize food production by enabling the incorporation of sensitive and easily degradable bioactive compounds (BACs) and other functional ingredients into 3D-printed food products. This aspect holds immense promise for advancing the realm of healthy food production. Moreover, 3D food printing presents a compelling solution to the challenge of increasing consumption of fruits and vegetables, thereby promoting overall health. However, meeting the rising consumer demand for health-promoting products entails enriching them with functional ingredients that may not naturally occur in these foods, such as lipophilic BACs, probiotics, proteins, and peptides. In addition to the aforementioned benefits, 3D food printing offers advantages such as significant time and energy savings, enhanced sustainability, and the capacity for personalized and reproducible food production. The integration of innovative non-thermal technologies further extends the shelf life and improves the nutritional profile of 3D-printed foods, addressing key concerns in food preservation and quality. In conclusion, the application of 3D food printing in food manufacturing holds the promise of overcoming major limitations associated with traditional manufacturing methods and providing effective solutions to challenges related to processing fruit-based functional foods. It

represents a cutting-edge and transformative technology that is poised to shape the future of food production and consumption.

HITASA/AB/2024/253

Estimation of Surface Runoff from Small Watershed Using Remote Sensing & GIS

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Soil and water are the two basic natural resources for the survival of living organisms and the future of the world depends largely on the effective management, utilization and development of these resources. Surface runoff occurs if the precipitation rate is greater than the infiltration capacity. Knowledge about the amount of surface runoff from a watershed is important as surface runoff is the most essential and fundamental parameter needed for planning watershed man0agement strategies. In this present study, Dapoli watershed located in Ratnagiri District of Maharashtra, having a total area of 26,646 ha has been considered as the study area for the estimation of surface runoff by Soil Conservation Service (SCS) Curve Number (CN) method using remote sensing and GIS. SCS-CN method takes into consideration important factors such as rainfall (P), Initial Abstraction Loss (I_a), Potential Maximum Retention (S), Hydrological Soil Group (HSG), Antecedent Moisture Condition (AMC) and Land Use/Land Cover (LULC). Various thematic maps like soil map, elevation map, slope map and LULC map were generated in the GIS environment.GIS software was also used to store, manipulate and estimate pixel wise runoff curve number (CN).The results of this study showed that the highest rainfall was observed in the year 2021 (5421.40 mm) and the lowest rainfall was observed in the year 2015 (2330.70mm). The maximum and minimum annual runoff volume from 1993–2022 were in the years 2021 and 2001 respectively. This study revealed that in the past 30 years, 46% of the rainfall was contributed to runoff and SCS-CN method coupled with Remote

Sensing and GIS can serve as a useful tool for estimating surface runoff in similar watersheds.

Keywords: Dapoli watershed, Surface Runoff, Thematic maps, Remote Sensing and GIS.

HITASA/AB/2024/254

Integration of Inorganic nutrients and Biofertilizers enhances the growth and yield of Spinach Beet (*Beta vulgaris* var. *bengalensis*) Cv. PUSA BHARATI.

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Spinach beet (*Beta vulgaris* var. *bengalensis*; 2n=2x=18) is the most popular vegetable crop grown in India and other parts of the world as leafy vegetable. It is rich in vitamins especially vitamin A and other vitamins like Ascorbic acid Riboflavin, Thiamine. Minerals like Iron and Calcium, Folic acid and some amounts of Nicotinic acid, Pyridoxine, Antioxidants, Carotene and essential amino acids etc. Hence, it is called “Mines of Minerals”. Farmers use large amount of nitrogenous fertilizers for efficient growth and yield which leads to deterioration of quality, shelf-life and presence of chemical residue in leaves which cause harm to consumers. To maintain and sustain a higher level of soil fertility and crop productivity, by reducing the levels of inorganic nutrients are very important in the crop production system. Therefore, A study has been taken up to examine the best inorganic nutrients and its combination with biofertilizers for better quality and also nutrient availability for crop and soil. The ten integrated

treatments consisting of inorganic nutrients (75%, 50% and 25% NPK kg/ha), biofertilizers (Azotobacter Phosphorous Solubulizing Bacteria (PSB), Potassium Solubulizing Bacteria (PSB), Arka Microbial Consortium (AMC) and Arka vegetable special @ 5 gm/litre was done for 3 times at 15 days interval with three replications were arranged in a randomized block design. Results revealed that maximum growth and yield obtained in 50% Recommended Dose of Fertilizers (NPK kg/ha), 50% Biofertilizers (Arka Microbial Consortium + Potassium Solubulizing Bacteria) along with Arka vegetable special (micronutrient spray). However, balanced use of Inorganic fertilizers and Biofertilizers aims at maximizing yields, maintaining soil productivity, proper environment and ecological balance.

Key words: Inorganic nutrients, Biofertilizers, growth, yield.

HITASA/AB/2024/255

Effect of drinking water frequency on nutrient digestibility in lactating Deoni cows

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A trial was conducted to study the effect of drinking water frequency on production performance of lactating Deoni cows with the objectives to assess the effect of different drinking water frequency on water intake, dry matter intake and nutrient digestibility. Nine lactating Deoni cows were selected on the basis of age, body weight, parity, stage of lactation and milk yield and divided into three groups comprising of 3 animals in each group. The experiment was conducted in three periods in Switch over design in order to expose each group to all the three treatments. The control treatment (T_1) received *ad libitum* drinking water whereas, treatment T_2 and T_3 received drinking water twice and thrice daily, respectively. Significantly higher water intake was noticed in thrice daily watering than rest of the treatments, while intake of water was decreased in twice daily watering compared to other

treatments. Dry matter intake was positively correlated with water intake. Significant increase in dry matter intake was observed in *ad libitum* and thrice daily watering whereas, dry matter intake was decreased when frequency of watering adjusted to twice daily. The apparent digestibilities of all the nutrients including DM, CP, CF, EE and NFE was significantly improved due to restriction of drinking water to twice daily (T_2). However, *ad libitum* and thrice daily watering were at par for DM, CP, CF and NFE digestibility except EE digestibility differ significantly in all the treatments.

HITASA/AB/2024/256

Response of Total Phenol Content of Different *Bt* and Non-*Bt* Cotton Genotypes against Sucking Pests of Cotton

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An investigation was undertaken with an objective to evaluate the different *Bt* and non-*Bt* cotton genotypes against sucking pests under field condition at the Cotton Improvement Project, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar (Maharashtra). Sixteen genotypes (10 *Bt* genotypes + 6 non-*Bt* genotypes) with diverse morphological characters were selected and statistically laid out field trials were during *kharif* 2015 and 2016 to study their reaction to sucking pests. Biochemical constituents were studied to know their association with resistance to sucking pest. Many biochemical factors are known to be associated with insect resistance in crop plants. The ability of plant to withstand attack of insect is due to certain biochemical characteristics which exert unfavourable effects on the insects. The results revealed that total phenol content of different *Bt* cotton cultivars ranged from 8.50 to 10.57 mg per g and of non-*Bt* cultivars ranged from 8.78 to 10.59 mg per g. The maximum amount of total phenol content was noticed in *Bt* cotton cultivars, Ajeet 155 (10.57 mg/g) and non-*Bt* cultivars, GISV 272 (10.59 mg/g) which was less

susceptible to leafhoppers (*A. biguttula biguttula*) and aphid (*A. gossypii*) and susceptible to thrips (*T. tabaci*) and whitefly (*B. tabaci*); while less total phenol content was noticed in *Bt* cotton cultivars, MRC 7377 (8.50 mg/g) and non-*Bt* cultivars, Phule 388 (8.78 mg/g) which was susceptible to leafhoppers (*A. biguttula biguttula*) and aphid (*A. gossypii*) and less susceptible to thrips (*T. tabaci*) and whitefly (*B. tabaci*).

Keywords: Total phenol content, Genotypes, Sucking pests.

HITASA/AB/2024/257

Effect of drinking water frequency on yield and chemical composition of milk in lactating Deoni cows

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A trial was conducted to study the effect of drinking water frequency on production performance of lactating Deoni cows with the objectives to assess the effect of different drinking water frequency on water intake, dry matter intake, yield and chemical composition of milk. Nine lactating Deoni cows were selected on the basis of age, body weight, parity, stage of lactation and milk yield and divided into three groups comprising of 3 animals in each group. The experiment was conducted in three periods in Switch over design in order to expose each group to all the three treatments. The control treatment (T_1) received *ad libitum* drinking water whereas, treatment T_2 and T_3 received drinking water twice and thrice daily, respectively. Significantly higher water intake was noticed in thrice daily watering than rest of the treatments, while intake of water was decreased in twice daily watering compared to other treatments. Dry matter intake was positively correlated with water intake. Significant increase in dry matter intake was observed in *ad libitum* and thrice daily watering whereas, dry matter intake was decreased when frequency of

watering adjusted to twice daily. Significantly higher milk yield was noticed in thrice daily watering followed by *ad libitum* and twice daily watering. Milk production was significantly decreased in twice daily watering whereas, *ad libitum* supply of water did not found beneficial over thrice daily watering considering milk production. Twice daily watering significantly increased the fat and total solids content in the milk. Effect of drinking water frequency on solids not fat content was non-significant.

HITASA/AB/2024/258

Consequence of Foliar application of Organic Resources on Yield, Yield Attributing Characters and Macronutrient uptake by Chilli

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Field experiments entitled "Studies on efficacy of organics through soil and foliar application on soil properties and yield of chilli (*Capsicum annuum* L.) in lateritic soil" were conducted at Department of Agronomy, College of Agriculture, Dapoli during *Rabi*, 2020-21 and 2021-22. Chilli cv. Sitara was taken as test crop with a spacing of 60 cm x 45 cm with gross plot size of 4.5 m x 3.0 m. The experiment was laid out in Randomized Block Design (RBD) comprising sixteen treatment combinations which were replicated thrice. The vermicompost was applied to soil on the basis of 100 per cent recommended dose of nitrogen alongwith the foliar application of three levels of cow urine, vermiwash, moringa leaf extract, glyricidia leaf extract and pongamia leaf extract @ 0.02, 0.04 and 0.06 per cent N content.

The foliar application was carried out at 30, 60 and 90 DAT and the observations were recorded at vegetative, reproductive and at harvest of chilli. The study was undertaken with the aim to assess the suitability of vermicompost as well as to find out suitable organic source for foliar application to chilli crop using different organic sources under organic farming practises.

The results of the investigation clearly indicated that the foliar application of vermiwash @ 0.06 % N content significantly improved green pod yield (11.88 and 17.29 t ha-1), weight of fruits (252.89 and 249.15 g) per plant. Similarly, the macro nutrients uptake *viz*., nitrogen (52.80 and 56.92 kg ha^{-1}), phosphorus (16.27 and 13.93 kg ha^{-1}) and potassium (29.42 and 31.03 kg ha^{-1}) by chilli was also recorded significantly higher in the treatment T_7 comprising application of highest dose of vermiwash i.e. 0.06 per cent nitrogen content during the years 2020-21 and 2021-22, respectively.

HITASA/AB/2024/259

Accelerating crop improvement: unleashing the potential of speed breeding

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The global human population is anticipated to rise by 25% over the next three decades, reaching a total of 10 billion. This demographic shift is expected to lead to a significant increase in global food demand posing a substantial threat to global food security. Additionally, the world is struggling with the issue of climate change, which causes temperatures to rise, new pests and diseases to emerge, and frequent occurrences of severe droughts and floods there by causing drastic reductions in global food production. To address these challenges, there is a need to produce crop varieties that can adapt to the rapidly changing climate and produce sufficient yield for the rapidly increasing population. One major obstacle to the swift production of new cultivars lies in their extended generation time. Conventional breeding methods, commonly requiring eight to ten years of breeding cycles, contribute to the slow development of improved cultivars for most crop plants. This prolonged process hinders the timely development and release of new and enhanced varieties. Speed breeding on the other hand, employs suite of procedures that involves manipulating the environmental parameters under which crop genotypes are cultivated with the aim of hastening flowering and seed development thereby reducing the time it takes to complete a breeding cycle. Careful selection of

plant material, creating controlled environments, adjusting lighting, temperature, and humidity, preparing and sowing seeds, managing crops, implementing accelerated growth cycles, using high-throughput phenotyping techniques, selecting traits, breeding strategies, analysing data, and evaluating new varieties are all part of the speed breeding methodology. Compared to earlier shuttle-breeding systems, this approach has made it possible to produce six wheat generations per year, achieving the entire cycle from seed to seed in just eight weeks. This method holds considerable potential for various crops; a recent reports suggest that for crops like bread wheat, durum wheat, barley, peas, and chickpeas up to six generations could be produced annually.

Keywords: Speed breeding, Food security, Climate change, New cultivars

HITASA/AB/2024/260

Foliar application of zinc oxide nanoparticles to enhance growth and nutritional value of eggplant (*Solanum melongena* L.) under high temperature stress.

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Crop plants treated with engineered nanoparticles show enhanced growth and crop yield without causing any toxic effects at lower doses. The eggplant crop is an important vegetable crop grown throughout tropical and subtopical regions and has great economic and nutritional importance. The objective of this research is to quantify growth, yield, and nutritional value of eggplant grown under natural heat stress conditions with foliar application of 30 mg/L and 60 mg/L zinc oxide nanoparticles at 30, 40, 50 and 65 days of transplanting with control. Number of leaves per plant,

number of branches per plant, plant height, number of fruits per plant and fruit yield was increased significantly with application of 60 mg/L zinc oxide nanoparticles compared to the control. Significant increase in zinc content, protein content, nitrogen, phosphorous, and potassium content in fruits compared with the control. Outcomes of the present study reveal that zinc oxide nanoparticles has the potential to increase growth, yield, and nutritional parameters of eggplant under high-temperature stress, but their effect is concentration dependent.

Keywords: Zinc oxide nanoparticles; Eggplant; Yield; Nutritional value

HITASA/AB/2024/261

Urban Horticulture for Sustainable Cities

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Urban horticulture includes a wide range of activities including community orchards and rooftop gardens that provide access to fresh fruit, support local food production, and improve urban biodiversity. In addition to lowering air pollution and mitigating the effects of urban heat islands, these green areas also offer leisure possibilities and promote social cohesiveness. Urban gardening must be incorporated into urban design, despite obstacles like resource shortage and land scarcity. Encouraging policies, community involvement, and capacity-building programmes are needed to empower locals and encourage environmental stewardship. All things considered, urban horticulture has encouraging answers for building more resilient, liveable, and healthy cities. Urban horticulture faces several challenges to widespread adoption despite its many advantages, such as limited land availability, contaminated soil, and restricted access to resources and technical expertise. To overcome these challenges, governments, urban planners, corporations, and community organisations must work together to create policies that support them, give funding for

them, and offer technical help and capacity-building initiatives. In conclusion, urban horticulture is a viable way to build liveable, resilient, and sustainable cities. Cities may improve food security, environmental quality, and community well-being by incorporating horticulture practices into urban planning frameworks. This will create more inclusive and equitable urban environments for both the current and future generations. Acknowledging urban horticulture as a fundamental element of urban development is crucial in tackling the complex issues associated with urbanisation and constructing resilient, prosperous cities.

Keywords: Urban, horticulture, orchards and cities

HITASA/AB/2024/262

Evaluating mangrove ecosystem vitality: development of a health index for Chettuwa backwater system, Thrissur, Kerala

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The study was conducted in the Chettuwai backwater system in the Thrissur district of Kerala, which harbours a significant stretch of mangroves with an area of five hectares. Mangrove Health Index (MHI) was developed based on the selected vegetation parameters (vegetation structure, species composition, regeneration status), water quality parameters (Dissolved oxygen, and Turbidity); and soil parameters (Texture, color, pH, Organic carbon, and available nitrogen).

The species diversity of mangroves in Chettuwa was found to be moderate, with a Simpson index of 0.58 and a Shannon-Weiner index of 1.16. Most of the mangrove vegetation was occupied by *Rhizophora mucronata (61%), followed by Bruigeria cylindrica (16%), Rhizophora apiculata (10%), Aegecerasc orniculatum (6%), and Avicennia officianalis (5%*). *Rhizophora mucronata* dominated the vegetation structure with an IVI value of 169, followed by *Bruguiera cylindrica* (53) and *Rhizophora apiculata* (38). The regeneration of mangroves in Chettuwa was found to

be poor; however, maximum regeneration was reported in *Rhizophora mucronata.*

The soil was black in color and clayey in texture. The soil pH was slightly acidic, with a mean value of 6.58. The organic matter content was high, ranging from 0.35 to 1.2%, and influenced by the depth of soil profile and zonation in the mangrove system. The organic matter content was high, ranging from 0.35 to 1.2%, and was largely influenced by the depth of soil profile and zonation in the mangrove system. The available nitrogen ranged from 0.56 x $10^{-5}$to 1.68 x 10^{-5} g/g of soil.

Turbidity was measured in Nephelometric Turbidity Units (NTU) with values observed between 9.2 NTU to 26.1 NTU, whereas Dissolved Oxygen (DO) values range from 5 ppm to 7 ppm. It was observed that the DO was positively correlated with Turbidity, Soil Organic carbon, and available nitrogen. The weighted score of the health index of Chettuwa mangroves was found to be 3.0, indicating that the overall health of the mangroves was moderately healthy.

There is an urgent need for conservation measures to protect these unique wetland ecosystems of Chettuwa backwater systems, including effective governance, afforestation, and rejuvenation of mangroves in the degraded area, paying for the conservation of mangroves under private ownership and creation of awareness to local communities.

Keywords: Mangroves- Phytosociology- Edaphic parameters- Floristic – Diversity index.

HITASA/AB/2024/263

Biotechnology for Sustainable Agriculture

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Sustainable agriculture stands as a holistic approach, that prioritizes meeting the present needs for food and fiber production while also protecting and enhancing natural resources for the benefit of coming

generations. In this quest, it becomes crucial to strike a careful balance between social responsibility, environmental stewardship, and economic viability. The difficulties in overcoming biotic and abiotic stressors—from diseases and pests to soil erosion and water scarcity—underline how difficult it is to achieve agricultural sustainability. The ubiquitous threat of pests and diseases, which can seriously reduce crop yields and compromise their quality, is a major obstacle in the way of this progress. In this context, biotechnology shows itself to be a powerful tool for tackling these issues. Agricultural biotechnology is the application of scientific methods such as genetic engineering, molecular biology, and micropropagation to modify the genetic makeup of plants, animals, and microbes. The potential for higher crop yields through genetic engineering is one of the biggest advantages. For instance, crops can be altered to produce more of a specific nutrient or to be more drought-resistant. Cotton with Bacillus thuringiensis genes uses less insecticide, yields more, and costs less to produce; Modified crops, such as glyphosate-resistant crops, make weed control easier and more efficient. The crop can be designed to have disease resistant qualities, which can reduce the need for synthetic pesticides. Crops can be biofortified by introducing genes unique to certain metabolic pathways, for example, Golden Rice fortified by adding genes for the manufacture of beta-carotene. Biotechnology has many advantages in agriculture, but there are also concern about the potential issues that might arise with it. Recognizing the continuous controversy regarding genetically modified organisms (GMOs) in agriculture is crucial. Although it may have advantages, there are worries about possible hazards to the environment, human health, and ethical issues.

Keywords: Sustainable agriculture, GMO, Biotech , genetic engineering.

HITASA/AB/2024/264

Effect f Organic and Inorganic Fertilizers along with Microbial Consortia on Regenerative Traits of Soil

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An investigation was carried out to study the effect of source of nutrients and inoculation with microbial consortia with regenerative traits on soil regeneration and yield of wheat using a field study. The soil microbial biomass carbon, organic carbon content, sequestered carbon, per cent water stable aggregates, dehydrogenase activity, urease activity, phosphatase activity were found to be significantly highest in the treatment N_2 with recommended N equivalent through vermicompost among source of nutrients, C_2 inoculation with liquid based consortium among different microbial consortia and their interaction treatments was found to be the highest in the treatment C_2N_2 receiving inoculation with liquid based consortium and recommended N equivalent through vermicompost. Whereas, the yield (1606 kg/ha) was found to be the highest in treatment (C_2N_3) receiving inoculation with liquid based consortium and 50% of RDN through chemical fertilizer and 50% of RDN through vermicompost. The results indicated that inoculation of microbial consortium prepared from efficient isolates isolated from naturally regenerating forests of Uttara Kannada district of Karnataka along with organic and inorganic source of nutrients, played an effective role in improving low fertile agricultural soils. Therefore, microbes along with organic source of nutrients from naturally regenerating forest types, play an important role in the regeneration of degraded or low fertile soils.

HITASA/AB/2024/265

Agricultural Legislation and its Impact on Agricultural Development

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Indian agriculture has made tremendous strides since independence from recurring food shortages and dependence on food imports to now not only self-sufficient but also a net exporter of commodities. During the first five-year Plan in 1952, the foodgrain output stood at approximately 50 million tonnes, while the population numbered nearly 360 million. Moving forward to 2022–23, the total foodgrains production surpassed 315.72 million tonnes, with the population reaching around 1,428 million. This transformation in Indian agriculture has been possible through technology development & adoption, policies, and hard work of farmers, supported by the legislative measures with codified laws for observation in agricultural and allied activities. Although agricultural legislations in the country was the legacy of British, real efforts were commenced only after 1947 to alter the economic condition of farmers and status of farming through legislative measures. Agricultural legislation refers to laws and regulations that govern various aspects of agriculture, including the production, processing, distribution, and marketing of agricultural products. These laws are typically enacted by governments at the national, state, or local levels to ensure the proper functioning and development of the agricultural sector. Agricultural legislation plays a crucial role in promoting sustainable agricultural development. It provides a framework for regulating agricultural practices, protecting the rights of farmers, and ensuring food security for the population. Agricultural legislation should be well-crafted, comprehensive, and adaptable to address the complex challenges and opportunities within the agricultural sector.

Keywords: Agricultural legislation, Laws, Sustainable agricultural development.

HITASA/AB/2024/266

Examining the adoption of climate change adaptation strategies among vegetable farmers

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It is undeniable that we need sound adaptation techniques to tackle the negative impacts of climate change on vegetable yield and quality. Practices like mixed cropping, crop rotation, shade, increased organic manure usage, and altered irrigation can sustain vegetable output year-round. The study assesses adoption of climate change adaptation strategies among vegetable farmers in Palakkad district, Kerala. Respondents were chosen from four randomly selected blocks. Data collection included 80 male and 80 female farmers with at least ten years' vegetable cultivation experience. List of prioritized adaptation strategies, encompassing crop, soil, fertility, water, pest, disease, financial management, and other strategies, were determined using AHP results. An interview schedule was developed with a three-point continuum viz. full adoption, discontinued adoption, and non-adoption with score of 2, 1, and 0. It was found that under crop management, vast majority (92.00%) farmers continued practicing crop rotation. Cultivation of stress tolerant varieties has highest rate of discontinuance (50.63 %) and cultivation of short duration crops has the highest rate of non-adoption (70.00%). Nearly all (99.37%) adopted organic manure usage under soil management. Use of biofertilizers has the highest rate of discontinuance (25%) while minimum tillage (89.38%) has highest rate of non-adoption. Majority (76.25%) adopted supplementary irrigation under water management. Water conservation (13.75%) and technology advances (98.75%) had the highest discontinuance and non-adoption rates respectively. Under pest and disease management, majority of the farmers adopted pest surveillance (65.62%). Cultivation of pest and disease tolerant varieties has the highest rate of discontinuance (31.88%) and Protected cultivation has highest rate of non-adoption (95%). Related to financial management, majority (72.5%)

of the farmers adopted income diversification. Crop insurances has highest rate of discontinuance (22.5%) while selling assets has the highest rate of non-adoption (94.37%). Among other adaption strategies, 71.25% of the farmers continued getting help from government and other agencies. Post-harvest management has the highest rate of discontinuance (22.5%) and avoidance of extreme climate areas has the highest rate of non-adoption (76.87%).

HITASA/AB/2024/267

Herbicide evaluation against *Phalaris Minor* in Wheat in Haryana

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Phalaris minor, a highly competitive grass weed, poses a significant threat to wheat production in North Indian states including Haryana and Punjab. Its widespread occurrence and the emergence of herbicide resistance necessitate ongoing evaluation of control strategies. This review critically examines the efficacy of various herbicides against *Phalaris minor* in the region, considering factors like application timing, weed growth stage, herbicide mixtures, and resistance development.

Key findings of this review work highlights the declining effectiveness of previously relied-upon herbicides like isoproturon due to widespread resistance. Newer options like pyroxasulfone, clodinafop + sulfosulfuron mixtures, and flufenacet show promise, but regional variations in efficacy and potential resistance development warrant further investigation. The review emphasizes the importance of integrated weed management (IWM) approaches that combine herbicides with cultural practices like crop residue management and crop rotation to achieve sustainable P. minor control. Research gaps are identified, and future directions for optimizing herbicide use and exploring alternative control methods are suggested.

Keywords: Phalaris minor, herbicide resistance, wheat, North India, integrated weed management (IWM)

HITASA/AB/2024/268

Barnyard Millet vs Rice: based on physicochemical properties

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Rice (*Oryza sativa*) is one of the most consumed cereals in India and it is categorized under food with high glycaemic index (GI). With increasing prevalence of Diabetes mellitus there is a demand of foods that can substitute food with high GI, specifically rice. Barnyard millet (*Echinochloa* species) has become one of the most important minor millet crops, showing a firm upsurge in world production. The genus *Echinochloa* comprises of two major species, *Echinochloa esculenta* and *Echinochloa frumentacea*, which are predominantly cultivated for human consumption and livestock feed. Uttarakhand is a contributes maximum to the production and yield of *Echinochloa esculenta* across India. Barnyard millet is a crop with low GI.

In order to see the suitability of barnyard millet as a replacement of rice, both the grains were compared for their physicochemical properties. They were compared based on their seed weight, seed volume, soaked weight, soaked volume, seed density, sweeling capacity, swelling index, hydration capacity, hydration index, and cooking time using statistical tools. There was significant difference in their seed weight, seed volume, soaked weight, soaked volume, seed density, sweeling capacity, swelling

index, hydration capacity, and cooking time. The value for hydration Index was not comparable. Even though the seed weigh and volume were different the cooking time was higher for barnyard millet and the swelling capacity was less.

In conclusion we can say that barnyard millet can be a substitute for rice based on physicochemical properties but will take more time for cooking. Further preference of consumers can be studied to reach to a conclusion.

Theme: Production and Management of Sericulture, Apiculture, Forestry, Vermicomposting, etc.

HITASA/AB/2024/269

Bee Venom: A Potent Resource for Pharmaceuticals - Production Methods and Therapeutic Applications

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Bee venom, a complex mixture of bioactive compounds, offers a plethora of therapeutic benefits, making it an intriguing subject for exploration. This abstract encapsulates cutting-edge research on the production techniques and diverse therapeutic roles of bee venom, highlighting its promising applications within the pharmaceutical industry. This abstract delve into advanced and sustainable production techniques for bee venom, aiming to address scalability and consistency in the pharmaceutical context. Biotechnological approaches and optimized extraction methods are explored to meet the demand for bee venom as a valuable

pharmaceutical resource. Bee venom is rich in bioactive compounds, with melittin being a primary focus. The antimicrobial properties of melittin are effective against a spectrum of pathogens, in combating bacterial and viral infections. The abstract explores about melittin's mechanisms of action, including membrane disruption and interference with intracellular processes. This abstract delve into the anti-inflammatory potential of melittin, exploring its modulation of immune responses and its application in the treatment of inflammatory conditions, autoimmune diseases, and related disorders. The versatility of melittin extends to its role in drug delivery systems. The abstract explores about development of melittin-based nanocarriers, liposomes, and micelles, highlighting their potential for targeted drug delivery and enhanced therapeutic efficacy. The anti-cancer properties of melittin are explored, including its ability to induce apoptosis in cancer cells, inhibit angiogenesis, and mitigate metastasis. The abstract shed light on the potential integration of melittin in cancer treatment regimens. This abstract provides a comprehensive overview of our research, underscoring the significance of bee venom in pharmaceuticals and ongoing efforts in harnessing the therapeutic potential of bee venom, offering diverse applications in antimicrobial strategies, anti-inflammatory therapeutics, and neurological health.

Keywords: Bee Venom, Melittin, Pharmaceutical, Production, Antimicrobial, Anti-Inflammatory and drug delivery.

HITASA/AB/2024/270

Influence of Plant Growth Regulators on Growth Characters of Coriander (*Coriandrum sativum* L.)

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An experiment was conducted at vegetable block, SRM College of Agricultural Sciences, Vendhar Nagar, Baburayanpettai, Chengalpattu District, and Tamil Nadu to study the “Influence of Plant growth regulator on growth parameters of Coriander (*Coriandrum sativum* L.). The experiment was laid out in Randomized Block Design (RBD) with three replications. There were seven

treatments, viz., GA_3 30ppm, GA_3 40 ppm and NAA 30 ppm, NAA 40 ppm, CCC 250 ppm, CCC 500 ppm, and control. Among the growth regulators tried GA_3 40 ppm the highest values for plant characteristics like plant height (51.43), number of branches (7.14 cm), number of nodes per plant (8.14), number of leaves per plant (38.28), plant spread (44.39cm). From the present study, it is recommended that spraying of GA3 40 ppm improved growth parameters in coriander.

Keywords: Coriander, Plant Growth Regulators, Growth parameters

HITASA/AB/2024/271

Optimizing maize growth and yield through integrated nutrient sources

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Increasing food production while also preserving the environment and conserving natural resources, such as land and water, presents one of the most pressing challenges for humanity today. To maintain soil productivity, a combination of organic and inorganic sources of nutrients is necessary. By integrating chemical fertilizers with organic materials, sustainable yields can be achieved. A field experiment was conducted at Lovely Professional University to explore the effectiveness of integrated nutrient management strategies for the sustainable production of maize (*Zea mays* L.). Both growth parameters like plant height, number of leaves per plant, leaf area per plant and yield attributes like cob length, cob girth, number of grains per cob, 1000-grain weight, grain yield stover yield and harvest index, gross returns, net returns, B:C ratio were significantly higher with the application of 100% RDN+ Mixed biofertilizers + FYM +1% spray of $ZnSO_4$ but it was statistically at par with 100% RDN+ Mixed biofertilizers + FYM.

Keywords: Biofertilizers, FYM, integrated nutrient management, maize

HITASA/AB/2024/272

Value Added Fish Products: Tool for Doubling Income

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Food security for people is the prime concern of any nation. Although the problem of food security has been somewhat alleviated by the green revolution in India, the problem of malnutrition and protein deficiency is still hovering over the rapidly growing population. Fish is a good source of high quality proteins and fats as well as vitamins and minerals. It is healthy food, easy to digest, and cheaper to buy. Adding value means employing processing methods, specialized ingredients or novel packaging to enhance the nutrition, sensory characteristics, shelf life and convenience of food products. Needless to say, that approximately 30% of the total fish landings are generally considered as low cost or underutilized. To prevent over-exploitation of quality fishes and post-harvest fishery losses, the development of value added products from underutilized fishes is the present need for their utilization for human consumption. There is a great demand for seafood and seafood based products especially value added products. Products processed in 'convenience' form such as 'Ready-to-eat', 'Ready-to-cook', 'Ready-to-fry', 'Thaw & eat', 'Heat & serve' have high unit value in domestic and international market and are considered as value added products. These technologies are not only useful to prevent post-harvest losses but also promote to generate the employment opportunities and income.

Key words: Fish products, value added products, by-products, convenience products, doubling income

HITASA/AB/2024/273

A recent study highlights the discovery of *Lasiodiplodia spp.* isolates in the coastal region of Odisha, India, responsible for inducing crown rot disease in bananas.

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The study aimed to investigate and characterize new isolates of *Lasiodiplodia* species affecting bananas in the coastal region of Odisha, India, with a focus on addressing crown rot disease, a significant contributor to post-harvest losses in banana production worldwide. Field surveys were conducted in Bhubaneswar, Odisha, between 2022 and 2023, where isolates of two *Lasiodiplodia* species, *Lasiodiplodia brasiliensis* and *Lasiodiplodia theobromae*, were obtained from infected fruits. These isolates were morphologically and molecularly characterized. Pathogenicity tests were conducted to confirm Koch's postulates. Isolates were sequenced and submitted to the NCBI Gene Bank. Additionally, the evolutionary relationships of these pathogen isolates were investigated in comparison to other related genera and species of *Lasiodiplodia*. The findings of this research contribute to the identification of the causes of crown rot disease in bananas and the understanding of pathogen diversity associated with it. To the best of our knowledge, there have been no previous reports of *Lasiodiplodia brasiliensis* and *Lasiodiplodia theobromae* causing crown rot disease in bananas in Odisha, India. Therefore, our objective is to identify and characterize these two species collected from the coastal region of Odisha, India.

Keywords: *Lassiodiplodia* spp., Banana, crown rot, morphological characteristics, molecular characteristics

HITASA/AB/2024/274

Influence of Weather Parameters on Seasonal Incidence of Major Insect Pests of Chilli

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The present investigation was carried on seasonal incidence of major insect pest of chilli at the Research Farm of the Govt. College of Agriculture, Nandurbar, Dist- Nandurbar, (M.S.) during *Rabi* 2021-22. The data reveals that peak incidence of thrips was recorded in 52nd SMW (23.45 thrips/3 leaves), while the peak incidence of mite was noticed in first week of February (6th SMW) with 13.25 mites/3 leaves. The fourth week of January seen the highest incidence of whiteflies (13.45 whiteflies/5 leaves), while in the second week of February (7th SMW) it was seen the highest incidence of fruit borer (3.50 larva/plant). The maximum population of natural enemies *i.e*. lady bird beetles and spiders were noticed in 8th and 6th SMW of 2022, respectively.

Keywords: Seasonal incidence**,** chilli, thrips, whitefly, *H. armigera*, correlation

HITASA/AB/2024/275

Molecular Characterization and Variability of *Sarocladium oryzae* (Sawada) Causing Sheath Rot of Rice in Hilly and Coastal Zones of Karnataka

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Rice (*Oryza sativa* L.) is the most extensively cultivated food crop in the world, which also suffers from various fungal, bacterial, viral and nematode diseases. Among fungal diseases, sheath rot incited by *Sarocladium oryzae* is more predominant and causes huge yield loss in hilly and coastal zones of Karnataka. Twenty isolates were collected from these regions to study the molecular variability. Present study was conducted in Centre of Excellence, Department of Plant Pathology, Shivamogga during the year 2021-2022 where CTAB method of DNA extraction followed by PCR amplification using fungi universal primers ITS1 and ITS4 was done for all isolates which yielded bands in range of 550-600 bp. Sequencing of 11 isolates and Blast analysis revealed (98%) similarity with *Sarocladium oryzae* isolates present in NCBI and corresponding accession numbers were obtained through Genbank. Random Amplified Polymorphic DNA (RAPD) was used to detect the variation between 20 isolates. Among 10 random primers used for amplification LC-94, LC-98, OPE-18, OPB-11, OPD-03 and OPA-10 showed cent per cent polymorphism. Out of 59 bands, 54 bands were polymorphic. These isolates exhibited overall polymorphism of (91%) indicating molecular variability among the isolates. Genetic similarity matrix and dendrogram was constructed to access the genetic relatedness among isolates. The maximum and least genetic similarity of (76 and 39 %) was between Narasimharajapura and Bhadravati and between Sullia and Brahmavar isolates, respectively. Dendrogram constructed by UPGMA from the pooled data showed two major clusters *viz.*, A and B at a similarity co-efficient of 0.53. Cluster A was further sub grouped into 2 sub clusters *viz.*, A1 encompassing Ponnampet, Madikeri and Sagara isolate and A2 encompassing Sullia isolate. Cluster B was further sub grouped into 2 sub clusters *viz.*, B1 encompassing of Virajpet, Brahamavar, Puttur, Mudigere, Shivamogga and Holenarasipura isolat

HITASA/AB/2024/276

Effect of saline irrigation on plant water status, biochemical responses and yield attributes in chickpea genotypes

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Global warming and climate change present a major challenge to human beings which affects crop productivity. Among all the grain legumes, the chickpea (*Cicer arietinum* L.) is one of the oldest cultivated food legumes grown in the world in semi-arid parts of India. In order to meet the food demand, increasing attention is being given to the use of non-conventional water resources such as saline water and treated waste water for irrigation. With this in mind, the effects of saline irrigation on plant water status, RWC, water potential (Ψ_w), osmotic potential (Ψ_s), RSI and yield attributes in two chickpea genotypes viz. HC-3 and CSG-8962 with close phenology but differing in their sensitivity to salinity was investigated under natural conditions of screen house. At the vegetative stage (40 DAS) plants were exposed to single saline irrigation (Cl^- dominated) of levels 2.0, 4.0 and 6.0 dS m^{-1}. The control plants were irrigated with distilled water. Sampling was done at flowering stage (85 DAS) and podding stage (105 DAS). The (Ψ_w), (Ψ_s), RWC % of leaves and roots decreased significantly in both the genotypes with increasing levels of saline irrigation. The genotype HC-3 showed less decrease the water potential (Ψ_w) of leaves and osmotic potential (Ψ_s) and RWC of leaves and roots as compared to CSG-8962 with increasing the saline irrigation from control to 6.0 dS m^{-1}. The hydrogen peroxide (H_2O_2), lipid peroxidation (MDA content) and relative stress injury (RSI %), increased with increasing levels of saline irrigation, the increase being more in CSG-8962 than HC-3. The yield and yield attributes like number of pods $plant^{-1}$, number of seeds pod^{-1}, 100 seed weight, biological and seed yield $plant^{-1}$ also decreased with increasing saline irrigation from control to 6.0 dS m^{-1}. The reduction is more in CSG-8962 as compared to HC-3. Hence, the mechanism of salt tolerance is relatively better in HC-3 than in CSG-8962 as found from physiological and yield attributes studied.

HITASA/AB/2024/277

Participatory Assessment of Novel Formulation of *Bacillus thuringiensis* var. *kurstaki* (DOR Bt-127) SC Formulation Against Lepidopteran Pests in Sunflower

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Sunflower (*Helianthus annuus*) is an important oilseed crop cultivated for its premier oil. The crop is grown under different agro-ecological situations and cropping systems due to its wide adaptability, day neutral nature and responsiveness to better management practices. Currently, it is being grown in an area of 2.8 lakh hectares with a production of 2.5 lakh tonnes. The national average productivity of 905 kg/ha is low due to its production under sub-optimal agro-ecological conditions and damage due to insect pests and diseases. Insect pests are the major production constraints in traditional sunflower areas. Capitulum borer (*Helicoverpa armigera*), tobacco caterpillar (*Spodoptera litura*), whitefly (*Bemisia tabaci*), green leafhopper (*Amrasca biguttula biguttla*), and semilooper (*Thysanoplusia orichalcea*) are the major insect pests of sunflower in India. So far, the use of synthetic insecticides has been the major approach for controlling the pests. Presently used conventional insecticides are unsafe to potential natural enemies and beneficial insects in sunflower ecosystem. In ICAR-Indian Institute of Oilseeds Research (IIOR), a suspension concentrate (SC) formulation of a novel local isolate of *Bacillus thuringiensis* (Bt) var. *kurstaki* DOR Bt-127 (MTCC-5976/NAIMCC-B-01463) was found effective against wide range of lepidopteran pests under laboratory and field conditions. In the present study, large scale field evaluation of Bt-127 SC formulation as a component of IPM was carried out in farmers' fields (Harali Village, Lohara Taluka, Osmanabad District, Maharashtra State) through farmer's participatory approach during *kharif* 2019. Seed treatment with imidacloprid (5g/kg seed) for management of sucking pests, monitoring *Spodoptera litura* and *Helicoverpa armigera* using pheromone trap (4/acre) and hand collection of gregarious larval

stages with damaged leaves, application of DOR Bt-127 SC formulation @ 3 ml/l for *H. armigera*, *S. litura* and *Thysanoplusia orichalcea* and use of reflecting ribbons for avoiding damage by birds were undertaken in IPM module. Neem oil sprays were taken up in farmer's practice for management of the pests. Incidence of *T. orichalcea*, *S. litura* and *H. armigera* was reduced by 96.7%, 85.7% and 96.3%, respectively due to Bt-127 SC formulation in IPM trial. The IPM trial resulted in net returns of Rs. 10658/acre with a cost-benefit ratio (CBR) of 2.30 over net returns of Rs. 7034/acre with a CBR of 1.94 in farmers' practice. Considering the yield and economics, the IPM modules with Bt-127 SC formulation as a component proved their effectiveness by increasing yield and protecting natural enemies and the environment.

HITASA/AB/2024/278

The influence of physical traits of bitter gourd against melon fruit fly *Zugodacus cucurbitae* (Coq.)

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The role of physical traits of bitter gourd in showing host plant resistancy against *Zugodacus cucurbitae* (Coq.) experiment was carried out at College of Agriculture VNMKV Parbhani Maharashtra during 2022. The available genotypes of bitter gourds were taken to study physical traits of bitter gourd resistancy against melon fruit fly and genotypes were categorized based on per cent fruit damage. Among them Green gold came under resistant category. Ko-tara, Hirkarni, Ko-karli and Pusa hybrid 4 were under moderately resistant category. Priyanka, NS-435, Preethi and Pusa aushadi were under susceptible category whereas, Pusa-rasdhari came under highly susceptible category in this region. Physical traits of bitter gourd fruits like; fruit length, fruit diameter, number of longitudinal ridges/cm^2 and pericarp thickness of fruits shows negative correlation

with fruit damage. Thickness of longitudinal ridges shows significant and positive correlation with fruit damage. Depth of longitudinal ridges, number of small ridges/cm^2, depth of small ridges and fruit toughness shows significant and negative correlation with per cent fruit damage.

Keywords: Melon fruit fly, Physical traits, bitter gourd, Host plant resistance, Per cent fruit damage *etc*.,

HITASA/AB/2024/279

Organic Amendments in the Management of Soil Borne Plant Diseases

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Many soil borne pathogens are managed effectively by the application of organic amendments. The use of organic amendments to the soil are traditionally for improving soil conditions and crop productivity, also support multiplication of beneficial microorganism in the rhizosphere which are helpful in suppressing soil borne plant diseases. Application of oil cakes, composts and liquids enriched with bio-agents, plant extracts and essential oils from herbs are effective against soil borne diseases. Organic manures made up of oil cakes, organic wastes, composts and peats are being used to control soil borne diseases. The activity of microorganisms increases in the soil creates competition, which effectively helps in suppression of harmful soil borne diseases. The use of organic amendments enriched with beneficial microbial consortium provide diversified food base, contains large number of microorganisms which enhance crop production and produce plant growth regulators and have antagonistic effect on soil borne plant diseases. The repeated application of the organic amendments with organic manures as a source of carbon enhances respiration and soil chemical properties which favour beneficial soil microorganisms population in the soil, results in disease suppressiveness

of the soil. Efficacy of these organic amendments depends upon the raw materials from which it is derived, processed and enriched. The consortium of organic amendments with beneficial bio-agent microorganisms enrichment and mass multiplication enhance the disease suppressiveness of the soil with higher efficacy and reliability. The addition of well balanced soil organic amendments together with soil solarization bio-agents, are to be used for the management of soil borne diseases. In contrary, some soil borne pathogens *viz*., *Rhizoctonia solani*, is very difficult to manage and disease severity increases with the addition of organic amendments.

HITASA/AB/2024/280

Trichoderma in the Management of Soil Borne Plant Pathogens

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The biological control of the soil borne disease is getting more significance as these are not easy to manage through the chemicals. Many soil borne pathogens are managed successfully by the application of bio-agents and their enrichments with substrates. The *Trichoderma* has no harmful effects on the environment and non-target organisms and can be used in most food crops. *Trichoderma* sp. plays a significant function in sustainable crop production through its multiple roles as a bio agent against fungal plant pathogens and as a growth promoter undeniably proved as a better choice in organic agriculture to ensure good and sustainable yield. The significance in the field depends mostly on the quality of the commercial formulation, the substrates used for multiplication and soil and environmental conditions. It is very important to improve the *Trichoderma* sp. mass multiplication and enrichment to manage the soil borne plant pathogen by utilizing cheaper and locally available substrates. The locally available cow dung, compost, farmyard

manure, vermicompost, neem cake, poultry manure were used as organic substrates for enrichment of *T. harzianum*. Of these substrate, compost was recorded the higher population of *T. harzianum* (15 x 10^7 cfu/g) and found superior to others in plant growth parameters and reduction of seedlings mortality due to soil borne plant pathogens. For the large scale production, mass multiplication and enrichment of *T. harizanum*, use of substrate combinations *viz*., cow dung + neem cake (4:1) and compost + neem cake + poultry manure + cow dung (2:1:1:1) were found to be ideal and to use in large scale field applications. It is very much essential to test different local isolates in many locations with additional substrate combinations to improve the efficiency of microbial agents.

HITASA/AB/2024/281

Management of Mulberry Root Rot Disease

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Mulberry is a perennial, evergreen, fast growing tree used to feed silkworm across the world. Mulberry root rot disease outbreak is more frequent, because of intense cultivation, loss of plant vigour and increased susceptibility to soil-borne pathogens. The root rot disease of mulberry was widely distributed severe disease leads to complete destruction of the plants resulting enormous loss recorded plant mortality of 30 to 50 per cent leaf yield loss and thereby reducing the in cocoon production. The disease was caused by fungal complex and the severity was influenced by micro and macro climatic factors. This economically important disease has been managed by various integrated management strategies and biological methods are giving hopes to overcome the unfavourable situations in a beneficial way. Symptoms of root rot affected mulberry plants were progressive wilting, premature drying, and loss of vigour and yield reduction as the characteristic root rot symptoms in mulberry plants. Though some control measures along with fungicides were widely used in

conventional agriculture, the disease could not contain effectively. In general, the farmers are more reluctant to use chemicals, bio-agents and plant component which helps to kill the fungal pathogens associated with root rot disease and also offer resistance to the plant to sustain the damage caused by the pathogen. The farmers of these areas practicing the application of manure along with bioagents applied at the time of planting and at monthly intervals @ 500 g/plant and application of cow dung slurry once in a month. The maximum disease control of 90.86 per cent was noticed in the fields applied with *Trichoderma harizanum* with minimum disease (11.08%) incidence, followed by *Trichoderma* local isolate applied fields (90.00% and 13.79%). The per cent disease incidence was maximum (20.94%) in the field which are not used any bio-agents.

HITASA/AB/2024/282

Eco-friendly Management of *Alternaria* leaf spot of broccoli

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Broccoli is becoming more popular in the Indian vegetable market as a result of its nutritional value, which includes flavor, taste, carotenoids and anticancer properties. Eco-friendly management of Alternaria leaf spot of broccoli with bioagents and phytoextracts alone needs to be discouraged due to their ill- effects. Therefore, present lab experiments were conducted to manage the disease with effective bioagents species & phytoextracts under control condition at Plant Pathology Section, College of Agriculture, Dhule, Maharashtra, India.

The result showed that all bioagents evaluated exhibited fungistatic / antifungal activity against *A. brassicae* and significantly inhibited it's growth, over un-treated control. Of the antagonistic tested, *Trichoderma viride* was found to be the most effective, with the highest inhibition of mycelial growth of the test pathogen (75.74 %). The second most inhibitory antagonistic found were *T. hamatum* 73.90 per cent inhibition,

followed by *T. harzianum* (66.41 %) mycelial inhibition. Minimum, mycelial growth inhibition was found in *Pseudomonas fluorescens* (64.44 %). All the treatments were statistically significant with rest of the treatments including un-treated control.

Results revealed that all the seven plant extract tested *viz.,* Drumstick (*Moringa oleifera);* ginger (*Zingiber officinale);* bougainvillea (*Bougainvillea glabra);* tulsi (*Ocimum sanctum);* neem (*Azadirachta indica);* garlic (*Allium sativum)* and sadaphuli (*Vinca alba)* evaluated (@ 5 and 10 %) by poisoned food technique and using potato dextrose (PDA) as basal medium. Garlic was found most effective treatment and showed 70.90 per cent mycelial growth inhibition of test pathogen at 5 percent concentration; which was significant with rest of the treatments including untreated control. The treatment of neem was found next most effective in mycelial growth inhibiting and showed (66.51 %) at 10 percent concentration; which, was followed by ginger (61.72 %) at 5 percent concentration and bougainvillea (56.10 %) at 10 percent concentration. All the three, treatments were statistically, significant with rest of the treatments including untreated control. The treatment of tulsi and drumstick was found (46.77 %) and (44.75%) mycelial growth, inhibition at 10 percent concentration, respectively and sadaphuli treatment found minimum mycelial growth inhibition (30.62 %) at 10 percent concentration.

Keyword : *Alternaria brassicae,* broccoli, bioagents, phytoextracts, management

HITASA/AB/2024/283

Efficacy of fungicides against *Alternaria* leaf spot of broccoli

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Broccoli (*Brassica oleracea* L. var*. italic*) belongs to 'Brassicaceae' family (formerly Cruciferae), also known as the 'Mustard family or cabbage

family'. The family contains species of great economic importance, providing much of the worlds' winter vegetables. Broccoli is becoming more popular in the Indian vegetable market as a result of its nutritional value, which includes flavor, taste, carotenoids and anticancer properties. The Alternaria leaf disease has been reported to cause 25 to 60 per cent yield losses in broccoli. Management of Alternaria leaf spot of broccoli with chemicals alone needs to be discouraged due to their ill- effects. Therefore, present lab experiments were conducted to manage the disease with effective fungicides under control condition at Plant Pathology Section College of Agriculture, Dhule, Maharashtra, India. The experiment was conducted during 2021-22.

Eight fungicides belonging to different groups were tested *in vitro* for their efficacy against *A. brassicae*, by employing poisoned food technique and using PDA as basal medium. Result revealed that treatment of propiconazole, tebuconazole and hexaconazole were found cent percent (100 %) mycelial inhibition at 0.05 per cent concentration of *A. brassicae* which were statistically, at par with each other and significant with the rest of treatments including untreated control. The copper oxychloride at 0.3 per cent concentration was found next best fungicide and showed (92.22 %) mycelial inhibition, followed by carbendazim 12 % + mancozeb 63 % (86.73 %), mancozeb (84.44 %) and thiophanate methyl (75.99 %) at 0.25, 0.2 & 0.01 per cent concentration, respectively. Carbendazim was found minimum mycelial growth inhibition (72.26 %) at 0.1 % concentration, followed by chlorothalonil (74.55 %) mycelial inhibition at 0.2 % concentration.

Keyword : *Alternaria brassicae,* broccoli, fungicides, management, *in vitro* evaluation

HITASA/AB/2024/284

Effects of Climate Change on Mango Production and its Impact on Farmer's Income in Uttar Pradesh

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Uttar Pradesh is one of the major mango-producing states in India, renowned for its diverse varieties and significant contribution to the country's mango output. Uttar Pradesh is home to various mango varieties, including Dasheri, Langra, Chausa, Safeda, and Amrapali, among others. Each variety has its own unique taste, aroma, and characteristics, contributing to the richness and diversity of India's mango industry. Mango cultivation plays a crucial role in the economy of Uttar Pradesh, providing livelihoods to a significant number of farmers and generating substantial revenue through both domestic sales and exports. The main aim of the research was to analyse the Effects of Climate change on mango production and its impact on farmer's income in Uttar Pradesh. For this purpose, from Lucknow district Malihabad block which is known for the varieties of mango were selected for the study. Descriptive analysis was conducted to know the Effects of Climate change on mango production and its impact on mango growers. The results concluded that the impacts of climate change on mango production in Uttar Pradesh are multifaceted and pose significant challenges to farmers' incomes. Rising temperatures disrupted the flowering and fruiting patterns of mango trees, leading to lower yields due to premature flowering or fruit drop. Erratic weather patterns, including irregular rainfall and unexpected storms, damaged orchards, disrupted pollination, and resulted in lower fruit quality and quantity. Warmer temperatures and altered rainfall patterns also created favourable conditions for pests and diseases, increasing management costs for farmers. Additionally, changes in precipitation patterns resulted to water stress during critical growth stages, further reducing fruit size, quality, and overall yield. It was further concluded that shifts in growing seasons due to

climate change disrupted traditional agricultural practices, requiring adjustments that increased production costs. Market instability, driven by fluctuations in mango production, makes it challenging for farmers to plan and manage their incomes effectively. Small-scale mango farmers were particularly vulnerable due to limited resources and adaptive capacity, with reduced incomes from mango cultivation having broader economic and social implications for rural communities in the study area.

HITASA/AB/2024/285

Ecological Engineering: A Multidisciplinary and Healthy Approach to Pest Management

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The Green Revolution was a transformative 20th-century agricultural project that aimed to increase food production and reduce poverty and hunger in developing countries. This resulted in the large-scale use of pesticides and synthetic nitrogen fertilisers that led to pest resurgence, secondary outbreaks, pesticide residues and death of natural enemies, which increased the cost of cultivation of crops, a lack of natural control over pests, the development of health hazards and environmental pollution like biomagnification, eutrophication etc.

Ecological engineering was designed for the sake of a healthy agro-ecosystem. Crops and their habitat were manipulated for the well-being and inconvenience of natural enemies and pests. A push and pull strategies were applied by employing semiochemicals and trapping crops. Natural enemies were conserved by providing alternate food through the phenomenon of chocolate box ecology and beetle banks. Pest movement has been arrested through windbreaks and trenches and their population were managed by applying botanicals, narrow spectrum and bio-rational pesticides with the correct time, dose and amount.

In ecological engineering, instead of using single input, complex and multiple tactics were deployed for pest management as a result there will

be no chances for the development of resistance and resurgence. Ecological engineering aims to reduce the reluctance on pesticides and to promote natural control over pests which will be an economically, ecologically and environmentally feasible way for pest management.

HITASA/AB/2024/286

Digitization in livestock/ fishery health, production and reproduction.

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Digitalization in livestock management involves employing technology such as sensors, data analysis, and automation to improve animal care and farming effectiveness. It also involves monitoring animal behavior and well-being, governing nutrition and feed, and deploying precision farming strategies to boost production and environmental sustainability. This approach requires digital data obtained from devices such as biometric sensors, big data, and block chain. Precision Livestock Farming (PLF) technology conveys safe monitoring, that helps in addressing welfare challenges. However, this shift to digital farming has implications for technology, economy, society and the environment. It's important to deliberate ethical concerns, especially regarding human-animal interactions. PLF technologies can lessen resource use and promote proactive animal health practices, potentially reducing the need for medications like antibiotics. Innovations such as automation, robotics, and computerized programs may further improve productivity in livestock farming. However, challenges persist, including data privacy issues, infrastructure restrictions in remote areas, etc. among farmers. Nonetheless, the integration of digitization into livestock and fishery management holds great potential for sustainable and efficient animal production systems in the modern age.

HITASA/AB/2024/287

Effect of Edible Coatings Chitosan and Calcium Gluconate on shelf life of Mango (*Mangifera indica* L.)

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An experiment was conducted to study the effect of edible coatings chitosan and calcium gluconate on shelf life of mango (*Mangifera indica* L.) at College of Horticulture-Rajendranagar, SKLTSHU, Siddipet district, Telangana during 2021-2023. The experiment was conducted with Completely Randomized Design with six treatments, three replications which includes T_1 - Dipping in 1% edible chitosan coating, T_2 - Dipping in 2% edible chitosan coating, T_3 - Dipping in 2% calcium gluconate, T_4 - Dipping in 1% edible chitosan coating + 2% calcium gluconate, T_5 - Dipping in 2% edible chitosan coating + 2% calcium gluconate, T_6 – Control and observations were recorded at every three days' interval up to end of shelf life. There was significant difference among all the treatments with respect to PLW, browning, spoilage%, firmness and shelf life. Among different treatments lowest PLW (3.65 %), least browning score (4.87), spoilage% (46.98 %), highest firmness (8.62 kg/cm^2) and maximum shelf life (17.41 days) on 15th day were recorded by T_2 - dipping in 2% edible chitosan coating, followed by T_1 - dipping in 1% edible chitosan and least was recorded on 3rd day of storage by T_6 - control. Post-harvest coating of mango fruits with chitosan has resulted in increased shelf life compared to calcium gluconate and control as chitosan treatment slows down the transpiration and respiration of fruit which increases fruits shelf life and decreases the fruit rot.

HITASA/AB/2024/288

Building a Sustainable Agri-Value and Supply Chain: Post-Harvest management

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The rapid economic development of a country, particularly in the case of India where a significant portion of the population relies on the agricultural sector for their livelihoods, hinges on the advancement of agriculture. In such economies, achieving inclusive growth necessitates a focus on agricultural sustainability. Achieving sustainable agricultural output includes lowering food waste and improving farmers' livelihoods require a technologically sophisticated and well-integrated agri-value and supply chain with post-harvest technology, food processing and value addition. Post-harvest management is a crucial process in agriculture, focusing on preserving the quality and longevity of horticultural produce from harvest to consumption. The key objectives include accurate timing of harvest to maximize shelf life and nutritional content. Careful handling during harvesting is essential to prevent damage, ensuring the produce maintains its market value. Proper storage, utilizing technologies like cold storage and controlled atmosphere storage, plays a vital role in extending the shelf life of perishable goods. Cold storage slows down ripening processes, preserving freshness, while controlled atmosphere storage modifies the environment to enhance storage life. Efficient transportation networks are necessary for timely and safe delivery to markets, minimizing losses and ensuring optimal conditions upon reaching the destination. Ensuring a profitable price for agricultural produce through improved marketability achieved by processing, packaging and enhancing durability could be done with technology transfer combined with better storage systems. By enhancing worker's abilities, skills and knowledge enables them to actively contribute to reducing postharvest losses and increasing production. Building capacity is necessary to help farmers become more aware of postharvest agricultural practices. This capability prolongs the period of human consumption, guards against fungus and pests and helps create value-added products from stored and excess raw materials. The extended shelf life from value addition resulting from food processing not only benefit farmers by ensuring remunerative prices but also promote crop diversification, making the overall agricultural sector more resilient and sustainable

.**Keywords**: Sustainable Agri-value, Supply chain, Cold storage, Shelf life

HITASA/AB/2024/289

Role of Plantation crop in mitigating climate change

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Climate change is the most significant challenges of 21st century. As the global climate crisis intensifies, the imperative to identify sustainable solutions becomes increasingly urgent. Plantation crop have emerged as significant players in climate change mitigation strategies. They have the unique property of carbon sequestration and ecosystem services. Several crops such as coconut, oil palm, rubber, cocoa and tea possess inherent characteristics that make them valuable assets in climate change mitigation efforts. These crops have extensive root systems and dense canopies, enabling them to sequester substantial amounts of atmospheric carbon dioxide through photosynthesis and soil carbon storage. Moreover, their perennial nature ensures long-term carbon sequestration and resilience to climate variability. They help to mitigate soil erosion, regulate water cycles, and promote biodiversity conservation by providing habitats for diverse flora and fauna. Plantation agriculture can enhance local livelihoods by generating employment opportunities and supporting rural economies, thereby fostering resilience to climate change impacts. The sustainability of plantation crop cultivation hinges on responsible management practices that prioritize environmental conservation and social equity. Sustainable land-use planning, agroforestry techniques, and certification schemes can help minimize deforestation, biodiversity loss, and social conflicts associated with plantation expansion. By adopting sustainable management practices, plantation agriculture can play a pivotal role in transitioning towards a more resilient and sustainable future in the face of climate change.

Keywords: climate, plantation crop, mitigation

HITASA/AB/2024/290

Studies on genetic divergence through cluster analysis in bold seeded linseed

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Linseed (*Linum usitatissimum* L.) is an annual self-pollinated crop with originating either in the Middle East or the Indian regions. The bold seeded linseed alone has never been exploited for yield improvement of crop and its oil yield potential. Hence, for the present investigation the different source for variation of bold seed character in germplasm is taken. Generally in linseed the comparing bold seeded with medium and small seeded, the advantage lies with better germination and seedling vigour giving robust plant growth which ultimately produces more branches and capsule and finally will produce more seed yield and seed oil content, respectively. The experiment was conducted at Research-cum-instructional-farm, Department of Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh" during 2019-20 *rabi* season. The material were used in the research work comprises of 45 bold seeded genotypes along with checks (RLC-92 and R-552) in RCBD with 3 replications. The observations taken for different agro-morphological traits based on linseed descriptor, "National guidelines for the conduct of tests for Distinctness, Uniformity and Stability in linseed, India" published as per Catalogue on linseed germplasm, Project Coordinating Unit (Linseed), Kanpur, (2010). Diversity analysis through D^2-analysis was carried out among 45 bold seeded genotypes of linseed. Cluster analysis distributes the 45 genotypes into 8 clusters. Cluster I has maximum number of genotypes *i.e.* 27 genotypes. Based on intra-cluster distance, the most diverse clusters among all clusters were cluster III whereas, the highest inter cluster D^2 values were observed between cluster VI and IV (711.93) followed by cluster VI and V (696.75), cluster VI and II (551.16), cluster III and II (487.20) and cluster VIII and IV (461.72). Based on inter-cluster values, it can be concluded that genotypes of the cluster I and II could be selected for hybridization programmes as they are expected to produce high seed yield.

HITASA/AB/2024/291

Enhancing Crop Competitiveness for Sustainable Weed Management in Cotton

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The farming sector must supply rising demand for food, fiber, and fuel as the world's population grows. Technical improvements, such as genetic manipulation of plants, were quickly implemented to increase output. In cotton production, the increasing use of herbicide-tolerant genetically engineered crops has resulted in an excessive reliance on chemicals for weed control, resulting in a rapid development of herbicide-resistant weeds. Poor weed control can result in large yield losses, emphasizing the significance of incorporating non-chemical measures to assure the viability of weed management strategies.

Increasing crop competitiveness is one strategy for diversifying weed control alternatives and reducing dependency on herbicides. This review looks at the potential advantages of using crop competitiveness as a weed management approach in cotton production.

Cultural techniques that accelerate crop canopy development and inhibit weed emergence, density, and growth include reducing row spacing, increasing seed rates, and choosing competitive cultivars. Additionally, by changing the properties of the canopy structure, these techniques enhance the crop's capacity to suppress weeds.

Several studies have shown that cultural weed management approaches reduce agricultural yield losses due to weed interference while additionally decreasing selection pressure for herbicide-resistant weed populations. However, adoption of these approaches remains restricted in many cotton-growing countries, and their efficacy may vary depending on environmental conditions, soil type, and resource availability. Future study

should focus on analyzing the efficacy of cultural weed management approaches under various situations and advocating their widespread use to ensure long-term weed management in cotton production systems.

In addition to cultural techniques, integrated weed management (IWM) strategies that combine several tactics, such as mechanical control, crop rotation, and cover cropping, can improve weed control while also increasing environmental sustainability. Furthermore, farmer education and extension programs play an important role in encouraging the adoption of these techniques and ensuring their successful implementation in the field. Cotton producers can reduce the difficulties caused by weeds resistant to herbicides, increase crop yields, and support the long-term sustainability of agricultural systems by adopting proactive and holistic weed management techniques.

Keywords: Crop competitiveness, Cotton production, Cultural practices, Herbicide resistance, Weed management

HITASA/AB/2024/292

Utilizing Genetic Diversity for Climate-Resilient Crop Improvement: Strategies and Innovations

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Climate change and heightened agricultural unpredictability are impacting the resilience and sustainability of agriculture. As climate change continues to impact ecosystems worldwide, ensuring food security necessitates the cultivation of crops that can withstand higher temperatures, unpredictable rainfall patterns, and other environmental challenges that detrimentally affect the yield and quality of crops. This overview investigates using genetic diversity as a potent strategy for developing crops resilient to these changing conditions. These stresses induce notable alterations in plant gene expression, metabolism, and phenotype, making research into crop adaptation to adverse growing

conditions imperative for agricultural science. We explore various established methods such as utilizing landraces, wild plant relatives, and diverse germplasm collections, which offer a rich source of genetic traits for enhancing stress tolerance. Furthermore, we discuss innovative techniques including genomic selection, gene editing, Marker-assisted selection and precision breeding, which hold promise for accelerating the identification and incorporation of these valuable traits into modern crop varieties. Climate-resilient crop breeding emerges as a cost-effective, viable, and eco-friendly strategy for adapting to abiotic stress. However, owing to the intricate nature of plant characteristics, novel research methodologies are needed to fully explore this approach. By considering these diverse approaches, the overview emphasizes the potential of genetic diversity as a crucial tool in our efforts to secure a sustainable food supply amidst the challenges posed by climate change.

Keywords: Climate change, Crop resilience, Genetic diversity, Germplasm, Genomic selection, Gene editing, Precision breeding, Food security.

HITASA/AB/2024/293

Production and Management of Apiculture

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Apiculture, the practice of beekeeping, is an integral component of agriculture and biodiversity conservation worldwide. This abstract provides a comprehensive overview of the production and management aspects of apiculture, focusing on key elements such as bee species, hive types, honey production, bee health, and sustainable management practices. The success of apiculture largely depends on the understanding and management of bee species. Among the commonly reared species, Apis mellifera mostly use for honey production due to its high productivity and adaptability to various environments. However, indigenous bee species

such as Apis cerana and Apis dorsata also play significant roles in different regions, especially in countries like India, where they have cultural and ecological importance. Effective hive management is crucial for optimizing honey production and ensuring bee colony health. Various hive types, including Langstroth, top-bar, and traditional mud hives, offer different advantages and are chosen based on factors such as climate, bee species, and management objectives. Proper hive placement, regular inspection, and pest control are essential practices for maintaining healthy colonies and maximizing honey yields. Honey production techniques encompass harvesting, extraction, processing, and storage. Modern technologies such as centrifugal extractors and honey filters streamline the extraction process, ensuring product quality while minimizing labor requirements. Moreover, adherence to hygiene standards during processing and storage is imperative to prevent contamination and maintain honey's nutritional and medicinal properties. Bee health management is a critical aspect of sustainable apiculture. The major hazards as a bee-saving guardian include ailments, pests, pesticides, and habitat degradation, which are detrimental to bees globally. Integrated pest management (IPM) techniques, organic beekeeping and restoration of other habitats for bees are all aspects that are vital to bee health and diversity. Sustainable apiculture practices emphasize environmental stewardship, economic viability, and social responsibility. Initiatives promoting organic certification, fair trade practices, and community-based beekeeping empower beekeepers economically while safeguarding ecological integrity and promoting social equity. This abstract provides a foundational understanding of the production and management of apiculture, highlighting the importance of scientific knowledge, traditional wisdom, and ethical considerations in ensuring the sustainability and resilience of beekeeping enterprises.

Keywords: Apiculture, Beekeeping, Hive management, Honey production, Bee species, Sustainable practices, Bee health, Integrated pest management, Environmental stewardship, Social responsibility

HITASA/AB/2024/294

Selective Sweeps Identified for Cytokinesis Genes Using DDRAD Sequencing in Murrah Buffalo

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The quantity of secretory epithelial cells and their relative activity levels are closely correlated with the amount of milk that a mammary gland produces. The development of lactation is controlled by the dynamic interaction of changes in the secretory activity of mammary epithelial cells, cell loss, and proliferation. A total of 28,893 SNPs with excellent quality were acquired. Using SweeD 3.0 software and a CLR value threshold of 9.8246, the top 1 percentile SNPs with a window size of 10 Kb were presumed to represent probable selection signatures. 22 loci were tracked in 179 selective sweep regions, with the largest number, or 40, on chromosomal number 3. Genes common across different traits were traced and a total of 106 genes including 10 genes for cell division were identified. According to our research, there are some genes in the Murrah breed that are essential for cell division and proliferation. It has been determined that genes including BCR, CCDC70, CEP135, and DEPDC5 play a major role in controlling cell proliferation and differentiation. Furthermore, CDC23 plays an essential role in the anaphase-promoting complex, which facilitates appropriate cellular division. While SFI1 is responsible for preserving centrosome integrity, DOCK6 is in charge of the complex arrangement of the cytoskeleton. The complex molecular mechanisms controlling cellular regulation in the mammary gland of Murrah buffalo are clarified by these findings.

Keywords: mammary gland, selective sweep, cell division, Murrah, SNPs

HITASA/AB/2024/295

Millets : A Treasure Trove of Wellness for Sustainable Livelihood

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The UN declared year 2023 as the International Year of Millets on India's proposal**.** It belongs to NUS (Neglected and Under Utilized Species) category. With current increase in life style disorders around the world, it is more important to promote healthy nutrition in all age groups. Many developing nations are facing double burden of malnutrition, with hidden hunger on one side and obesity on the other. Approximately 1.9 billion adults are overweight or obese, while 462 million are under weight, 52 million children under 5 years of age are suffering from malnutrition. In India, there is large scale prevalence of stunted growth among children and anemia among pregnant women and 20 percent of children less than 5 years of age suffer from malnutrition related disorders. Millets have gained popularity in the western countries because it is gluten free and its regular intake can effectively combat anemia, B-complex vitamin deficiency and pellagra. Millet grains are nutritionally comparable and even superior to major cereals with respect to protein, energy, minerals, nutraceuticals, phytochemicals, dietary fiber and vitamins therefore also called as nutricereals. These crops have substantive potential in broadening the dietary diversity, food security and nutritional security. They have low input, high production, rich in minerals (Ca, Fe, Zn etc), low fats, high fiber content and is good for diabetic patients. Millets can be used to combat human life style disorders viz., diabetes, cardiac diseases, osteoporosis, cancer, hyper tension, etc.

HITASA/AB/2024/296

Agricultural diversification and doubling farmers' income

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Agriculture sustains livelihood for more than half of India's total population. The low level of farmers' income and year-to-year fluctuations is a major source of agrarian distress. This distress is spreading and getting severe over time impacting almost half of the population of the country that is dependent on farming for livelihood. Doubling a farmer's income is quite challenging but it is needed and is attainable. Some of the innovative approaches for doubling farmers' income are enhancing production through improved seeds and organic farming. Special focus on dryland areas; adopting smart nutrient management practices; regular income through integrated farming systems approach, irrigation, and technological advancement for higher productivity. Precision farming raises the production and income of farmers substantially. Strengthening warehousing and cold chain facilities to curb post-harvest losses; value addition through food processing; and income enhancement through diversification and professionalization, by adopting the above-said approaches in an integrated manner, the objective of doubling farmers' income can be achieved. Sh. Dharampal, a farmer in Haryana's Karnal area, practiced organic farming and intercropping. He plants six crops in 18 months on a 1-acre plot (sugarcane; main + ratoon, turmeric, maize, and one mustard intercrop). Sugarcane yields were about 1000-1200q/acre, and turmeric yields were around 20q/acre. During the pandemic, Tamil Nadu farmers demonstrated that "Value addition is the way to increase their Income" by producing 80 value-added goods.

Keywords: Doubling farmer's income, Innovations, Organic farming, Value addition.

HITASA/AB/2024/297

Effect of inorganic and organic sources (Solid and liquid), nutrient management on improve growth, yield and nutrient uptake of traditional rice variety cv. mappilai samba

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Traditional rice varieties in India and across Asia are facing extinction as a result of the entrance of modern rice varieties, such as hybrids and genetically engineered rice being developed as a result of corporate-centered technology. So this study was carried out to study the combined effect of inorganic and organic inputs for the better growth and yield of traditional rice. A field experiment was carried out in Pazhankovil village, Kalasapakkam taluk, Thiruvannamalai district, Tamilnadu, in June 2021. The experiment used a Randomized Block Design (RBD) with 11 distinct treatments and three replications. The eleven treatments were T_1 – Control, T_2 – 100% RDF, T_3 – 50% RDF+FYM @12.5 t ha^{-1}, T_4 – 50% RDF+VC @2.5 t ha^{-1}, T_5 – 50% RDF+Humic granules @25 kg ha^{-1}, T_6 – 50% RDF+FYM @12.5 t ha^{-1}+NPK Consortia, T_7 – 50% RDF+VC @2.5 t ha^{-1}+NPK Consortia, T_8 – 50% RDF+Humic granules @25 kg ha^{-1}+NPK Consortia, T_9 – 50% RDF+FYM @12.5 t ha^{-1}+NPK Consortia+Sea weed liquid @2% (FS two times), T_{10} – 50% RDF+VC @2.5 t ha^{-1}+NPK Consortia+Sea weed liquid @2% (FS two times), T_{11} – 50% RDF+Humic granules @25 kg ha^{-1}+NPK Consortia+Sea weed liquid @2% (FS two times). Among the different treatments tried, application of 50% RDF along with vermicompost @ 2.5 t ha^{-1} and NPK consortia and Sea weed liquid 2% FS (two times) performed better growth, yield and nutrient uptake compared to other treatments.

Keywords: Mappilai samba, vermicomposting, seaweed liquid, plant growth

HITASA/AB/2024/298

Doubling the Farmer's income through innovative approaches

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In India, the agricultural sector (dairy, crop and mushroom cultivation, fisheries, poultry, piggery, honey and vegetable production, agroforestry and horticulture etc.) is continually refining mechanisms for maximising production and food security. Yet, a huge number of farmers are abandoning agriculture due to low revenue. To help farmers, Indian government has also constituted a committee to analyse current challenges and provide recommendations to accomplish 'Doubling Farmers' Income. Furthermore, some innovative approaches (R&D, conservation technology, judicious use of resources/inputs, improved market, minimum support price reform, Timely financial support by bank credits and implementation of farmer-friendly policies) are also suggested by various agricultural experts. Moreover, approaches like smart agriculture, advanced farming techniques, diversification and commercialization, nutrition farming and climate smart agriculture are implemented at Pan India level will yield in encouraging results. Despite such efforts and approaches, some challenges still exist at ground level. Overall, we may conclude such studies may result in fruitful recommendations that would serve pillars in the policymaking and diversification to accomplish the 'doubling farmers' income concept. Socioecological and Financial access to sustainable agriculture could be only safeguarded by such approaches.

HITASA/AB/2024/299

Plant Quarantine and its Relevance in India – A Review

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Plant quarantine is a critical practice aimed at preventing the introduction and spread of pests and diseases that pose significant threats to crops and natural ecosystems. In India, a country known for its rich biodiversity and diverse agro-climatic conditions, the implementation of plant quarantine measures holds paramount importance. This review paper aims to provide a comprehensive overview of the plant quarantine system in India, focusing on its historical evolution, regulatory framework, objectives, roles, limitations, and constraints. The importance of plant quarantine lies in its ability to mitigate the potential threats posed by invasive species, thereby safeguarding crop health, food security, and the overall economy. The review outlines the historical evolution of plant quarantine measures in the global context. It highlights the unchecked pest introductions, underscoring the need for stringent quarantine protocols. A piece of detailed information about the regulatory framework in India including the key institutions and international agreements that govern plant quarantine has been discussed. The role of these regulatory mechanisms in ensuring the effective implementation of quarantine measures is analyzed, focusing on their role in facilitating safe trade and promoting sustainable agriculture. Emphasis is placed on the dynamic

nature of plant pests and diseases, requiring continuous adaptation of quarantine strategies to address emerging threats. The paper also assesses the integration of advanced technologies such as molecular diagnostics, diagnostic protocols, and other inspection procedures in modernizing quarantine practices. Furthermore, the review findings contribute to a holistic understanding of the multifaceted aspects of plant quarantine, paving the way for informed policy decisions and advancements in the field.

Keywords: Quarantine protocols, Molecular diagnostics, Policymaking, Fumigation, Incubation

HITASA/AB/2024/300

Elevated nutrients caused phytotoxicity in aeroponics farming

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The impact of varying nitrogen, phosphorus, and potassium (NPK) concentrations on the growth and physiology of *Acorus calamus* (sweet flag) was investigated using an aeroponic system. Four NPK treatments (10%, 20%, 30%, and 40% NPK) were compared against a control group receiving standard Hoagland solution. The study aimed to assess how increasing NPK concentrations affect the morphological and physiological traits of *Acorus calamus* and to identify potential phytotoxic effects. The experimental period, various morphological and physiological parameters were monitored, including plant height, leaf number, chlorophyll content, and biomass production. The results indicated a trend towards reduced biomass with increasing NPK levels. Specifically, higher NPK concentrations led to observable phytotoxicity symptoms such as chlorosis, stunted growth, and decreased overall plant vigor. The findings suggest that excessive NPK levels can negatively impact the growth and development of *Acorus calamus* under aeroponic conditions. This study

highlights the importance of carefully optimizing nutrient concentrations to avoid detrimental effects on plant health and productivity. Understanding the response of Acorus calamus to different NPK levels is critical for sustainable cultivation practices, especially in controlled environments like aeroponic systems. Further research is warranted to elucidate the underlying mechanisms of NPK-induced phytotoxicity and to develop tailored nutrient management strategies for optimal growth and secondary metabolite production in Acorus calamus cultivation.

Keywords- *Acorus calamus*, Aeroponics, NPK, Phytotoxicity, Sustainable cultivation practices.

HITASA/AB/2024/301

Flower Forcing: A New Approach to improve Far mer's Income

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Flowering regulation has immeasurable practical value. The system used to produce flowers in the off-season is called "forcing". Flowers are forced to adjust several climatic factors and mechanical and chemical methods to produce flowers that meet the required conditions at desired times and during festivals such as Diwali, Navaratri, Christmas and New Year. The timing of the peak of the plant generally does not coincide with the time of greatest demand, so the flowering sequence is altered to avoid peak production in certain months and to promote more or less continuous and uninterrupted flower production throughout the year. The way to do it is of great benefit to both. both producers and consumers. In this regard, off-season flower production can be improved by changing the timing of pruning, using plant growth regulators, and regular split applications of fertilizers. Forced cultivation allows off-season flower production when demand for flowers is typically very high. Introducing out-of-season

flowers increases farmers' incomes and improves their livelihoods. Also, from a consumer perspective, flowers are available all year round.

Keywords: Flower forcing, temperature, photoperiod, plant hormones, gibberellins, ethylene.

HITASA/AB/2024/302

Evaluation and Development of Packed Lunch for School Children

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This study was aimed at assessing the pattern of packed lunch of school children from Campus School, Hebbal, Bengaluru- 65 and development of ready to cook lunch mixes. The results revealed that mean nutrient intake from packed lunch was low in both groups when compared to 1/4th of their RDA. Height of both boys and girls in the age group of 13-15 were less. But majority of them weighed normal. Fifty seven per cent were having normal BMI, whereas 29 per cent were underweight, 12 and 3 per cent were overweight and obese. The mean mid upper arm circumference and triceps skin fold thickness were lower when compared to IAP standards. Five ready to prepare mixes were developed using egg white/milk powder at different combinations, *i.e.*76, 68 and 58 per cent of wheat flour chapthi mix and 78, 69 and 60 per cent of rice flour for rice roti mix along with other ingredients. One meal kichidi mix was prepared using millet and pulse combination along with dried vegetables. Egg white and milk powder based chapthi were best accepted at 58 per cent whereas egg white powder based rice roti was best accepted at 78 per cent and milk powder based at 60 per cent. Products stored for one month at ambient

condition did not show any change in sensory parameters when compared to fresh products. Pre and post evaluation of nutrition education enhanced the of the nutrition knowledge of the children and parents.

Keywords: School children, RDA, BMI and Packed lunch

HITASA/AB/2024/303

Understanding the role of nutrient status on yellowing intensity of Yellow Leaf Disease of Arecanut

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Yellow Leaf Disease (YLD) is one of the most serious disease of arecanut in Chikkamagaluru and Dakshina Kannada districts of Karnataka causing 50-90 per cent yield loss. The disease symptoms appear as yellowing of older leaves from the tips followed by wilting and drooping. As the disease progress entire crown leaves turns yellow, wilts and fall off leaving a bare trunk. Affected mature and immature nuts turn chlorotic and falls down whereas the kernel become soft and emits foul smell. Soil nutrient status of YLD affected gardens revealed the variation in the micronutrients in both diseased and healthy areca garden soils during August-September and April-May. Higher concentration whereas their availability was slightly improved during April-May. Higher micronutrients showed significant variation in condition of the palms while, seasonal variation showed non-significant with nutrients in soil (Fe and Mn) and in leaves (Fe and Cu). Contrast scenario with regard to diseased samples was observed with respect to nutrient concentrations, which were significantly more in diseased than healthy samples in case of calcium, iron, manganese and copper during August-September, where intensity of yellowing of the disease was maximum. The significant effect of season on the nutrient

concentration was clearly observed. The study concluded that, there is a direct correlation between nutrient status along with the yellowing of intensity of yellow leaf disease in areca palm.

HITASA/AB/2024/304

Effect of Husking (Removing Seed Tip) and Pre-soaking Trratment on Seed Germination and Seedling Growth of Mango Cv. Alphonso

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A field experiment was carried out at College nursery, N. M. College of Agriculture, Navsari Agricultural University, Navsari during 2015-2016 to study the effect of husking (removing seed tip) and pre-soaking treatments on germination and seedling growth of mango cv. Alphonso. The experiment was laid out in completely randomized design (CRD) with factorial concept. The results revealed that unhusked seed soaked in cow dung slurry, KNO_3 @ 1%, KCL @ 1% and sucrose solution @ 1% proved to be the best with respect to germination % and survival %. When the husked seed (removing seed tip) dipped in KH_2PO_4 @ 1% and sucrose solution @ 1% observed maximum germination % and survival %. While, H_1P_1 (husked mango seed dipped in water) treatment reported minimum days taken for germination (10.15 days), optimum height of plant (61.80 cm) and maximum number of leaves (21.80) at 6 MAS. The seedling diameter was maximum in treatment H_1P_5 (husked mango seed dipped in 1 % KCL) at 6 MAS.

Keywords: Mango, Husking, Seed tip cutting, Pre-soaking, Seedling growth, Alphonso

HITASA/AB/2024/305

Farming Wisdom: Evaluating Farmers' Knowledge Levels of Kisan Call Centre Advisory Services

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The Kisan Call Centre (KCC) serves as a vital connection between farmers and agricultural expertise, blending Information and Communication Technology (ICT) to offer crucial support across India. Established by the Ministry of Agriculture, Government of India, on January 21, 2004, these centres, located in 15 different places, provide toll-free access to farmers in 22 regional languages. This study, conducted in 2021-22 in Chamarajanagar District of Karnataka, aimed to assess the knowledge level of 200 KCC beneficiaries regarding the services provided. Using stratified random sampling and an ex-post facto research design, the study revealed that nearly all respondents (100.00%) were aware of the toll-free number (1551) and the fact that KCC services are free (99.50%). A significant majority also understood KCC's mission of providing solutions in regional languages (99.00%). However, there were notable gaps in knowledge, especially regarding the operating hours, with a large portion (85.00%) unaware of the service hours. Interestingly, the study found that dryland farmers exhibited a higher understanding (48.00%) likely due to their reliance on KCC for weather updates, while irrigated land farmers showed slightly lower levels of knowledge (43.00%). Overall, the research highlights the KCC's pivotal role in disseminating agricultural information, empowering farmers, and bridging the technology-agriculture gap for improved productivity and sustainability nationwide

Keywords: Kisan Call Centre (KCC), Farmers, Advisory Service, Agricultural Expertise, Knowledge level

HITASA/AB/2024/306

Leveraging soil carbon modeling in rice-centric cropping systems to mitigate climate change.

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Over the past thirty years, numerous soil carbon models have been developed, yet a significant gap remains in creating a comprehensive model that integrates quality and prolonged carbon and nitrogen dynamics in wetland rice systems. Common cropping systems in the Indo-Gangetic plains include rice-fallow-fallow, rice-rice-fallow, and rice-pulses-vegetable, covering 9.64 million hectares. Given that rice farming contributes about 17.5% of greenhouse gas emissions in India, carbon sequestration becomes crucial, especially with atmospheric CO2 concentrations nearing 420 ppm. Effective soil carbon modeling, employing techniques like machine learning, is gaining prominence for consolidating diverse data sources, estimating sequestration potential, generating carbon distribution maps, and optimizing agricultural practices. A model merging PAPRAN (Production of Annual Pasture limited by Rainfall and Nitrogen) with a Long-term model delineates organic matter pools, elucidates carbon dynamics, offers sensitivity to environmental and soil conditions, validates across various agricultural contexts, and provides insights into soil carbon-nitrogen relationships and crop yields. This review aims to critically explore the opportunities and imperatives of soil carbon modeling to promote sustainable, climate-resilient agriculture while preserving the environment, with a focus on rice-based cropping systems.

HITASA/AB/2024/307

Exploring Biohydrogen Production from Algal Biomass: Overcoming Challenges, Innovations, and Pathways Forward

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Replacing conventional energy sources that emit detrimental greenhouse gases (GHGs) with eco-friendly and renewable alternatives is imperative. Biohydrogen has emerged as a promising solution due to its high energy content, approximately 2.75 times greater than fossil fuels, and its clean combustion process, which produces only water as a by-product. Algal biomass stands out as a potential feedstock for biohydrogen production. This article aims to explore various methods of algal biohydrogen production, examining the mechanisms and challenges involved. Factors influencing hydrogen production and challenges related to economics, technology, and storage are considered. Additionally, the article outlines a future roadmap for biohydrogen production from algae, aligning with decarbonization efforts, and includes a SWOT analysis highlighting strengths, weaknesses, opportunities, and threats. A key strength of algal biohydrogen lies in algae's ability to capture carbon and valorize waste, contributing to a zero-waste circular bioeconomy. However, technological limitations resulting in low biohydrogen yields and high initial investment costs represent significant weaknesses. Nonetheless, opportunities exist in implementing genetic, metabolic, or environmental manipulations to enhance algal biohydrogen production, ensuring long-term sustainability. The potential threats stemming from technological immaturity, coupled with the challenge of credibility despite suggested alterations, necessitate careful oversight. Addressing these threats requires optimizing operational parameters, engaging in metabolic engineering, and implementing other relevant strategies to ensure effective management.

Keywords: Bio-hydrogen, Algal Biomass, Renewable energy, Cleaner fuel, SWOT analysis

HITASA/AB/2024/308

Blossoming Beyond Tradition: Molecular Breeding Revolutionizing Ornamental Crop Improvement

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Ornamental crops encompass a diverse array of plants, ranging from seasonal herbaceous flowers to perennial woody trees for different purpose from landscaping to commercial industry. Given this diversity, a variety of breeding techniques have been employed to create new cultivars within ornamental crops to meet the ever-changing market demands. Ornamental horticulture sector operates within a dynamic and swiftly evolving market, where the continual creation of new cultivars possessing superior traits is imperative for maintaining competitiveness. Traditional breeding methods have historically been employed for cultivar development, but these approaches can be labor-intensive. Biotechnological methods, such as molecular breeding, have played a pivotal role in altering and enhancing a range of advantageous traits like flower color, fragrance, longevity, plant architecture etc., in ornamental crops that are not feasible or are laborious to achieve through conventional cross-breeding techniques. Molecular breeding encompasses various advanced breeding techniques, including marker-assisted selection, which targets specific alleles governing traits influenced by a small number of genetic loci. A more recent innovation is marker-assisted recurrent selection, where multiple genomic regions influencing complex traits are identified and selected to create superior genotypes within individual or related populations. Additionally, genome-wide selection is on the horizon, enabling selection based on markers without significance testing or pre-identification of associated markers. Molecular breeding holds immense promise for revolutionizing crop improvement in the 21st century. This approach aims to increase genetic gains within each crop cycle, either by amplifying the gains per cycle or by minimizing the number of selection cycles required. Advancements in molecular plant breeding, genetics, genomic selection, and genome editing have significantly enhanced our

understanding of molecular markers. These developments have offered profound insights into the diversity present within crops and have greatly augmented breeding strategies. However, the successful integration of molecular breeding hinges on the availability of essential human and operational resources. To ensure sustainable adoption, modern breeding strategies necessitate a grassroots approach led by breeders.

Key words: Molecular breeding, Genomics, Markers, Crop improvement.

HITASA/AB/2024/309

Influence of Various Plant Growth Regulators on Growth and Yield of Garlic (*Allium sativum* L.) under *Terai* region of West Bengal.

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The present study was conducted at the instructional cum research farm of the Department of Plantation Crops and Processing of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, India during *Rabi* season for consecutive two years (October – March 2020 and 2021) to investigate the "Effect of Different Plant Growth Regulators on growth and yield attributes of Garlic (*Allium sativum* L.)" with various growth regulators (GA_3@ 50 ppm , GA_3@ 100 ppm, GA_3@ 150 ppm, NAA@ 50 ppm, NAA@ 100 ppm, NAA@ 200ppm, Kinetin@ 10 ppm, Kinetin@ 20 ppm, Kinetin@ 40 ppm and Control (Distilled water). The experiment laid out in Randomized Block Design comprising of ten treatments and replicated

thrice. The results pertaining to morphological and yield attributes shows significant variations. The results pertaining to Maximum plant height (80.50cm), leaf length (50.05cm), number of leaves (9.30), neck thickness (13.46mm) and number of roots per plant (74.26), maximum polar and equatorial diameter (3.37 and 4.25cm) with heavier cloves (13.70 g), highest number of cloves per bulb (27.50), fresh and dry weight of cloves (13.70 g and 8.31g), higher total biomass yield (4.0kg) and plot yield of bulb (2.85kg) with a projected yield of (9.96 tons) of bulb per ha was registered under GA_3 @ 50 ppm. Based on the current experimental results, it may be concluded that foliar application of GA_3 @ 50 ppm proved the best over other plant growth regulators.

Keywords: Garlic, GA_3, NAA, Kinetin, growth and yield

HITASA/AB/2024/310

Glycemic Index And Antioxidant Activity Of Barnyard Millet Based Designer Vermicelli On Human Health

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A nutrient-rich staple food throughout Asia and Africa, millet is a hardy and drought-resistant crop. Antioxidant-rich bioactive compounds can be found in abundance in millet. Consuming antioxidants through diet is necessary to enhance human health. In this study, four beneficial ingredients (fenugreek seeds, garden cress seeds, *Brahmi* leaves and *Ekanayakam* root bark) were added to barnyard millet which contains several bioactive principles were utilised to prepare designer vermicelli. The present study is to formulate the designer vermicelli with a combination of barnyard millet as 40 per cent, functional ingredients of fenugreek seed flour, garden cress seed flour, *ekanayakam* root bark as 2 per cent and brahmi leave powder as 0.5 per cent. The aim of this study is

to determine the antioxidant activity and glyceamic index for the developed barnyard millet vermicelli incorporated with the functional ingredient. The antioxidant activity has measured using DPPH scavenging activity shows that the barnyard millet vermicelli has high antioxidant activity of 23.28 to 27.18 per cent initially which decreased to 22.94 to 26.74 per cent during fourth month of storage. The glycemic index of the designer vermicelli varied from 48.25 to 57.91 which was lower than in control (74.89).

Keywords: Millet, Barnyard millet, Functional ingredient, Designer vermicelli, Antioxidant activity and glycemic index

HITASA/AB/2024/311

Improvement in growth and physiological responses of GIFT fish in the Freshwater IMTA system

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The research spanned a 60-day experimental duration with the primary aim of assessing the impact of extractive species on enhancing GIFT fish production in the Freshwater Integrated Multi-Trophic Aquaculture (FIMTA) system. In this study, GIFT fish were co-cultured with L. marginalis and L. minor as organic and inorganic extractive species, respectively, in 1000-liter Fibreglass Reinforced tanks. Three treatment combinations were implemented: GIFT fish with L. minor (T1), GIFT fish with L. marginalis (T2), and GIFT with both L. minor and L. marginalis (T3). The control treatment (C) involved GIFT fish alone. Stocking densities were 40m-2 for GIFT fish, 250 g/tank for L. marginalis, and 25% of the tank's surface area for L. minor. Various treatments were examined to understand their effects on the growth, water quality, and physiological responses of GIFT fish. GIFT fish were provided with floating pelleted food at 4% of body weight, containing 30% crude protein. Results indicated that the specific growth rate (SGR) and percent weight gain (PWG) were highest in T3.

Water quality parameters such as chlorophyll a, dissolved solids, and suspended solids showed a reduction in T3. Enzyme activity analysis revealed lower levels of protease, lipase, and amylase in the control group, while T3 exhibited the highest levels. These findings suggest that integrating GIFT with L. minor and L. marginalis in the FIMTA system has the potential to improve water quality and physiological responses, leading to increased survival rates and higher yields.

Keywords: FIMTA, Extractive organisms, IMTA, GIFT, *L. minor*, *L. marginalis*

HITASA/AB/2024/312

Collection and Evaluation of Elite Custard Apple (Annona squamosa L.) Genotypes from Dhadgoan Tehsil of Nandurbar District

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Present investigation entitled "Collection and evaluation of elite custard apple (*Annona squamosa* L.) genotypes from Dhadgoan tehsil of Nandurbar district" was carried out during April-November 2022, on the basis of physical and qualitative characters. Dhadgoan tehsil in Satpuda hills is known for rich biodiversity of custard apple, which was undertaken to explore and evaluate the elite custard apple genotypes. Selected twenty five custard apple genotypes are evaluated for distinct fruit characters. These genotypes revealed wide variability in physical characters *viz*., fruit weight (157.9 g to 412 g), pulp weight (42.7 to 226 g.), pulp percentage (24.73 to 69.33%), seed weight (4.7 and 23 g), seed percentage (2.5 to 8.66%), pulp: seed ratio (4.52 to 17.5), seed: pulp ratio (0.05 to 0.22), while

in qualitative characters *viz*., average TSS (22.2 to 32.4 ^{0}Brix), acidity percentage (0.16 to 0.35), TSS: Acidity ratio (72.9 to 180).

Keywords: Custard apple, Genotype,Variability, Physical and Qualitative characters

HITASA/AB/2024/313

Trilliumgovanianum Wall ex D.Don an endangered medicinal herb

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Trillium govanianum Wall ex D. Don a herb endemic to Western Himalayan parts (2400-3500 mts) and is a high value medicinal plant of family Trilliaceae. It is distributed throughout Afghanistan, China, Nepal, Pakistan, and India. In India this herb is found in Jammu & Kashmir, Himachal Pradesh, and Uttarakhand and inhabits in sub-alpine forests, cold shaded moist,thick humus, slowly decomposing litter. The rhizome of the plant is a key component because of presence of high value saponins. The plant has properties needed for treating cancer, skin infections, open wounds, diarrhoea, and sexual disorder, (Khan *et al* 2013 and Rani *et al* 2013, Sharma *et al* 2018, Rolika gupta and Hemant Sood 2018, Rolika gupta, Deepak Sharma, Hemant Sood 2021). *Trillium govanianum* Wall ex D. Don is generally considered as high valued medicinal herb as the market value of its rhizome is very high i.e., 3000 rs per kilogram (Rathore *et al* 2020.).The high value coupled with high demand has threatened this species in Indian Himalayas. Though, attempts were made to conserve Trillium through ex situ and vegetative propagation but resulted in poor or no-success (Blanchette, 1998; Case and Case, 1997; Nivot *et al*., 2008). Recently, in an attempt for exsitu conservation of Trillium sp. researchers successfully developed a propagation protocol using vegetative propagation and tissue culture techniques (Chauhan *et al*. 2019 and Rolika gupta, Deepak Sharma, Hemant Sood 2021), yet the status remained endangered. This has open new avenues towards mass cultivation and conservation of Trillium and urges a greater number of studies to scale up from *invitro* to *in vivo*.With the help of Biotechnological Moreover, in order

to preserve this important flora, awareness about the medicinal and other uses of the plants among the local population is needed to be communicated in order to restrict overuse and exploitation of species from the natural habitats. The marketing and collection of medicinal plant species from forest is very important source of living and employment for large number of poor people residing in forest areas.

HITASA/AB/2024/314

Yield and yield attributes of maize as influenced by varied levels of nitrogen application

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Maize is a 3rd important cereal crop after rice and wheat grown around the world. It is also called as “super plant” because of its C_4 photosynthetic pathway which makes it possible to grow under varied temperature conditions Maize is an exhaustive cereal, balanced application of 150:65:65 kg of N, P_2O_5 and K_2O ha^{-1} is recommended for adequate water supply condition in northern Karnataka. Maize reacts extremely well to bulkier nutrient supply rates. Of the major nutrients, oversite of nitrogen in maize husbandry is one of the main concerns and management of nitrogen plays a vital physiological role, for instance photosynthesis. Nitrogen also aids in amino acid production and enhances the chlorophyll content. Plants that receive adequate amount of nitrogen grows rapidly and have leaves that are deep green. More than half of the population currently relies on food production made possible by application of nitrogenous fertilizers.

However, over and under use of nitrogen may cause immensible damage on the environment. Verging on the above facts, the study was undertaken with an objective to study the Yield and yield attributes of maize as influenced by varied levels of nitrogen application at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, during *rabi* 2020-21. The Randomized Complete Block Design was employed for statistical analysis, encompassing nine treatments at varied levels of nitrogen ranging from 0 to 200 % recommended dose of nitrogen (RDN) at an interval of 25 % *i.e.,* T_1-0 % N, T_2- 25 % N, T_3-50 % N, T_4-75 % N, T_5- 100 % N, T_6-125 % N, T_7-150 % N, T_8-175 % N and T_9-200 % N.

The experimental results revealed that yield parameters were significantly higher with the application of 200 % RDN than rest of the treatments. Significantly higher yield parameters *viz.,* number of row per cob, number of grains per row, test weight and grain yield (9485 kg ha^{-1}), straw yield (11485 kg ha^{-1}) and harvest index (45.0 %) were recorded with the application of 200 % RDN as compared to other treatments. However, it remained on par with 175 % applied treatments.

HITASA/AB/2024/315

High-Tech Horticulture: A Tech-Fueled Symphony of Sustainability and Abundance

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The agricultural industry is undergoing a radical transformation driven by cutting-edge technologies that are revolutionizing high-tech horticulture and precision farming.

It aims at enhancing efficiency, optimizing resource use, and promoting environmental sustainability in horticultural practices. The hi-tech horticulture extend beyond the cultivation of fruits, vegetables, and flowers; it encompasses aspects such as conservation, plant protection, and post-harvest management, including valuable processes of value addition. Key technologies include, Internet of Things (IoT) Real-time data is

gathered by sensors to help with decision-making. Precision farming Remote sensing and GIS technologies, leverages satellite and aerial images to monitor crop health and quantify production. Drones and Robotics Drone-based crop and soil health monitoring system using Hyperspectral Remote Sensing (HRS) sensors. Artificial Intelligence (AI) Uses data analysis to forecast results and enhance procedures. Advantages are Environmental sustainability entails conserving water and chemicals, improving soil health, and minimizing environmental impact. Increased Productivity and Quality: Data-driven decision making, precision irrigation, automation, and controlled environments all improve yield and quality while reducing waste. Economic benefits include increased profitability, lower labor costs, and access to new markets through specialized and out-of-season crops. NITI Aayog emphasizes the importance of adopting smarter agricultural practices and technologies for sustainable and efficient natural resource management, boosting output, promoting sustainability, and gaining economic benefits. Hi-Tech Agriculture Activities are Hydroponics/ Aeroponics Growing plants without soil using water-soluble mineral nutrients or air or mist environment. Protected cultivation. Rows plants in an air or mist environment without soil or an aggregate medium. LED Lighting Energy-efficient LED lights provide the best light spectrum for individual crops, increasing growth and quality. Vertical farming-Growing crops in layers that are stacked vertically. Challenges and Opportunities: Include investment costs, data privacy and security, and bridging the digital divide between tech-savvy and less tech-equipped farmers. Modernizing traditional agriculture can enhance food supply, improve farmers' economic conditions, and ensure the sustainability of their produce amidst challenges faced by the growing population.

HITASA/AB/2024/316

Trichoderma: A Boon to The Farmer

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Trichoderma spp. it is biofertilizer benficial for different technologies in all areas of agriculture have improved crop yield, but some practices affect the environment. Recent challenge faced by advanced agriculture farming is to achieve higher production.Among various types of micro-organism being used as biocontrol agents; *Trichoderma spp*. are widely used as biocontrol in agriculture and industry as biofertilizer the production of antifungal metabolites (antibiosis), competition for space and nutrients, induction of defence responses against pathogen in plant and sources of enzymes, respectively. Along with revelation of diverse antifungal mechanisms of *Trichoderma*, the ability to promote plant growth, yield, to increase plant height, leaf area and dry weight.Many strains of *Trichoderma* produce elicitors and induce resistance in plants through colonization of roots. These fungi not only protect plants by killing other fungi and certain nematodes but induce resistance against plant pathogens, improve plant growth, impart abiotic stress tolerance, solubilize plant nutrients, vigor and bioremediate heavy metals and environmental pollutants. *Trichoderma species* has had a major impact on human welfare, recent genome sequencing projects have targeted seven species: *Trichoderma viride*, *Trichoderma virens*, *Trichoderma atroviride*, *Trichoderma harzianum*, *Trichoderma asperellum*, *Trichoderma longibrachiatum* and *Trichoderma citrinoviride. Trichoderma spp.* have also used as a growth promoting agent. Thus, it has the potential as a preferred input in Integrated Disease Management (IDM) systems; integration of fertilizers or herbicides with biocontrol agents to control plant infection caused by plant pathogen. Soil nutrient content is an important factor that influences the accretion and bioactivity of plant growth promoting fungi. *Trichoderma spp.* can produce organic acids such as citric, gluconic or fumaric acids that lower soil pH. *Trichoderma* species have wide ranging abilities to solubilize plant nutrients such as phosphorus and micronutrients including copper, iron, manganese and zinc, thereby making them available to plants for enhanced growth capability. Also,

positive influence of *Trichoderma* to a faster germination and increase in percentage of germination were perceived. Nowadays, *Trichoderma* species are considered as opportunistic plant symbionts because they colonize root surface and even penetrate into the epidermis (outermost layer) of root tissue and a few cell layers below this level establishing pseudomycorrhizal relationship with plant host. The plants also benefit from this relationship through increased soot and root growth and increased macro and micronutrient uptake. Therefore, *Trichoderma* may be benefit as pathogen control agent (mycofungicide) as well as, growth promotant (biofertilizer) and their application may lower the production costs and environmental impact. Strains of *Trichoderma* are grown and multiplied in order with well-known methods for semi-solid cultivation on wheat or corn bran, rice or similar substrate or in liquid fermentation. The sucrose that leaks from roots stimulates growth of *Trichoderma* mycelium and leads to interaction with plant. In order to stimulate plant to provide more sucrose, *Trichoderma* has evolved numerous mechanisms for better routing. With its enzyme arsenal, *Trichoderma* enhances solubility of soil nutrients which will be otherwise unavailable to plant.

Keywords - *Trichoderma,* Biofertilizer, Nutrients, Strain, Germination

HITASA/AB/2024/317

Extraction, modification and characterization of starch from two Cultivars of barley

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The present study entitled "Extraction, modification and characterization of starch from two Cultivars of barley" was carried out in the laboratories of Department of Food Science, DKSG Akal College of Agriculture, Eternal University, Baru Sahib, HP. The objective of this study was to modify the starch isolated from two cultivars (PL-751 and PL-830) using physical (annealing) and enzymatic (amylase) method and to investigate the difference in functional properties of native and modified

starch. The functional properties such as Syneresis, light transmittance, swelling and solubility index changed significantly in modified starches as compared to native starch. Syneresis of annealed starch increased from 11.5%-15% and for amylase starch rises from 3.98%-9.14%, light transmittance of annealed starch increased from 21.2%-32.69%, while for amylase starch increased from 32.64%-47.61%. The swelling and solubility index also increased significant ($p \leq 0.05$) with increase in temperature in native as well as modified starch. But the drop in swelling and solubility index of an annealed and enzymatic modified starch was observed as compared to native starch. Thus, it can be concluded that modification enhances the functional properties of the starch and can be utilized in food and non-food industry for wide range of applications. In order to improve the swelling and solubility index of modified starch, further study will be done.

Keywords: Barley, annealed starch, amylase starch, β-glucan, health benefits

HITASA/AB/2024/318

Effect of portion of cuttings and root microbial inoculants, chitosan and IBA on rooting of Aglaonema cuttings (*Aglaonema commutatum* L.)

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A field investigation entitled "Effect of portion of cuttings and root microbial inoculants, chitosan and IBA on rooting of Aglaonema cuttings (*Aglaonema commutatum* L.)" was carried at Floriculture Research Station, (Agricultural Research Institute) Rajendranagar, Hyderabad during October to April 2020-2021. The experiment was laid out in Factorial Completely Randomized Design with three replications. The experiment was conducted with two factors, portion of cuttings (Top and middle) as one factor and different levels of root microbial inoculants, chitosan and IBA as another factor. The study revealed that, among different treatment combinations i.e., P1 - (Top cutting) with S6 - (*P. fluorescence* -5 ml / kg) + IBA - 1000 ppm) recorded least number of days taken to rooting (24.08 days), average length of root per cutting (14.28 cm), rooting percentage (86.67 %), fresh weight of roots per cutting (15.52 g) anddry weight of roots per cutting (4.86 g). Hence, it can be concluded that, Top cuttings + *P. fluroscence* 5ml/ kg + IBA 1000 ppm found to be best treatments for improve rooting of Aglaonema cuttings.

Keywords: Aglaonema, chitosan, IBA-Indole Butyric Acid and root microbial inoculants

HITASA/AB/2024/319

Agri - Startups: Present Situation and future prospects in Indian states of Telangana and Punjab

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Entrepreneurship is key to the introduction of new technology, innovations and overall economic changes in society. The present study was designed to study the status and prospects of agri start-ups in Punjab and Telangana state. A sample size of 20 start-ups, 10 start-ups from each state, using simple random sampling was selected for this study. Data for the study was collected with help of the interview schedule. The findings of

the study revealed a strong desire to do something independent was ranked 1st. Agripreneurs of Punjab and Telangana had a medium awareness about start-ups schemes. All the agripreneurs of Punjab and Telangana had knowledge about RKVY RAFTAAR schemes and they were willing to expand their business in future. Agripreneurs want to construct storage facilities in coming future. All the agripreneurs wanted to invest their profit margins further in business.

Keywords: Status, Prospects, Agripreneurs, Start-ups, Awareness, profit margin.

HITASA/AB/2024/320

Influence of Extension Services in Transforming, Sustaining Agriculture and Poverty Alleviation Through Artificial Intelligence in Nigeria

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In Nigeria, like in many other parts of the world, the integration of artificial intelligence (AI) technology is having a significant positive impact on agricultural development. Food security is a big problem in Nigeria because of the problems facing the agriculture sector and the nation's expanding population. Food needs are rising faster than farmers can meet them with conventional methods due to population growth. The agricultural industry has consequently begun to apply artificial intelligence to meet the demand for food and sustainability. Agriculture 4.0 encompasses a number of upcoming technologies, including cellular

agriculture, blockchain, machine learning, robotics, nanotechnology, synthetic protein, and gene editing technology. AI improves farmers' productivity and sustainability and these technologies have the potential to significantly transform agriculture and food systems in the future.Issues like talent shortages and data accessibility in technology infrastructure are explored alongside opportunities like precision farming, climate-resilient approaches, and crop monitoring. There is a growing need for agricultural production systems to transition to more sustainable practices in order to prevent environmental damage and guarantee global food security. This article examines the adoption of sustainable agricultural practices through extension services and the transformative potential of artificial intelligence in the context of sustainable agricultural development across Nigerian regions. Artificial intelligence is transforming agriculture education and the banking sector through financial inclusion, as well as by enhancing the collection of data connected to poverty through poverty maps. AI increases the sustainability and productivity of farming.

Keywords: Agriculture, Artificial Intelligence**,** Extension Services**,** Sustainability, Transformation and productivity

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Magnetic Mastery: Revolutionizing Ornamental Horticulture with Magnetic Energy

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Magnetism is a fundamental force of nature characterized by the attraction or repulsion between objects with magnetic properties. When applied to water, magnetism refers to the process of subjecting water to a magnetic field, altering its molecular structure and properties. Magnetized water is believed to exhibit enhanced fluidity, solubility, and surface tension, leading to potential benefits in agricultural applications. Magnetized water has shown promised applications in various aspects of

ornamental horticulture. One significant benefit is its positive impact on seed germination. It was proved that seeds treated with magnetized water demonstrate higher germination rates and improved seedling vigour. This phenomenon contributes to more robust crop establishment, leading to increased plant populations and ultimately higher yields.

Furthermore, magnetized water can mitigate scale deposition in irrigation systems, preventing the accumulation of mineral deposits that can impede water flow and reduce system efficiency. By reducing scale build-up, magnetized water helps maintain optimal irrigation infrastructure conditions, ensuring consistent water delivery to ornamental crops. Moreover, the application of magnetized water in irrigation practices has been associated with decreased water requirements and increased water use efficiency. By enhancing water absorption and nutrient uptake by plants, magnetized water facilitates better utilization of irrigation resources, ultimately promoting sustainable water management practices.

Additionally, the vase life of cut flowers can be extended through the use of magnetized water in vase solutions. By enhancing water uptake and nutrient absorption by flower stems, magnetized water helps maintain hydration and freshness in cut flowers, resulting in longer-lasting and more aesthetically pleasing floral arrangements.

HITASA/AB/2024/322

Innovative strategies: Integrated Pest Management as a key player in Fall Armyworm Suppression

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The fall armyworm (FAW), *Spodoptera frugiperda* (J.E. Smith) (Lepidoptera: Noctuidae), native to Central and South America, has

recently invaded Africa and Asia, causing serious damage to various crops. To fight this pest, tremendous quantities of synthetic insecticides are being used. Therefore, a holistic approach is necessary for the control of FAW in maize fields that integrates sustainable alternative management strategies which include intercropping systems and use of beneficial microbes. The influence of intercropping (Groundnut and Rice bean) with EPN spray (*Heterorhabditis indica*) on FAW incidence in maize crop was evaluated by carrying out a field experiment during *kharif* 2022 at Andro Research Farm, Central Agricultural University, Imphal. Different maize-based intercrops were planted in 1:1 ratio, by following Randomized Block Design with ten treatments replicated thrice. Among all the treatments, T_5 (maize + groundnut + EPN spray at 20 & 40 DAS) was proved to be more effective, having gradual cumulative reduction of leaf and cob damage after two sprays followed by T_3 (maize + rice bean + EPN spray at 20 & 40 DAS). Per cent plant infestation was observed less in T_5 (maize + groundnut + EPN spray at 20 & 40 DAS) having 36.67% when compared to untreated plot (T_{10}) having 80.00%. Per cent population reduction over control ranged from 18.75 to 68.75%, the highest being recorded in T_5 (maize + groundnut + EPN spray at 20 & 40 DAS) and the lowest in T_8, maize + EPN spray at 20 DAS. The treatment with Maize + groundnut + EPN spray at 20 & 40 DAS (T_5) was significantly superior in suppressing the infestation of FAW and recorded the highest cost-benefit ratio of 1:3.53. Intercropping with EPN spray was found to be an effective tool for the sustainable management of FAW in maize and can be used as a potential pest management strategy in IPM.

Keywords: Maize; Spodoptera frugiperda; Integrated pest management; Intercrops; EPN

HITASA/AB/2024/323

Utilizing Remote Sensing and GIS Techniques for Land Use Planning in the Madapur Micro-Watershed, Ranebennur Taluk, Haveri District, Karnataka

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The geospatial analysis of land resources for integrated land use planning in the Madapur Micro-Watershed presents a comprehensive approach to understanding and managing the landscape dynamics and resource distribution within the area. Through the utilization of geospatial techniques and tools, this study aims to assess various aspects of land resources including land cover types, land use patterns, terrain characteristics, and soil properties. Through the integration of remote sensing data and geographic information systems (GIS), this research facilitates informed decision-making for integrated land use planning initiatives, considering factors such as environmental sustainability, socio-economic considerations and land resource availability. Results reveals that soil erosion assessment of a specific area highlights several key findings. Moderately soil erosion category affects the majority of the area, covering 65.67% (316 ha), followed by 20.56% (99 ha) categorized as experiencing slight erosion category. Gravel content is prevalent, with 57.39% (276 ha) falling into the gravelly category (15-35%), while the remainder is non-gravelly (<15%). Salinity levels are low across the entire area, with non saline (<0.5 dSm^{-1}) area. Regarding soil depth, the majority of the area (57.81%, 278 ha) boasts very deep soil (>150 cm), while a significant portion (26.16%, 126 ha) has moderately shallow depth (50-75 cm). Soil reaction tends toward moderately alkaline conditions, with 97.27% of the area exhibiting this characteristic. Nutrient availability presents a mixed picture, with nitrogen deficiency prevalent across 97.27% of the area (<280 kg ha^{-1}), while phosphorus is available at medium levels (23-56 kg ha^{-1}). Potassium content is medium in 65.22% of the area (140-330 kg ha^{-1}). Adequate levels of micronutrients like iron, copper and

manganese are present, but zinc content is deficient. Despite soil limitations, a substantial portion (57.12%, 275 ha) is classified as good cultivable land, suggesting potential for agricultural productivity with appropriate management practices.

Keywords: Geospatial Analysis, Soil Depth, Land Resources, Nutrient availability

HITASA/AB/2024/324

Effects of combined processing techniques on the chemical composition and lipid profile of broiler chicken (*Gallus Gallus Domesticus*) breast and thigh meat

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Chicken is a popular poultry meat due to its nutritional value, eating habits, and affordability. The study aimed at evaluating the effect of combined cooking techniques on the chemical composition and lipid profile of chicken breast (CHB) and thigh (CHT) meat. The broiler chickens were slaughtered and eviscerated to obtain chicken breast and thigh. Four different methods (boiling and frying; microwave roasting; grilling; and conventional oven cooking) were used in processing CHB and CHT. The proximate, mineral, vitamin and lipid profile of the samples were analyzed using standard methods and result statistically analyses by one way ANOVA considering level of significance of less than 5% using the SPSS statistic program version 20.0 (SPSS Inc., Chicago, IL, USA). The result obtained for proximate composition in % of the samples shows a decreased in moisture significantly ($p<0.05$) from 58.39 in cooked CHB to 68.58 (uncooked) and 71.22 in uncooked CHT to 60.06 in cooked CHT. The protein content of the raw samples in % ranged from 23.26 to 30.09 and

22.47 to 28.06 for CHB and CHT respectively. The ash content, fat and carbohydrate content increased in all the cooking methods used. The results for mineral composition in mg/100g of the samples revealed that the values for calcium (from 7.78 to 11.14), sodium (from 70.20 to 99.45), and phosphorus (from 256 to 286) in both CHB and CHT decreased in all the cooking methods used, while magnesium (from 38.19 to 46.78) increased. All the cooking methods decreased the vitamin content measured in mg/100g of the CHB and CHT with vitamin B_1 (from 0.068 to 0.085 and 0.072 to 0.097 for CHB and CHT respectively, while also vitamin B_3 and vitamin B_6 decreased. The results obtained for the lipid profile composition of the CHB and CHT measured in mg/100g show an increase in HDL-cholesterol, LDL-cholesterol, triglycerides and total cholesterol. The combined cooking methods had an impact on the composition of the chicken breast and thigh meat as they resulted in a decrease in the majority of the mineral elements with exception of sodium and vitamin content while revealing an increase in proximate composition and cholesterol contents.

Keyword: Combined cooking, Boiling-Microwaving, Broiler chicken, Lipid profile

HITASA/AB/2024/325

Evaluation of functional, nutritional and phytochemical properties of unexplored *Sesbania grandiflora* leaves Powder

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Sesbania grandiflora is commonly known as Hadaga an indigenous medicinal plant cultivated for its edible flowers in all over India. It's edible

flowers and leaves has unique medicinal properties and used as a herbal drug for its antibiotic, anthelmintic and anti-tumor properties. The plant contains rich in antioxidants, tanins, flavonoides, coumarins, steroids and triterpens and used in colic disorder, jaundice, poisoning condition, small-pox, eruptive fever, epilepsy. As per previous studies revealed that leaves are good source of many vital nutrients. Besides having medicinal value *Sesbania grandiflora* leaves were not explored in food products due to lack of information on nutritive and phytochemical properties.

In present investigation, the process of preparation of powder from *Sesbania grandiflora* leaves was standardized to enhance its utilization for value addition. For preparation of powder leaves subjected to different pre-treatment [without blanching (control), blanching (LP_1) and blanching + sulphitation (LP_2)]. The effect of pre-treatment on drying characteristics, physical, functional and reconstitutional properties of leaves powder were investigated. Moreover the powder prepared by selected pre-treatment were investigated for nutritional and phytochemical properties .

Results obtained revealed that there is remarkable decrease in the drying time of blanched and blanched + sulphited *Sesbania grandiflora* leaves. The colour attributes show increase in lightness ie L* value and reduction in the a*and b* value in treated leaves powder sample than control. Regarding particle size among treatment the LP_2 powder sample received the higher percentage on 80, 60 and 30 mesh having pore size 180, 250 and 300 µm pore size. The highest bulk density and swelling power recorded in sample LP_2 and water absorption capacity and oil absorption capacity was recorded maximum in blanched sample LP_1 over that of the untreated (control) sample. It was observed in blanched and blanched + sulphited powder that trend of increase in solubility and decrease in per cent dispersibility while reduction in time of wettability was noticed than control. Hence can be concluded from present investigation that the treatment blanching + sulphitation was most suitable for *Sesbania grandiflora* leaves powder preparation. The nutritional analysis of selected sample (LP_2) depicted that it contain protein (16.15%), fat (2.45%), carbohydrate (59%), ash (4.12 %), fiber (13.15%) and also rich source of calcium (1470.45mg), potassium (665.52mg), iron (4.10mg), phosphorus (148.60 mg), magnesium (70.49mg), zinc (0.65 mg) and selenium (160.90 µg) per 100g. The leaves

powder (LP_2) contain vitamin A 139.82µg RE and also considerable amount of vitamin B_9 (0.110µg per 100mg). The phytochemical assessment of leaves powder (LP_2) shows that it comprises total phenolic content 240mg/100g, total flavonoids content 40.27mg/100g, total carotenoid content 6124.33µg /100g, kaempeferol 2.40 mg/100g and antioxidant activity 43.67%. As *Sesbania grandiflora* leaves powder has medicinal value and many nutritional, phytochemical properties, the prepared powder can be utilized in different value added food products for health benefits.

HITASA/AB/2024/326

Studies on the Effect of Growth Regulators and Chemicals on Mango (*Mangifera indica* L.) Varieties Under Ultra-High Density Planting System in Telangana State

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The major benefits of UHDP from traditional methods of planting is to make the best use of vertical and horizontal space per unit time and to get maximum possible return per unit of inputs which means planting of a greater number of plants than optimum through manipulation of tree size. In Mango, the flower bud initiation starts from October to January. To get the early and synchronized flowering, growth regulators are used. Commercially, Cultar or Paclobutrazol, KNO_3, K_2SO_4, CPPU are used to regulate the flowering in mango. Therefore the present study framed on-

effect of growth regulators and chemicals on mango varieties under ultra-high density planting system in Telangana state was conducted at Centre of Excellence, Mulugu, Siddipet district during 2021-2022.

The experiment was designed with factorial RBD concept. It has two factors *viz.,* (A) Mango varieties under Ultra-high density (3 × 2 m), (B) Growth regulators and chemicals. Four mango varieties (*Viz*., Baneshan, Himayat, Kesar and Totapuri) were treated with Growth regulators and chemicals (*Viz*., i) KNO_3@ 10g/l, ii) KNO_3@ 10g/l + PBZ @ 3ml/m; iii) KNO_3 @ 10g/l + CPPU 1ml/l; iv) KNO_3@ 10g/l + K_2SO_4@ 10g/l; v) KNO_3@ 10g/l + CPPU 1ml/l + K_2SO_4@ 10g/l; vi) KNO_3@ 10g/l + PBZ @ 3ml/m + CPPU 1ml/l; vii) KNO_3@ 10g/l + PBZ @ 3ml/m + K_2SO_4@ 10g/l; viii) KNO_3@ 10g/l + PBZ @ 3ml/m + CPPU @ 1ml/l + K_2SO_4@ 10g/l). The treatments imposed on mango varieties significantly minimized the number of days taken for panicle initiation, increased the number of panicles/ tree, fruit set (%), fruit retention (%), no. of fruits subsequently fruit yield per tree (Kg/tree).

Keywords: UHDP (Ultra High Density Planting System), CPPU, Paclobutrazol and Yield

HITASA/AB/2024/327

Digital Tools for Rural Agriculture Extension

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Digital Extension Tools (DETs) examples Calls, WhatsApp groups, a nd specialised smart-phone applications for agricultural information brokering. We looked into the methods that farmers and other extension players in low and middle income nations have used and have not to

implement DETs. In Bihar, India, we spoke with 101 DET users and 40 DET developers from 21 different nations. We discovered that fifteen common pitfalls limit the use of DET: not knowing about DET; not being sensitive to socio-economic constraints; irrelevant to farm and distrust etc. These drawbacks help to partially explain why user driven DETs like phone calls and chat apps are frequently used more frequently than externally driven DETs like specialist smartphone apps. Women, farmers with lower levels of education and farmers with lower incomes frequently use DETs less frequently. Second, users frequently created helpful DETs for themselves and others, rather than just finding them. This indicates that the term "appropriation" conceptualises DET use more usefully and precisely than "adoption." The last important result we made was that nearly all developers and users supported including desirable users in the provision of DET. To assist funders and developers in facilitating more practical, beneficial and positively impactful DETs, we have summarised these findings into a one-page template. In summary, we find that developers can enhance the use of DETs by acknowledging users as fellow developers. This can be achieved through cooperative design or by creating flexible DETs that facilitate user creativity.

Keywords: Digital Tools**,** Rural Agriculture Extension and Digital Extension

Dr. Paresh Pundlikrao Baviskar holds a Doctorate in Agricultural Economics and was awarded the prestigious SARTHI National Research Fellowship-2019. He is the Vice-President of Just Agriculture magazine and an executive member of the AEEFWS Foundation. Dr. Baviskar, who qualified ICAR-ASRB NET in 2021 in Agricultural Economics, has contributed 22 research papers, 7 abstracts, and numerous popular and technical articles. He has presented his research at national and international conferences and actively participates in professional development events.

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Dr. Davinder Pal Singh Badwal is CEO & Founder of Just Agriculture Magazine & Newsletter, President of Agro Environmental Educational Society (Red.), Social activist, Agripreneur, Speaker. He has also received Young Professional Award. He has organized numerous national and international events under his organizations viz., trainings, workshops, expos and conferences in collaboration with ICAR, NAHEP, ICRISAT, NAARM, NIPHM, MANAGE, IRRI, PJTSAU, MPUAT and many more. Apart from being an Organizer of many International & National Events, Dr. Badwal has attended more than 45 National and International Conferences. He also delivered many Guest Lectures in various National and International Events. His publications include more than 31 popular articles, 15 Research & Review Papers, 6 Books. Furthermore, he is a member of many reputed agricultural societies. Due to his dream & passion Just Agriculture is now in the list of India's Top 5 Agriculture Magazines with more than 2 lakhs + readers.

Dr. Utkarsha Pramod Gaware has completed her Doctorate in the discipline of Agricultural Economics from Dr. Rajendra Prasad Central Agricultural University, Pusa (Bihar). During her doctoral degree program she was awarded with Senior Research Fellowship (SRF) from ICAR. She is the Vice- President of India's most rising Agriculture Magazine, Just Agriculture- the Magazine and also an executive member of AEEFWS Foundation, Punjab. Her publications include 23 research papers, 06 abstracts and numerous popular/ technical articles. She has participated and presented (Oral & Poster) her work in nearly 10 national and international conferences. She has also attended various National International events.

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