

*Abstract Book for*  
**5<sup>th</sup> International Agriculture Conference**  
**"GLOBAL INSIGHTS ON RESEARCH  
AND DEVELOPMENT IN AGRICULTURE,  
HORTICULTURE AND ALLIED SCIENCES"**

Organized by  
GH RAISONI UNIVERSITY, SAIKHEDA  
JUST AGRICULTURE EDU. GROUP and AEEFWS, CHANDIGARH  
On **05-07 October, 2023**  
At **G. H. Raisoni College, NAGPUR (ICAR accredited)**



## **Editors**

Mohit Bharadwaj  
D. P. S. Badwal  
Paresh P. Baviskar  
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Kevin Gawali

**JUST AGRICULTURE PUBLICATIONS**

**Global Insights in Research and  
Development in Agriculture,  
Horticulture and Allied Sectors  
(GIRDAHA- 2023)**

**5<sup>th</sup> International Conference  
Book of Abstracts**

**Organized by**

**Agro Environmental Education & Farmers Welfare  
Society, (AEEFWS) Chandigarh  
G H Raison University, Saikheda (MP) and  
Just Agriculture- the Magazine**

**on**

**05<sup>th</sup>- 07<sup>th</sup> October, 2023**

**at**

**GHRU, Saikheda**

**Editors**

**Mohit Bharadwaj**

**D. P. S. Badwal**

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**Utkarsha P. Gaware**

**Kevin Gawali**



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**05th- 07th October, 2023**

**Co-editors**

**Dr. Piyush Choudhary**

**Pavithra S**

**Patibandla Lakshmipriya**

नितीन गडकरी  
NITIN GADKARI



मंत्री  
सड़क परिवहन एवं राजमार्ग  
भारत सरकार  
Minister  
Road Transport and Highways  
Government of India



### *Message*


It gives me immense pleasure that the Agro Environmental Education & Farmer's Welfare Society, Punjab, Just Agriculture Education Group & G.H. Rasoni University, Saikheda is organizing a 3 Day's International Conference in Hybrid Mode on "Global Insights on Research & Development in Agriculture, Horticulture & allied sciences" in collaboration with Dr. PDKV, Akola, CICR-Nagpur, CCRI-Nagpur during 05-07 Oct, 2023.

I hope the issues pertaining to various aspects of agriculture & technology and their dissemination to the end user will be deliberated and discussed by the delegates at length during the conference in order to come out with certain adoptable low-cost, location specific recommendations for benefit of the people at global level.

I extend my warm greetings and felicitations to the organizers and participants.

Nagpur  
25 September, 2023

Yours,

  
(Nitin Gadkari)



**Dr. Meena Rajesh**

Vice Chancellor  
G H Raisoni University, Saikheda (M.P.)



Dear Esteemed Delegates, Researchers, and Distinguished Guests,

It is with great pleasure and enthusiasm that I extend my warmest welcome to all of you to the International Conference on "Global Insights on Research and Development in Agriculture, Horticulture and Allied Sciences" (GIRDAHA). As the Vice Chancellor of G H Raisoni University, I am honored to inaugurate this significant gathering of minds dedicated to advancing knowledge in the fields of agriculture, horticulture, and allied sciences.

GIRDAHA represents a pivotal moment in our academic calendar, offering a unique platform for international experts, researchers, and scholars to exchange ideas, share groundbreaking research, and explore innovative solutions to the pressing challenges facing the agriculture and horticulture sectors. Agriculture and its allied sciences have always played a pivotal role in ensuring food security, environmental sustainability, and economic prosperity. In the face of global challenges such as climate change, population growth, and resource scarcity, the role of research and development in these domains has never been more critical.

This conference promises to be a melting pot of diverse perspectives, fostering collaborative opportunities that transcend geographical boundaries. Over the course of this conference, you will have the opportunity to engage with renowned experts, learn about cutting-edge research, and network with peers who share your passion for advancing agriculture and horticulture.

GIRDAHA will feature a rich tapestry of sessions and presentations that span the breadth and depth of these vital fields, covering topics ranging from sustainable farming practices, agricultural biotechnology, and crop protection to innovative horticultural techniques and post-harvest management. We are delighted to have an impressive lineup of keynote speakers who will inspire, educate, and challenge your thinking.

Furthermore, this conference will provide a platform for young researchers and students to showcase their work and interact with leading experts. We believe in nurturing the next generation of scientists and leaders, and we are excited to see the fresh perspectives and ideas they will bring to the table.

I appreciate the efforts of the organizing committee, sponsors, and all involved in making this event happen. Your dedication to advancing knowledge in agriculture, horticulture, and allied sciences is commendable. I believe the discussions at GIRDAHA will significantly contribute to global sustainability efforts. I encourage active participation, sharing insights, and seizing opportunities for a fruitful experience. May the knowledge gained inspire continued contributions to these fields. Welcome to all participants, and let's work together for a brighter future in agriculture and allied sciences.

Warm regards,

**(Dr. Meena Rajesh)**

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**Dr. Kevin Gawali**

Dean, School of Agricultural Sciences,  
G H Raison University, Saikheda. (M.P.)



**MESSAGE**

Universities are platforms where new ideas can germinate and blossom into innovations for the betterment of society. Every attempt that advances the cognitive process of thinking and dialogue should be made, encouraged, and recognized. G. H. Raison University, Saikheda has established such a platform, and School of Agriculture Sciences, GHRU, Saikheda is leading the way in carrying on the tradition. The efforts of this institute are commendable for organizing an international conference on "**Global Insights on Research and Development in Agriculture, Horticulture and Allied Sciences (GIRDAHA- 2023)**" from **October 05 to 07, 2023** at GHRU, Saikheda (MP).

I am very glad that the **SOAS, GHRU, Saikheda, AEEFWS, Chandigarh & Just Agriculture Education Group** have taken on the task of organizing this International Conference with a goal to have a discussion on the important issues of Organic Farming, climate change resilient Agriculture, Dairy and Veterinary Sector towards Sustainable Development Goals, Role of Agrochemicals, biological and technological interventions, integrated nutrient, weed, diseases and pest management towards safe food and nutritional security, application of biotechnology, genetic engineering for the development of science and technology. It is my firm belief that this conference will certainly enhance our knowledge with the convergence of experts around the globe. More than 1000 participants across 11 countries joined this International Conference. I hope that the participants will make best use of this conference to exchange their ideas and develop new vistas for their future endeavors in the field of agriculture and allied sciences.

I applaud the efforts of the organizing committee for putting their best efforts in making the arrangements for this conference. I convey my good wishes for the successful organization of this conference.

I deeply acknowledge my gratitude to Honourable Shri. Sunil Raison (Founder Chairman RGI Group), Vice Chancellor- Dr. Meena Rajesh, Dr. Sharadrao Ramarao Gadakh (Vice- Chancellor, Dr. PDKV, Akola) for their support.

**(Dr. Kevin Gawali)**



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## 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 5<sup>th</sup> International Conference on “Global Insights on Research and Development in Agriculture, Horticulture and Allied Sciences (GIRDAHA- 2023)” was planned by Just Agriculture Education Group, & AEEFWS, Chandigarh in collaboration with G. H. Raison University, Saikheda during 05<sup>th</sup> to 07<sup>th</sup> October, 2023. The conference was embellished by the presence of Chief Guest, Dr. Sharadrao Ramarao Gadakh, Vice-Chancellor, Dr. PDKV, Akola and Guest of honour, Dr. C. D. Mayee (President of South Asia Biotechnology Centre (SABC) and Former- Chairman of ASRB), Dr. Sharad Nimbalkar (Ex- VC, Dr. PDKV, Akola), Dr. Ashosh Paturkar Ranshur (Chief Scientist & Associate Director of Research Zonal Agricultural Research Station, Solapur), Dr. Dilip Ghosh (Director, ICAR- CCRI, Nagpur), Dr. Balaji Vasudevan (Agrobioscience Chief Scientist, UM6P Venture) and Dr. Vinayak Shivankar (Ex- Director, ICAR- CCRI, Nagpur). The grand success of this event was due to the joint efforts of Shri. Sunilji Raison (Hon’ble Chancellor, GHRU, Saikheda), Dr. Meena Rajesh (Hon’ble Vice-Chancellor, GHRU, Saikheda), Dr. Kevin Gawali (Dean School of Agricultural Sciences, GHRU, Saikheda), other faculty members of GHRU, Saikheda 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 **AEEFWS, Chandigarh** and **Just Agriculture Education Group** in collaboration with **G. H. Raison University, Saikheda** have successfully organized the 5<sup>th</sup> International Conference on **Global Insights in Research and Development in Agriculture, Horticulture and Allied Sciences (GIRDAHA-2023)** at **G. H. Raison University, Saikheda** during 05<sup>th</sup> to 07<sup>th</sup> October, 2023 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 5<sup>th</sup> International Conference (GIRDAHA- 2023). 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 very glad that Just Agriculture Education Group and AEEFWS, Chandigarh in collaboration with G. H. Raisoni University, Saikheda has successfully organized three days international conference on “**Global Insights in Research and Development in Agriculture, Horticulture and Allied Sciences (GIRDAHA- 2023)**” from 05<sup>th</sup> to 07<sup>th</sup> October, 2023 at GHRU, Saikheda. 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.

A handwritten signature in black ink, appearing to read 'MR Bharadwaj', with a horizontal line underneath.

**Mohit Bharadwaj**  
Chief Editor, Just Agriculture the Magazine

## MESSAGE FROM ORGANIZING SECRETARY

I am delighted to announce that Just Agriculture Education Group and AEEFWS, Chandigarh in collaboration with G. H. Rasoni University, Saikheda has successfully organized the 5<sup>th</sup> International Conference on “**Global Insights in Research and Development in Agriculture, Horticulture and Allied Sciences (GIRDAHA- 2023)**” at GHRU, Saikheda during 05<sup>th</sup> to 07<sup>th</sup> October, 2023. 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.

A handwritten signature in blue ink, appearing to read 'Paresh P. Baviskar'.

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

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# **Sustainability of Organic Sugarcane Cultivation in tropical India**

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In India, approximately 60% of the population is involved in agriculture and among the many crops cultivated in the nation, sugarcane is one of the most important Kharif crops. The total area dedicated to organic agriculture in Asia was more than 6.5 million hectares in 2021. There were nearly 1.8 million producers, most of whom were in India. (FIBL & IFOAM Year Book, 2023).

India is gifted with the potential of producing multifarious organic products due to its diverse agro-climatic zones. In several parts of the country, the inherited tradition of organic farming is an added advantage (Prasad and Gill 2009; APEDA 2014). This holds promise for the organic producers to tap the niche market which is growing steadily both in domestic and export segments. Currently, India ranks 10<sup>th</sup> among the countries in terms of cultivable land under organic certification. As per the available statistics, India's rank 6<sup>th</sup> in terms of World's Organic Agricultural land and 1<sup>st</sup> in terms of total number of producers as per 2021 data (FIBL & IFOAM Year Book, 2023).

Indian climate supports the cultivation of sugarcane throughout the year. The post-Green Revolution phase in India is characterized by high input-use and decelerating total factor productivity growth. Sugarcane, the major commercial crop of our country is no exception to this. Sugarcane productivity obtained during 1980s has not been sustained during 1990s and this has posed a challenge for the researchers to shift production function upward by improving the technology index.

According to the *Codex Alimentarius Commission*, 'organic agriculture/farming is a holistic production management system that avoids use of synthetic fertilizers, pesticides and genetically modified organisms; minimizes pollution of air, soil and water; optimizes the health and productivity of interdependent communities of plants, animals and people (*Codex Alimentarius Commission* 2013). The organic farming system

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differs fundamentally in soil fertility, weed, pest and disease management, and makes higher demands on product quality and yield stability than conventional farming.

Organic cultivation is characterized by promoting greater biodiversity of the microbiota and soil fauna, as well as by improving fertility and maintaining biological pest control. Organic manures produced with locally available raw materials are used to improve soil health (Dotaniya et al. 2016). Studies have shown that the management techniques adopted in the organic production system have promoted increases in soil organic matter, improving the functionality of the ecosystem (Borges et al. 2014).

The capacity of organic sugarcane cultivation to reestablish the organic carbon content in the soil is due to the great contribution of organic matter that enters this production system. Organic matter plays an important role in nutrient and moisture retention and in the structure of tropical soils, playing an important role in the fixation of atmospheric CO<sub>2</sub>, which increases carbon sequestration in the soil (Anaya and Huber-Sannwald 2015).

In a meta-analysis (Reganold 2012; Seufert et al. 2012) of 316 yield comparisons in 66 studies, organic farming systems in developed countries produced yields that were 20% lower than their conventional counterparts. However, the authors also found that for certain crops under unique growing conditions and management practices, organic yields nearly matched those from conventional systems. These findings underscore the potential for organic farming to have an increasing role in a sustainable food supply. There are wide differences among yields and production costs. Besides, higher yields combined with high premiums are the underlying cause for higher relative profitability in developing countries (Nemes 2009).

In sugarcane, comparative economics of the crop grown in both organic and conventional systems in growers' farms led to the conclusion that a combination of fertilizers and organic manures is essential for the crop (Gawade et al. 2005). Improvement in soil physical properties, and carbon content and available macronutrients and Sulphur were observed under organic farming (Prashanth et al. 2009). A combination of inorganic,

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organic and bio-fertilizers, bio-pesticides (neem cake), trash mulching and green manuring with green gram was found suitable for sustaining productivity, maintaining soil fertility and obtaining higher monetary returns in plant and ratoon (Thakur et al. 2012). The observations of Gawade et al. (2005) and Kshirsagar (2008) indicated marginal differences in the cost of plant protection between organic and inorganic farming systems.

The long-term study was conducted in the experimental farm of the Sugarcane Breeding Institute, Coimbatore (11000' 30.89"N, 76055' 02.87"E; 430 m above mean sea level) in the North Western region of Tamil Nadu, India, during the crop seasons of 2003-13 envisaged that, yields of sugarcane over the study period showed interesting trends, apparently governed by various causes including the crucial NMC and single cane weight. The differences were significant between organic and conventional systems in almost all years except 2007-08 ratoon crop. In the 2003-04 plant crop, the yield was significantly higher in the organic system that received high volume low-content organic nutrient supply, possibly due to the ability of the crop to utilize the resident nutrient matrix. The lingering effect of withdrawal of rich inorganic nutrient supply began showing its effect in the subsequent years beginning 2004-05 ratoon crop. Consistently and significantly higher yields (14.8,15.5 and 4.4%) obtained in the organic production system from 2009-10 could possibly be due to higher soil nutrient availability, soil organic carbon content, beneficial microorganisms and soil enzyme activities, besides lower activity of plant parasitic nematodes in the organic production system than in the conventional production system. (Sivaraman et al., 2013)

In earlier short-term studies in subtropical India, highest cane yields were obtained through combined use of sulfitation pressmud and FYM for the supply of nutrients (Srivastava et al. 2009) and productivity could be sustained through the integrated supply of nutrients with greater share of inorganic than organic source (Thakur et al. 2012). It was observed in Karnataka that sugarcane yields stabilized by the end of the third year and became higher with organic sugarcane farming than inorganic farming from the fourth year (IFAD 2005). However, there was no significant difference in yield between inorganic and organic sugarcane farming treatments in an experiment conducted in Iran (Soraghi et al.

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2013). Results of earlier studies established that productivity can be sustained through adoption of an organic production system comprising only organic sources of nutrients, notwithstanding the transition period and management of unanticipated biotic stresses.

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## **Bovine Mastitis and Impact of the Disease**

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### **Introduction**

Bovine mastitis has been one of the world's biggest problems for many decades and the most serious disease in bovine animals globally (Food and Agriculture Organization, 2014 and Abebe *et al.*, 2016). In present scenario, mastitis in animals has symbolized itself as a most challenging disease in high yielding dairy animals in India (Varshney and Mukherjee, 2002).

Bovine mastitis causes huge economic losses to the livestock industry worldwide, including India (Dash *et al.*, 2018). It affects the international trade of milk and milk products (Shaheen *et al.*, 2016) and milk also not fit for human consumption because the transmission of pathogenic bacteria and toxins produced by them through the food chain and spread different zoonotic disease in humans (Manoj and Singh., 2020; Argaw, 2016; Shaheen *et al.*, 2016; Patil *et al.*, 2015, Hameed *et al.*, 2007). Mastitis is a multi-etiological and complex disease, which is defined as inflammation of parenchyma of mammary glands. It is characterized by physical, chemical and, usually bacteriological changes in milk, and pathological changes in glandular tissues (Radostis *et al.*, 2000). It is caused by environment and infectious microorganism, resulting produce clinical and subclinical mastitic problems in animals (Garcia, 2004).

Bovine mastitis can be classified as Sub-clinical and Clinical depending on the presence or absence of clinical signs, the severity of inflammation and the milk quality (Ruegg., 2017; Taponen *et al.*, 2017). Mostly Clinical and Subclinical mastitis is caused by bacterial pathogens but sometimes it can also be caused by fungal and other environmental agents. The economic loss due to subclinical mastitis is greater than that of clinical mastitis (Romero *et al.*, 2018; Zano and Lacasse., 2008). In developed countries, many studies have been conducted and reported the annual



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losses per cow from mastitis in the United States of America in 1976 were estimated to be US\$ 117.35 per cow per year (Blosser, 1979); two decades later these losses had increased to US\$ 185 to \$ 200 per cow per year (Costello, 2004). In 1976, annual losses from mastitis in USA were estimated at a total of US\$ 1294 billion, and had increased to US\$ 2 billion by 2009 (Viguier, 2009).

The annual loss due to clinical mastitis in India was earlier reported to be Rs 52.9 crores (Dhanda and Sethi, 1962); Rs 1607.2 crores (Singh and Singh, 1994); the total loss of crossbred cows and buffaloes affected by mastitis was INR 536.25 and INR 404.73 per lactation respectively (Thirunavukkarasu and Prabakaran., 1999); Rs 987.60 crores (Dua 2001) and loss due to subclinical mastitis Rs 2646 crores (Dua, 2001) and 2129.72 crores (Sirohi and Sirohi, 2001); Economic loss due to subclinical form of mastitis in range of INR 21,677/- to INR 88,340/- for one lactation period (Rathod *et al.*, 2017): a total economic loss of Rs. 7824/- per cow in one month Das *et al.*, (2018) reported.

In bovine due to mastitic infection almost 1 to 2 kg of milk production decreases every day in the first few weeks of infection during lactation and after recovery from mastitis affected quarter is usually damaged and milk production is reduced or dries up completely in remaining period of lactation. Mastitis in cattle affects not only milk production, but also animal costs, net profitability and the economy of farmers and the dairy industry.

Mastitis is a disease related to mammary gland & udder tissue disease, most of cases the result of the interaction between the animal, agent and the environment associated with presence of microorganism (Contreras and Rodriguez., 2011). Mastitis is not only affecting the cattle and buffaloes; it also affects the sheep and goats. Most often it occurs due to stress of high milk production after few days of parturition, presence of mastitis causing agent in the milk and udder, faulty milking method, unhygienic environment in cattle farm, physical injury to udder, bacterial infection, fungus infections.

Environmental causative bacteria come from the bedding material, dirty soil, animal manure, faeces and unhygienic water. Contagious bacteria that cause clinical mastitis, include *Staphylococcus aureus*, *Streptococcus agalactiae*, *E. coli*, *Bacillus spp.* and *Corynebacterium spp.* this infection can

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spread from the udder of an infected cow to a healthy cow during milking using hands and other utensils. Clinical mastitis in cows, *Staphylococcus spp.* was the most prevalent organism causing mastitis in cattle followed by *E. coli*, *Streptococcus spp.*, *Bacillus spp.* and *Corynebacterium spp.* and sometimes mixed infection of mastitis causing bacteria also found. (Sandhya *et al.*, 2019).

The highest loss of milk production in primiparous animals occurs due to infection of *S. aureus*, *Streptococcus* and *E. coli* and *Klebsiella* infection and in older animals causes maximum loss due to infection of *Streptococcus spp.* *T. Pyogenes*, *S. aureus*, *Klebsiella* and *E. coli* infection (Grohn *et al.*, 2004).

Some other factors like not maintain proper hygiene during milking, uncontrol sucking of animal kids, keeping milking animals on the hard and rough surface, and exposure of contaminated pastures also contribute to spreading and producing and causing mastitis in cattle. Opening of the teat canal before calving is an important predisposing factor and is the most common factor responsible for the occurrence of mastitis in heifer. Many of environmental and genetic factors influence the size, structure and functional quality of a cow's udder during the developing stage. Mastitis is more prevalent in cows than buffaloes (Sharma *et al.*, 2012; Devi and Dutta, 2018).

Clinical mastitis can be easily diagnosed by external examination of the udder, such as swollen of udder, hot and cold to touch and presence of abnormalities in the milk like watery appearance with flakes and presence of colts. Some systemic sign such as high body temperature in mastitic affected cow also reported (Khan and Khan., 2006). Clinical mastitis again divided into acute, per acute and sub-acute on the base of degree of inflammation (Kibebew., 2017). Sub clinical mastitis not show any visible abnormality in the udder and milk, but production & milk quality deceased and somatic cell count will be increased during laboratory examination (Abebe *et al.*, 2016). The occurrence of subclinical mastitis (SCM) is more prevalent than clinical mastitis (Sharma *et al.*, 2012). Sub clinically affected animals can also act as continuous source of infection to other animals (Dasohari *et al.*, 2017).

Prevalence rate of mastitis varies from place to place, herd to herd and country to country (Devi and Dutta, 2018). In summer season, the

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highest prevalence was recorded at Tamil Nadu by Palanivel *et al.*, (2008), while in monsoon season highest prevalence was reported by (Kurjogi and Kaliwal, 2014) at Karnataka and in spring season highest prevalence observed by Tufani *et al.*, (2012).

Diagnosis of mastitis is easy in case of clinical mastitis but a bit difficult in case of subclinical infection. Clinical mastitis in cattle can be diagnosed on the bases of clinical signs such as swelling of udder, feeling of hot and cold of udder when touched, any changes in colour of milk along with flakes. In gangrenous mastitis the colour may turn in bluish and udder skin may sluff. For diagnosis of sub clinical mastitis in cattle, two methods are usually helpful, one is California mastitis test also know as rapid mastitis test (RMT) and other is somatic cell count (SCC). The California mastitis test gives results within a few seconds in sub clinical infection. It is a semi quantitative test for bovines. The Somatic cell counts method is based on number of leukocytes and epithelial cells in mastitic milk. In subclinical mastitic infection, leukocytes reached at the infected area in large numbers and the number of somatic cells increases. Culture examination of infected milk and in vitro antibiotic sensitivity testing are confirmative diagnostic test for clinical and subclinical mastitis in bovines. Recently some advanced diagnostic methods are used for diagnosis of etiological agents of mastitis, which are very easy to use, rapid and sensitive but are still not wildly used due to lack of awareness and knowledge.

Treatment of mastitis depends on the clinical and systemic symptoms of mastitis. Indiscriminate use of antibiotics for the treatment of mastitis without checking the in vitro sensitivity pattern leads to treatment failure as well as development of antibiotic resistance in addition to the financial burden to farmer (Shaheen et al., 2016). Monitoring of antibiotic resistance in livestock is recommended by OIE and WHO recommends a rational and judicious use of antibiotics in public domain (Dougnon *et al.*, 2020). Dry cow therapy and lactation therapy are two important therapies in the management mastitis in which antibiotic therapy is used. Dry cow therapy is used during late lactation and at the end of lactation or a few days before parturition, where lactation therapy is used during lactation period.

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The management of clinical and subclinical mastitis in female cows is very important but it is very challenging task at field level due to poor approach of animal health management. Control and prevention of mastitis is based on different stage which are related to each other. At dairy farm, specially for milch cattle should be regularly checked and procedure should be adopted to maintain properly milk quality. The method of milking has a great role on the transmission of mastitis from infected udder to healthy udder and from one animal to another. Bacterial transmission comes under direct transmission and teat canal, udder tissues and skin considered indirect transmission.

The impact of climate change, maintain milk quality, and the most important factor is the difficulties in early diagnosis in high milk producing animals always create a difficulty in proper diagnostic and treatment of mastitis affected animals. In addition, mastitic also poses an economic burden in form of treatment cost, reduced animal health and decreased milk quantity and quality once the animal infected with mastitis.

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## **Rice Economy – Issues & Perspectives**

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### **Abstract**

Rice farming has been the source of livelihood in many developing economies where this crop is a traditional food crop. Asia accounts for 80% of world's rice supplies with China and India being the leading producer. However, rice being a staple crop for about half of the world population, demand for it is numerous and spread across the globe. The increase in global rice production in the last 60 years was driven by both increase in yield and area expansion. However, the increase in yield across economies has been diverse. Countries with higher economic performance in terms of per capita income and real GDP growth showed higher growth in yield. In India, in the last 20 years, there has been migration of rice economy from low-lying wetlands of the east to the irrigated fields of the west. Global agricultural research (CGIAR) indicates that about 70% of the additional rice production will have to come from the irrigated rice ecosystem and almost 21% from rainfed lowland. Further, rice production is linked to economics, climate, social and political stability. Global rice economy is one of the most policy distorted market with significant border protection through tariffs. Growth in global rice production requires a more open economy with judicious provision of an increasingly diversified stock of social, economic and institutional infrastructure to address the rising risks from climate change. Enhancing productivity and improvement in global rice economy necessitates concerted government efforts to upgrade the quality and range of domestic human resources and technological capabilities.

### **Introduction**

Rice has long been the staple food item, as well as the major source of calorie intake, for about one-half of the world's population (Fukagawa et.al,2019). Besides, rice farming has long been a significant source of subsistence and/or income for a substantial number of farmers -

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particularly in many developing economies where this commodity is a traditional food crop. However, the rice economy is sharply skewed. Global, paddy crops are estimated to have averaged to 552 million tons per year in the last 3-years. Large growers with an annual domestic output of more than 1% of this aggregate level are all located in Asia - except Brazil and the United States of America. Paddy harvested from developing Asian economies on an average contributed almost 90% of world supplies in the same period. By far the largest producers are China and India, which in 2020-2022 registered an average annual output of around 148 million tons and almost 126 million tons of paddy respectively; these were equivalent to about 53% of the global volume. Paddy output from Indonesia, Vietnam, Myanmar and Thailand was only in the range of 4 to 7% of world supplies during the same period. Thus, surplus production of rice comes from a handful of countries, again mostly located in Asia, while the sources of import demand are numerous and spread across the world.

Global rice production (consumption) is projected to reach 628 million tons in 2050, or an 18% increase relative to 2022. The projected increase in global rice production and consumption are mainly attributed to population growth. However, the rice producing countries are more prone to climate change risks (Bairagi et.al, 2021). For instance, more than half of the total floods, droughts, and storms that occurred during the last 120 years happened in the first quarter of the 21<sup>st</sup> century and severely affected rice producing countries. Around one-third of the 140 million hectares under rice production in Asia are at risk of floods and droughts (Haefele & Bouman, 2009; Hayes et al., 2020; Son et al., 2013; World Bank, 2008). These extreme climatic events could pose a severe risk to those whose livelihood depends on rice production and the global rice market. The present study outlines the structural characteristics of global and domestic rice economy and identifies the key challenges.

### **Structural Characteristics of Global Rice Economy**

Global rice output increased from 259 mn tonnes during 1960s to 552 mn tonnes during 2020 to 2022. The increase in output in the last 60 years was largely driven by yield growth. Average yield increased from 2 tonnes per hectare in the 1960s to 3.5 tonnes per hectare in the 2020s. However, the levels of productivity and their rates of change over time differ noticeably among rice-producing countries. While rice productivity is greater than 4

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tonnes per hectare in China, Brazil, Japan and United States of America, it is around 2-3 tonnes per hectare and below global average in India, Thailand, Philippines and Pakistan. Bangladesh witnessed significant increase in rice output supported by both area expansion and yield increase. Average rice yield in Bangladesh in 2020 at 3.4 tonnes per hectare was higher than global average.

The diversity in average yield reflects the uneven spread of the green revolution and varying scales and intensities of cultivation, as well as availability of crucial infrastructure and support services. Farm sizes in many Asian economies, for example, cluster around one hectare, not all of which is available for wet-rice cultivation. (UNCTAD, 1995). Further, three-fourths of the global rice is produced by raising seedlings in a nursery to be transplanted in puddled fields (called puddling) that require extensive irrigation and water management (Ghosh, 2011). India has become the largest consumer of groundwater, nearly 90% of which is extracted for irrigation purposes (Suhag 2016), which, in turn, draws on power made from fossil fuels, causing CO<sub>2</sub> emission. The rice-wheat rotation of the north-west takes the blame for India becoming water-stressed according to the international norms (Ghosh 2023). Therefore, the need for productivity-enhancing, structural adjustments and diversification among nations has become even more pressing.

However, the global rice economy continues to be one of the most policy-distorted markets (Wailes, 2005; ICTSD, 2017). There is significant border protection through tariffs and tariff rate quotas in many importing countries. The primary rationale for these policies is to indirectly support domestic producers, usually with the underlying goal of improving rice self-sufficiency. Rice-exporting countries have increasingly turned to rice price and input subsidies to help their rice producers become competitive in world markets and to support farmers' incomes (Morat et al, 2019). Enhanced productivity and improvement in global rice economy necessitates concerted government efforts to upgrade the quality and range of domestic human resources and technological capabilities. Equally important, on the other hand, is the judicious provision of an increasingly diversified stock of social, economic and institutional infrastructure. This requires an overall sustained growth of the economy.

**Table 1: Global Rice Economy**

Countries	Production (mn tonnes)		X times increase	Area (mn hectare)		X times increase	Yield (tonne/hectare)		X times increase
	1960s	2020s		1960s	2020s		1960s	2020s	
<b>Global</b>	259	522	2.0	124	165.8	1.3	2.1	3.1	1.5
China	85.1	147.7	1.7	29.8	30.1	1.0	2.9	4.9	1.7
India	54.0	126.4	2.3	36.1	46.4	1.3	1.5	2.7	1.8
Bangladesh	15.7	56.9	3.6	9.3	16.8	1.8	1.7	3.4	2.0
Indonesia	13.8	35.2	2.6	7.4	10.4	1.4	1.9	3.4	1.8
Viet Nam	9.1	28.0	3.1	4.8	7.2	1.5	1.9	3.9	2.0
Thailand	11.9	21.9	1.8	6.6	11.2	1.7	1.8	1.9	1.1
Philippines	4.3	13.0	3.0	3.2	4.8	1.5	1.3	2.7	2.0
Pakistan	2.2	8.6	3.8	1.4	3.5	2.6	1.6	2.4	1.5
Brazil	6.3	7.6	1.2	4.0	1.7	0.4	1.5	4.5	2.9
Japan	17.2	7.3	0.4	3.3	1.4	0.4	5.2	5.2	1.0
United States	3.6	6.1	1.7	0.8	1.0	1.3	4.6	6.1	1.3
Nigeria	0.3	5.0	19.4	0.2	4.3	21.5	1.3	1.1	0.9
Egypt	2.0	3.8	1.9	0.4	0.5	1.2	5.2	8.0	1.6
Korea	2.0	3.7	1.8	0.5	0.5	1.0	4.2	8.0	1.9

Note – 1960s – Per year from 1960 to 1969; 2020s – Per year from 2020 to 2022

Source:

FAO,

OECD

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**Table 2: Key Economic Indicators of key Rice Producing Countries**

Countries	Per Capita GDP (US dollar)			Real GDP Growth (%)		
	1980	2000	2022	1980	2000	2022
World	2864	5671	13440	2.1	4.8	3.4
China	307	951	13721	7.9	8.5	3.0
India	272	450	2601	5.3	4.0	6.8
Bangladesh	311	483	2470		5.3	7.1
Indonesia	673	870	5017	9.9	5.0	5.3
Viet Nam	653	499	4476	-3.5	6.8	8.0
Thailand	705	2004	8182	4.6	4.5	2.6
Philippines	774	1087	3905	5.1	4.4	7.6
Pakistan	419	630	948	6.9	3.9	6.0
Brazil	1230	3772	9673	9.2	4.4	2.9
Japan	9659	39173	35385	3.2	2.8	1.1
United States	12553	36313	80035	-0.3	4.1	2.1
Nigeria		555	2280		5.5	3.3
Egypt	580	1637	3644	3.4	5.4	6.6
Korea	1715	12263	33393	-1.6	9.1	2.6

Source: IMF

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Amongst the top 14 rice producing countries contributing at least 1% to global rice production, per capita GDP was higher than the global average in only 3 countries- Japan, United States of America and European Union in 1980. Korea in 2000, and China in 2022 entered in the league of high per capita income countries. Of the top 14 countries contributing 80% to the global rice production, per capita GDP is lower than global average in about 9 countries. India -one of the leading rice producers is also amongst the low per capita income countries. However, the real GDP growth in most of the rice producing countries has been promising and higher than global average in 2022.

### **Structural Characteristics of Indian Rice Economy**

Rice is already in India's discourse for livelihood, fiscal economy, and political conflicts. Its association with soil health degradation, poor response to fertiliser uses and the climate change linkages make the future look "grim" for rice (Sidhu et al 2010; Ghosh et al 2019). Yet, it has been replacing not only wheat but also other nutritious crops in the diet of the people. In growing regions, infrastructure and institutions keep developing for rice marketing along with public procurements to prevent the price from falling in the face of large production levels.

West Bengal, Uttar Pradesh, Telangana, Odisha, Tamil Nadu, Andhra Pradesh and Bihar contribute almost 60% of the total rice output of the country. However, rice covers more than 50% of the state's cropped area in most states apart from Maharashtra, Karnataka and Gujarat. Punjab and Haryana which were primarily wheat growing crops also covers ~40-50% of the gross cropped area of the state. However, productivity in most states is around 2-3 hectare. Punjab is the only state with an average yield of 4.3 tonnes per hectare and can be compared with the global best. Haryana, Tamil Nadu, Telangana and Andhra Pradesh are the other states with an average yield above the All-India average.

In the last 10 years, while the area under rice cultivation increased in the north-western states, like Punjab, Maharashtra, Gujarat and some of the southern states, it has declined in most of the Eastern States, like Uttar Pradesh, West Bengal and North-East. Thus, though Indian agriculture continues to be rice dominant but there is a migration of rice away from low-lying wetlands of the east to the irrigated fields of the west, which calls for a

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**Table 3: Domestic Rice Economy**

States	Area( mn Hectares)		Production (mn Tonnes)		Yield (Kg./Hectare)	
	2010-11	2022-23	2010-11	2022-23	2010-11	2022-23
All India	42.9	46.40	96.0	126.4	2.7	3.1
West Bengal	4.9	4.8	13.0	16.7	2.6	3.0
Uttar Pradesh	5.7	5.5	12.0	15.3	2.1	2.7
Punjab	2.8	3.0	11	13.0	3.8	4.3
Telangana	2.0	3.7	6.5	12.4	3.3	3.4
Odisha	4.2	3.9	6.8	9.3	1.6	2.4
Tamil Nadu	1.9	2.2	5.8	7.9	3.0	3.6
Andhra Pradesh	2.8	2.3	7.9	7.8	2.8	3.4
Bihar	2.8	3.1	3.1	7.7	1.1	2.5
North East	3.1	2.8	5.9	5.5	1.9	1.9
Haryana	1.2	1.3	3.5	4.6	2.8	3.6
Karnataka	1.5	1.4	4.2	4.3	2.7	3.1
Maharashtra	1.5	1.7	2.7	3.6	1.8	2.2
Jharkhand	0.7	1.4	1.1	2.9	1.5	2.0
Gujarat	0.8	0.9	1.5	2.1	1.9	2.4
UttaraKhand	0.3	0.3	0.6	0.7	1.9	2.8
Kerala	0.2	0.2	0.5	0.5	2.5	2.5

Source: Ministry of Agriculture, Government of India

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fresh thinking on land-use policy. It is believed that past practice and mechanisation has been the causative factors for its move in Punjab and Haryana, economics and rainfall in Haryana and Gujarat, and reservoirs and interaction of all changes for Gujarat. On the other hand, reservoirs and economics did not support rice in most eastern states.

It is evident from table below, most of the western and southern states (apart from Karnataka) that reported increase in area under rice cultivation also had a higher per capita income compared to the All-India average. These states also reported higher real GDP growth in 2010. On the other hand, most of the eastern states where cultivation decreased, per capita GDP was lower than All India average.

**Table 4: Economic Performance of Major Rice Producing States**

States	Per Capita Income (Rs. 000)		Real GDP Growth (%)	
	2010	2022	2010	2022
All India	72	171	5.4	8.8
West Bengal	57	139	4.4	10.8
Uttar Pradesh	36	82	5.1	9.5
Punjab	95	183	4.6	5.6
Telangana	101	294	2.9	9.3
Odisha	55	144	5.3	9.5
Tamil Nadu	104	270	4.6	7.4
Andhra Pradesh	77	217	0.4	9.9
Bihar	24	54	4.1	10.6
North East	60	150	4.1	5.7
Haryana	116	296	7.1	10.1
Karnataka	99	293	6.0	10.1
Maharashtra	113	249	6.0	8.5
Jharkhand	45	89	8.0	7.6
Gujarat	101	282	10.0	9.8
UttaraKhand	113	237	7.2	7.8
Kerala	109	258	6.0	12.1

Source: Ministry of Statistics & Programme Implementation, Government of India



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Substantial growth in real GDP was seen in all the primary rice producing states in 2022. However, the per capita income in most of the states is still below average. With the inconsistency of climate change effects, upgradation towards advanced technology and higher mechanisation will be the possible way forward. For instance, Punjab and Haryana are reportedly moving towards direct seeding using technology like tensiometer, stubble remover, weeder, water standardisation, laser-leveller, new seed varieties, soil tests, need-based use of water and chemicals, and satellite surveillance (Chaba 2021). Though, the achievement on these front needs assessment, but it clearly demonstrates higher returns, overall economic growth for better infrastructure will be the key requirements for a sustained growth going forward.

### Conclusion

Estimates of the Inter Centre Review instituted by the Consultative Group on International Agricultural Research (CGIAR) indicate that about 70% of additional rice production will have to come from the irrigated rice ecosystem and almost 21% from rainfed lowland. To achieve this, it was estimated that the yield ceiling of irrigated rice would need to be increased by 30% from its current level. Simultaneously the yield gap would have to be reduced from 48 to 35% to produce average yields of about 6 tonnes/ha or about double the current level (Papademetriou,2022). It will be easier to produce the necessary increases in productivity under irrigated conditions than under rainfed or other ecosystems. Apart from the improvement in irrigation infrastructure, rice economy, so far, has also been linked to the stability in economic, climate, social and political stability of the countries. Rice policies of most countries has been towards domestic protection. However, to meet the growing demand for rice and to address the rising risk from climate change, we need a more integrated and open rice economy with judicious provision of an increasingly diversified stock of social, economic and institutional infrastructure. Clearly, Economics will be driving rice cultivation in the future. Therefore, governments of each country need to take more concerted efforts to upgrade the quality and range of domestic human resources and technological capabilities.

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# Impact of coronavirus lockdown on water quality of river Yamuna in the national capital of India

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The water ecosystem is the connecting link between all living creatures on the planet earth. Clean water is the need of the hour due to increased pollution levels and the rapid urban population growth trajectory. COVID-19, on the other hand, has some positive impact due to closed industrial activities and restricted human footprints during the National wide lockdown. The resting period due to the lockdown helped the entire environmental chemistry, be it lithosphere, atmosphere, or hydrosphere to replenish back and sustain our mother earth. The present study aims to observe the impact of COVID-19 on the water quality index of river Yamuna and water management at various monitoring stations observed by CPCB and DPCC. Nine sites were chosen between a stretch of 22 km long river Yamuna in the capital city of Delhi. Samples were collected before monsoon, during monsoon, and post-monsoon seasons. Physico-chemical parameters such as pH, BOD, COD, DO, and Faecal Coliforms were observed and Water Quality Index was calculated, using ANOVA for all chosen sites. Since the study was initiated during COVID-19, results show some positive impact on reduced industrial and human activities in improving the overall water quality and water quality management.

**Keywords:** Coronavirus, India, Water Quality, Yamuna River, DPCC, CPCB, Delhi.

# Transforming Fisheries Management with the Internet of Things (IoT)

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The recent focus on digital technologies has led to the empirical analysis of Indian mobile apps and the Internet of Things (IoTs) in fisheries. This analysis utilized virtual information to record various aspects such as features, downloads, ratings, space, and year of publication. The fisheries sector is more diverse compared to other agricultural industries. It faces significant pressures to innovate to ensure sustainability. IoTs include increasing fish production, improving the selection of appropriate species, mitigating diseases, reducing wastage, preventing environmental pollution, and generating more employment opportunities globally. This viewpoint article explores how digital transformation can support and meet the expansion needs of the fisheries and aquaculture industries. Digital technology involves ICT, Cloud-edge computing, AI, IoT, machine learning, immersive technologies, and blockchain. The introduction of IoT technologies has revolutionized farm production in the country. Additionally, digital technologies connect regions, nations, and international entities and can help mitigate significant risks faced by the fisheries and aquaculture industry. These risks include climate change, global pandemics, and conflicts that can disrupt fish and seafood production and supply chains. The study recommends the capacity development of fisheries professionals in Artificial Intelligence (AI), mobile apps, and IoTs.

**Keywords:** Digital era, IoTs, Sustainable aquaculture, Fish production, Smart fisheries

## **Response of sweet sorghum (*Sorghum bicolor* L.) to Subsoiling and Levels of Nitrogen in Mollisols of Uttrakhand**

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A field experiment was conducted at IDF Nagla, G.B. Pant University of Agriculture & Technology, Pantnagar (India) during *Kharif* seasons of 2011 and 2012 to study the effect of subsoiling, deep and differential rate placement of fertilizer on yield and quality of sweet sorghum (*Sorghum bicolor* L.) in Mollisols of Uttarakhand. The experimental results revealed that the highest growth attributes, fodder yield, brix%, sugar% and ethanol yield were recorded under subsoiling-cum-differential rate placement of fertilizer. The subsoiling-cum-differential rate placement produced 16.7, 26.7 and 32.7% higher green fodder and 19.2, 33.4 and 42.2% higher dry fodder yield than conventional tillage, subsoiling-cum-deep placement and subsoiling-cum-differential rate placement respectively. Similarly the brix%, sucrose%, and ethanol yield were recorded 21.9, 13.2, and 45.0% higher under subsoiling-cum-differential rate placement than conventional tillage, respectively. The nitrogen levels also influenced the quality attributes of sweet sorghum with 8.1, 21.3, and 74.0% higher brix%, sucrose%, and ethanol yield, respectively under 120 kg N/ha than control. It is therefore concluded that the fertilizer should be placed at differential depth (20cm and 50cm) coupled with 120 kg N/ha for higher yield and quality of sweet sorghum in Mollisols of Uttrakhand and may be replicated in similar agro-climatic zones of India.

**Keyword:** Brix. juice yield, ethanol, subsoiling, sucrose

# Effect of residue management with the application of microbial consortia on soil chemical properties

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The burning of crop residue can decrease soil fertility and productivity, resulting in a substantial loss of organic matter and causing environmental pollution. Therefore, it is essential to adopt alternative management practices to conserve soil health, improve ecosystem services, and protect the environment. In this study, we used different microbial consortia to enhance the decomposition of rice straw residue and assess their influence on soil chemical properties. The experiment was conducted at the Research Farm, College of Agriculture, Kaul, CCS HAU, during wheat crop in 2021-2023 with split-split plot design and three replications. The main plot treatments included without residue, residue incorporation and 100% residue retention; subplot treatments included N<sub>0</sub>, N @ 100 kg ha<sup>-1</sup> and N @ 150 kg ha<sup>-1</sup>; sub-subplot treatments included Control, PUSA decomposer-IARI, HAU decomposer and NRRI consortium-Cuttack. The availability of soil macronutrient (N, P and K) and organic carbon were higher when residue was incorporation then followed by 100 % residue retention and minimum to the soil with no residue application. The application of nitrogen with different doses significantly affects the availability of soil macronutrient (N, P and K) and organic carbon and it follows a trend of N @ 150 followed by N @100 kg ha<sup>-1</sup> and lowest in the treatment with no application of nitrogen. Application of different microbial consortia i.e. PUSA decomposer-IARI, HAU decomposer and NRRI consortium-Cuttack significantly increase the organic carbon, available nitrogen, phosphorus and potassium of the soil as compare to control. Microbial consortia for rice straw residue management offer a promising strategy to enhance soil fertility, mitigate environmental concerns and improve crop productivity in rice-based agricultural systems.

**Keywords:** Microbial Consortia, Residue incorporation, Soil Health and Residue retention



# **Estimate the Genotypic and Phenotypic Coefficient of Variation, Heritability in Broad Sense and Expected Genetic Advance in Third Cycle Families of Safflower (*Carthamus Tinctorius* L.) Developed Using GMS Lines**

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The present investigation entitled “Estimate The Genotypic And Phenotypic Coefficient Of Variation, Heritability In Broad Sense And Expected Genetic Advance In Third Cycle Families Of Safflower (*Carthamus Tinctorius* L.) Developed Using Gms Lines” was undertaken to estimate genotypic and phenotypic coefficient of variation, to estimate genotypic and phenotypic correlation and to select the top performing progenies significantly superior over checks AKS-207, Bhima, A-1, PBNS-12 and Phule kusuma. Total 240 progenies having sufficient seeds were selected from random mating population in safflower for third cycle evaluation. These progenies along with five checks (AKS-207, Bhima, A-1, PBNS-12 and Phule kusuma) were grown in augmented block design in *rabi* 2009-10. The genotypic and phenotypic coefficients of variation were high for seed yield per plant (25.22 and 51.29 respectively) followed by no. of capitula per plant (22.77 and 37.32 respectively). The broad sense heritability estimates were high for no. of seed per capitulum (84.80%) followed by days to maturity (79.21%), days to 50% flowering (69.77%), plant height (63.80%), oil content (38.90%), no. of capitula per plant (37.25%) and no. of primary branches per plant (25.13%). The expected genetic advance was highest for no. of seed per capitulum (28.95%) over population mean, over check variety AKS-207 (34.37%) and over Bhima (27.38) at 20 per cent selection intensity for the same character. The seed yield per plant was positively and significantly correlated with days to maturity (0.2724\*\*), plant height (0.3141\*\*), no. of seed per capitulum (0.1768\*), and oil content (0.8814\*\*).

**Keywords:** The Genotypic And Phenotypic Coefficient Of Variation, Heritability, Genetic Advance

## Farming System Approach for Better Livelihood

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The idea of the farming system approach can be summed up as being an all-encompassing strategy that is complex in nature, interrelated of components, and made up of a matrix of soils, plants, animals, power, implements, labour, capital, and other inputs that are influenced by political, economic, institutional, and social forces. The farming systems approach (FSA) aids in the understanding of the farm household's complex decision-making environment and the possibility for improved adaptation, sustainable intensification, and diversification processes. Over the years, the FSA's emphasis and scope have changed and grown. A farming systems approach considers the entire farm rather than just individual components; it is motivated as much by objectives for output and profitability as it is by the general welfare of farming households. Because agriculture continues to be the main source of income for the majority of people living in rural areas and because it also has a significant impact on the lives of many people living in semi-urban areas, farming systems and livelihoods are closely related. Agricultural systems use a complicated combination of inputs that are controlled by farming families but are also impacted by political. The farming systems method, which was initially focused on system characterisation and the design and adoption of better technologies in the 1980s and 1990s, can also be used for policy creation, investment planning, and scaling out. FS-based planning is now more accessible and widely applicable thanks to new breakthroughs in information technology, remote sensing, and GIS applications. In India, there is minimal room for horizontal growth of land for food, feed, fuel, and fibre production because of the country's constantly growing population and declining per capita land availability. Only vertical extension is possible since it requires less

time and space than horizontal expansion and ensures the farmer receives a regular income. The farming system approach, then, assumes enormous importance for good management of farm resources to increase farm productivity, lessen environmental quality deterioration, improve the quality of life of farmers, and above all to maintain sustainability in farm production and productivity. A farming system method needs farmers who are typically of the same sort. It is a multidisciplinary strategy. It is a bottom-up, participatory planning process. Trials on farms are necessary. Depending on the idea of "learning by doing," farming systems require technology that are deemed desirable by society.

GIRDAHA/AB/2023/007

## **Study on performance, yolk cholesterol and serum lipid profile of layer chicken through supplementation of alternative feed resources**

**Chongtham Sonia<sup>1</sup>, Blessa Sailo<sup>1</sup>, M. Norjit Singh<sup>3</sup>, Menalsh Laishram<sup>1</sup>, Chongtham Tania<sup>1</sup>, Ch.Premabati<sup>1</sup>, Romila Akoijam<sup>1</sup>, Arati Ningombam<sup>1</sup>, N.Umakanta<sup>1</sup>, T. Basanta<sup>1</sup>, Kh. Rishikanta<sup>1</sup>, W. Anand meitei<sup>1</sup>, K.Sarika<sup>1</sup>, A. Ratankumar<sup>1</sup>, Ch. Basuda<sup>1</sup> and N.Peetambari<sup>1</sup>**

<sup>1</sup>ICAR-RC for NEH Region, Manipur Centre

<sup>3</sup>Central Agricultural university, Imphal

The experiment was conducted done for 6 weeks duration in laying hens of 30 week old and there were 20 birds in each treatment. There were five number of different treatments, T1 – Control (Corn soya based layer diet), T2- Corn soya based layer diet with perilla @ 50 g/kg in diet, T3- T3- Corn soya based layer diet with perilla @100 g/kg in diet and T4- Corn soya based layer diet with flaxseed @ 50g/kg in diet and T5- Corn soya based layer diet with flaxseed @ 100g/kg in diet. The results revealed that Birds in T5 group have shown significantly better body weight gain (2422 g) when compared with control group during 1<sup>st</sup> week of feeding. Better intake of feed was observed in layer birds fed with perilla and flaxseed at 5% and 10 % inclusion level in 1<sup>st</sup>, 5<sup>th</sup> and 6 week feeding trial. No significant effect on feed conversion ratio was observed. T3 group have shown highest egg production percentage however the change was non-

significant. No significant differences in the yolk weight while yolk cholesterol content was effectively reduced when compared with control group. Egg yolk cholesterol reduction of 9.37% and 14% in T3 (with 10% perilla) and T5 (with 10% flaxseed) group at III and VI week. Significant reduction serum lipid profile (Total serum triglyceride, total serum cholesterol, LDL cholesterol and VLDL cholesterol) while HDL Cholesterol was significantly improved in laying hen by dietary inclusion of perilla and flaxseed. Thus, feeding of perilla and flaxseed at the rate of 5% and 10% inclusion levels in the layer diet have improved the body weight, feed intake with significant better result of lowering egg yolk cholesterol and serum lipid profile of layer chicken.

**Keywords:** Performance, egg yolk cholesterol, serum lipid profile, layer chicken, alternative feed resources

**GIRDAHA/AB/2023/008**

## **Utilization of locally available non-conventional feed stuff for evaluation of blood indices and serum biochemical profile of chicken**

**Chongtham Sonia<sup>1</sup>, Arnab Sen<sup>1</sup>, Blessa Sailo<sup>1</sup>, M.Norjit Singh<sup>4</sup>, Menalsh Laishram<sup>1</sup>, Chongtham Tania<sup>1</sup>, Ch.Premabati<sup>1</sup>, Romila Akoijam<sup>1</sup>, Arati Ningombam<sup>1</sup>, N.Umakanta<sup>1</sup>, T. Basanta<sup>1</sup>, Kh. Rishikanta<sup>1</sup>, W. Anand meitei<sup>1</sup>, K.Sarika<sup>1</sup>, Ch. Basuda<sup>1</sup> and L. Chanu Langlentombi<sup>1</sup>**

<sup>1</sup> ICAR-RC for NEH Region, Manipur Centre

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The experiment was conducted done for 6 weeks duration in laying hens of 25 week old and there were 20 birds in each treatment. Around 400 Kg of *Eichhornia crassipes* was collected from different places of Imphal east district of Manipur mainly from ponds, canal, river etc. The root and stem portion was removed and the promixate analysis of feedstuff was done. Moisture level was 89.9%, Crude protein content of whole mature plant was 18.6% and crude protein of immature young plant was 23.5%. There was four number of different treatments, T1 – Control, T2- with water

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hyacinth @ 30 g/kg in diet, T3- with water hyacinth @ 60g /Kg diet and T4- with water hyacinth @ 100 g/Kg diet. The results revealed that Birds in T4 group fed *Eichhornia crassipes* at 10 % level had significantly improved Total erythrocyte count ( $3.07 \times 10^6 / \text{mm}^3$ ) and total leucocyte count ( $33 \times 10^3 / \text{mm}^3$ ) while no changes were observed in the values of Hb, PCV, MCV, MCH and MCHC values in laying hen. No significant effect was also found in lymphocyte, heterophil, eosinophil and monocyte of differential count in laying hen. Dietary addition of 10% *Eichhornia crassipes* had a significant influenced on serum total protein (4.04g/dl) and serum albumin (1.67g/dl) in T4 group. No influenced on Serum globulin, total cholesterol and triglyceride were found in any of the test diets in laying hen. Thus, inclusion of *Eichhornia crassipes* in laying hen diet had improved the TEC, TLC, total serum protein and serum albumin.

**Keywords:** Non- conventional feed stuff, *Eichhornia crassipes*, blood indices, serum biochemical profile, chicken

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## Physical Properties of Chilli and Seed

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A study was conducted to determine biometric and physical properties of chilli and seed. The average weight of chilli, number of seeds per chilli, husk to seed ratio and thousand seed weight were found to be 12.52 g, 84.60, 12.65 and 7.35 g, respectively. The average size, geometric mean diameter, sphericity, bulk density, true density, porosity, angle of repose and coefficient of static friction of chilli were found to be 72.32 mm, 17.87 mm, 17.36 mm, 28.12 mm, 0.39 per cent, 317.18 kg/m<sup>3</sup>, 701.22 kg/m<sup>3</sup>, 54.74 per cent, 36.71° and 0.26, respectively. The physical properties of seed such as size, geometric mean diameter, sphericity, bulk density, true density, porosity, angle of repose and coefficient of static friction were found to be 4.28 mm, 3.45 mm, 0.92 mm, 2.38 mm, 0.56 per cent, 470 kg/m<sup>3</sup>, 1100 kg/m<sup>3</sup>, 56.63 per cent, 28.0° and 0.73, respectively.

**Keyword:** chilli, seed, physical properties, porosity, density, angle of repose, coefficient of static friction

## **Effect of integrated nutrient management on yield, dry matter of plants and quality of *kharif* sunflower (*Helianthus annuus* L.)**

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A field experiment was conducted during *kharif* 2019 at Experiment Farm, Agronomy section, Oilseeds Research Station, Latur to study the effect of integrated nutrient management on yield, dry matter of plants and quality of *kharif* sunflower" (*Helianthus annuus* L.). The experiment was laid out in RBD with 8 treatments 3 replication. The treatments were T<sub>1</sub> - RDF only, T<sub>2</sub> -RDF + Fly ash (2.5 t/ha), T<sub>3</sub> -RDF + FYM (5 t/ha), T<sub>4</sub> -RDF + ZnSO<sub>4</sub> (20 kg/ha), T<sub>5</sub>-RDF + FeSO<sub>4</sub> (20 kg/ha), T<sub>6</sub> -RDF + Azotobacter (250 gm/10 kg), T<sub>7</sub>- RDF + Vermicompost (2.5 t/ha), T<sub>8</sub>-RDF + Poultry manure (3 t/ha). Seed sown by dibbling method on 5<sup>th</sup> August, 2019. The RDF 90:45:45 NPK kg ha<sup>-1</sup> was applied as per treatment. The crop was harvested on 7<sup>th</sup> November 2019.

The results of the field experiment indicated that the yield, dry matter of plants and quality attributes of sunflower were significantly influenced by different treatments. The significantly higher leaf area plant<sup>-1</sup> (73.20 dm<sup>2</sup>), stem girth plant<sup>-1</sup> (8.60 cm), head diameter plant<sup>-1</sup> (23.83 cm), dry matter plant<sup>-1</sup> (112.57 g) was found significantly superior with application of treatments (T<sub>3</sub>) i.e RDF + FYM 5t/ha over the rest of treatments and number of filled seed plant<sup>-1</sup> (847.4), seed yield plant<sup>-1</sup> (36.30 g), seed yield ha<sup>-1</sup> (1833 kg), stalk yield ha<sup>-1</sup> (4227 kg), biological yield ha<sup>-1</sup> (6060 kg) was found significantly superior over rest of treatments. While higher oil content (19.92 %) and also higher gross (₹76986) and net monetary return (₹40236) with higher benefit cost ratio (2.09) was obtained due to application of treatments (T<sub>3</sub>) i.e RDF + FYM @ 5t/ha and followed by application of RDF + Vermicompost 2.5 t/ha (T<sub>7</sub>) and RDF + Poultry manure 3 t/ha (T<sub>8</sub>).

**Keywords:** Sunflower, yield, Dry matter, Quality, Oil

# **Indigenous knowledge and medicinal and aromatic uses of some plants by local communities in Darjeeling and Kalimpong Himalaya District of West Bengal-Overview**

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In recent decades, it has become increasingly important to document the ethnobiological knowledge of indigenous people who live in and near places with a high biodiversity. The potential availability of medicinal plants in wild areas is threatened by rising use and overexploitation, which raises concerns for their protection. The Darjeeling and Kalimpong Himalaya District of west Bengal is home to a wide variety of plants, many of which have strong therapeutic properties. The ethnomedicine practiced by locals in Darjeeling and Kalimpong Himalaya District of west Bengal, to treat a variety of illnesses and health issues is highlighted in this research. The region has tremendous potential for ethnobotanical study because it is home to three main communities: the Lepcha, the Bhutia, and the majority-Nepalese. This study describes 45 plant species, spread across 36 families, which used by local populations as ethnomedicine to treat roughly 20 diseases that can be further divided into seven major categories. According to the use pattern, up to 10 species can be used to treat cough, cold, and throat issues. There are then 7 species used to treat cuts, wounds, burns, diarrhoea/dysentery, and respiratory illnesses. A maximum of 13 species are targeted for leaf harvesting, followed by 12 species for roots/rhizomes, and the remaining species for various plant parts. The report explores the demand for and significance of ethnomedicinal knowledge in the research area in the context of conservation and socioeconomic development.

**Keywords:** Indigenous knowledge, Medicinal plants, Conservation.

## **Soil physical properties as affected by different nutrient management treatments after maize-wheat rotation in Mollisol.**

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A two-year field experiment was conducted from 2020-21 and 2021-22 at the Norman E. Borlaug Crop Research Centre, G.B.P.U.A & T, Pantnagar, to investigate the impact of various nutrient management treatments on soil physical properties following a maize-wheat rotation. The data indicated a significant reduction in bulk density in both surface and sub-surface soil compared to the control, with the most substantial decrease observed in the treatment 100% RDF +5 t ha<sup>-1</sup> farmyard manure (FYM). Throughout both years of the experiment, among all the different treatments, 100% RDF+5 t ha<sup>-1</sup> FYM exhibited the highest water-holding capacity (52.1% and 54.4%) and mean weight diameter (0.70 mm and 0.74 mm, respectively). Saturated hydraulic conductivity (1.82 and 1.78 mm hr<sup>-1</sup>) and porosity (44.4% and 44.9%) were also notably higher in the fully organic treatment that incorporated 10 t ha<sup>-1</sup> FYM, with or without Azotobacter, compared to the combined application of inorganic and organic fertilizers.

The results suggest that applying 100% RDF in conjunction with 5 t ha<sup>-1</sup> of FYM leads to improved soil quality, emphasizing the essential role of organic manure in enhancing soil physical properties.

**Keywords:** Bulk density, porosity, mean weight diameter, water holding capacity, Maize- wheat rotation.



**Studies on Phytoconstituents, Radicle  
Scavenging activity, LC-MS analysis of leave's  
ethanolic extract of *Butea monosperma* var.  
lutea (Witt.) Maheswari**

**Divyank Manilal Umale<sup>1</sup> and Dr. Esha Rami<sup>1</sup>**

<sup>1</sup> Assistant Professor, Parul Institute of Applied Science, Parul University, Vadodara, Gujrat.

The medicinal potential of Indian herbs is acknowledged and admired around the globe. Across the globe, individuals are becoming increasingly conscious of the positive aspects of employing natural medicines rather than pharmaceutical medications. The most valuable deciduous tree, *Butea monosperma* (Lam.) Taub. Fabaceae, frequently referred to as the "flame of the forest," exists in tropical and subtropical regions of the Indian Subcontinent, Burma, and Ceylon. Aphrodisiac, astringent, bitter, alterative, anthelmintic, antibacterial, anti-asthmatic, anti-convulsive, anti-diabetic, anti-diarrheal, anti-estrogenic, anti-fertility, antimicrobial, anti-fungal, anti-bacterial, anti-stress, chemopreventive, and hepatoprotective effects are all said to be present in the plant. IUCN has declared *Butea monosperma* var. *lutea* (Witt) Maheshw. as a threatened species. Recent investigation indicates that *B. monosperma* var. *lutea* is a significant source of compounds that have both economic and therapeutic potential. Therefore, it is crucial for safeguarding this vulnerable species. The current studies taken under consideration on phytoconstituents, antioxidant property, FTIR analysis, isolation of alkaloids and LC-MS analysis of leave's ethanolic extract of *Butea Monosperma* Lutea var.(witt) Maheshwari

*Butea Monosperma* Lutea var.(witt) Maheshwari plant leaves were cleaned, dried and grinded to form powder. Ethanol as a solvent used for extract preparation by using Soxhlet unit and analysed for qualitative, quantitative test for phenols, flavonoids and tannins free radicle scavenging assay, hydrogen peroxide assay and reducing power assay, FTIR analysis and LC-MS analysis.

Carbohydrates, proteins, amino acids, alkaloids, flavonoids, saponins, tannins, glycosides, terpenoids and phenols showed presence. With reference to standard, at 100mg/ml concentration 77 per cent and of inhibition of leaves states highest DPPH activity. Myosmine, Tecostanine, Oxindole, Monocerin, Kobusone, Tropolone etc phytochemicals are observed in compounds in LC-MS analysis.

**Keywords** – *Butea Monosperma* Lutea var.(witt) Maheshwari, Qualitative, Quantitative Analysis, DPPH Assay, Partition Chromatography, LC-MS analysis

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## **Designing an ionome database for horticulture crops of Sikkim Himalayas**

**Duyu Monya**

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Elements, along with nucleic acids, proteins, and metabolites, are an essential building block of the living cell and are involved in almost every process in an organism. Ionome is defined as “the mineral nutrient and trace element composition of an organism, and represents the inorganic component of cellular and organismal systems” (Salt *et al.*, 2008). It is a dynamic network of elements that are controlled by the physiology and biochemistry of the plant, which are ultimately controlled by the genome, in response to the environment. Elemental accumulation is a complex process that impacts almost every aspect of plant growth, development, and survival. Mass spectroscopy technology has progressed to the point that multiple elements can easily be measured in a high-throughput manner. Measuring multiple elements allows researchers to explore the dynamics of the ionome as a whole, not just individual element in isolation. The present work was carried out in order to achieve the objective of making available ionome data of horticulture crops in the public domain through university website. ICPMS (Inductively-Coupled Plasma Mass Spectrometry) data of crops was collected from ICPMS laboratory, Department of Computer Science Application, Sikkim University, 6th Mile,

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Samdur, Tadong, Gangtok. All the data's collected were brought into single unit i.e., ppm (parts per million) and were arranged in MS excel for easily accessible. Along with the data of the Horticultural crops obtained, different filter components were also added to the database. Horticultural crop ionome database was created using web development paradigm i.e., JavaScript, HTML (Hypertext Markup Language), CSS (Cascating Style Sheet). It provides user interface that allows accessing, analyzing and interpreting among the filter component. This ionome database contains ionomic information for 15 horticultural crops along with other information like habitat, types of crops, explants used, etc. The filter component in database helps the user to narrow down the result and find interesting relationships among them. The information obtained from the these ionome database will be valuable from the point of view of improving crop yields, enhancing agricultural sustainability, and improving food quality for human nutrition.

**Keyword:** Elements, data, database, ionomic, ICPMS

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## ***Lantana camara* : Medicinal Properties and other Uses.**

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In ancient time, plants have been a tremendous source of medicine. Since very long time *Lantana camara* was reported to be used in traditional medicine system for the treatment of itches, cuts, ulcers, swellings, bilious fever, cataract, eczema and rheumatism. It is among top ten invasive, toxic weeds on the earth but also listed as one of the significant medicinal plants of the world. It has been used in many parts of the world to treat a wide variety of disorders. Lantana oil is sometimes used for the treatment of skin itches, as an antiseptic for wounds and externally for leprosy and scabies. Potential of lantadene and its isomers play role in brain activity of animal cell and also used for chicken pox and measles. It has scientifically studied

for various therapeutical activities like antioxidant, antibacterial, anti ulcerogenic activity, anthelmintic activity, anti cancer activity, antipyretic, anti fungicidal activity, larvicidal, insecticidal, antimicrobial, wound healing, nematicidal and anti hyperglycemic. Prevention of such invasive toxic weed, which now becomes the tedious process and simultaneously considering the above medicinal properties with important uses of lantana crop, we should focus on this plant for the advancement through different ways.

**Keywords:** *Lantana camara*, Therapeutical, Nematicidal, Anthelmintic & Medicine

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## **Potential of In situ Green Manuring with Sesbania in Cotton for Enhancing Crop Productivity and Improvement in Salt Affected Soils of Purna valley in Vidarbha region of Central India**

**B. A. Sonune, D. V. Mali, V. V. Gabhane, V. K. Kharche, S. D. Jadhao, S. M. Bhojar, N. M. Konde, R. N. Katkar, A. N. Paslawar and D. N. Nalge**

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The present study was conducted on farmers' field in Purna valley of Vidarbha region to evaluate the potential of in situ green manuring and crop residue for improving soil properties and crop productivity during 2011-12 to 2017-18. The treatments comprised of five different green manures (dhaincha (sesbania), sunhemp, leucaena lopping and greengram), two crop residues (cotton stalk and farm waste) and gypsum. The crop rotations were cotton-(greengram-chickpea)-cotton which is predominantly followed in the area. During first year, cotton was grown in *kharif* and various green manuring crops were sown in between two rows of cotton, which were buried at 30 DAS subsequently in soil. During the

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second year the residual effect of these treatments were studied in green gram –chickpea crops.

The pooled results indicated that significantly higher crop productivity (cotton, greengram and chickpea crops), net monetary returns and B:C ratio was recorded with the application of gypsum @ 2.5 t ha<sup>-1</sup> which was found to be at par with the application of *in situ* green manuring of sesbania. The use of green manuring and crop residues was found beneficial as that of gypsum in improving physical properties of the soils in addition to gradual chemical amelioration. Although considerable improvement in chemical properties has been observed with gypsum application indicating significant reduction in pH and ESP over initial value, the application sesbania in-situ green manuring was also found significant in reduction of pH and ESP. The application sesbania in-situ green manuring was also found useful and superior to gypsum in improving the organic carbon, SOC stock, available NPK and biological properties of soil.

Hence, it can be concluded that *in situ* green manuring of sesbania (Dhaincha) is a best cost effective alternative and potential for improvement in soil properties and sustaining the productivity of cotton-(greengram-chickpea)-cotton rotation along with higher monetary returns as that of gypsum in salt affected soils of Purna valley in Vidarbha region of Central India.

# **Potential of In situ Green Manuring with Sesbania in Cotton for Enhancing Crop Productivity and Improvement in Salt Affected Soils of Purna valley in Vidarbha region of Central India**

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The pooled results indicated that significantly higher crop productivity (cotton, greengram and chickpea crops), net monetary returns and B:C ratio was recorded with the application of gypsum @ 2.5 t ha<sup>-1</sup> which was found to be at par with the application of *in situ* green manuring of sesbania. The use of green manuring and crop residues was found beneficial as that of gypsum in improving physical properties of the soils in addition to gradual chemical amelioration. Although considerable improvement in chemical properties has been observed with gypsum application indicating significant reduction in pH and ESP over initial value, the application sesbania in-situ green manuring was also found significant in reduction of pH and ESP. The application sesbania in-situ green

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manuring was also found useful and superior to gypsum in improving the organic carbon, SOC stock, available NPK and biological properties of soil.

Hence, it can be concluded that *in situ* green manuring of sesbania (Dhaincha) is a best cost effective alternative and potential for improvement in soil properties and sustaining the productivity of cotton-(greengram-chickpea)-cotton rotation along with higher monetary returns as that of gypsum in salt affected soils of Purna valley in Vidarbha region of Central India.

GIRDAHA/AB/2023/018

# Impact of pre and post emergence herbicides on weed control efficiency and yield of maize hybrid

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A study was conducted to develop the weed management option in maize hybrid under irrigated condition at Maize Research Station, Tamilnadu during 2015 to 2017. The experiment comprised with different pre and post emergence herbicides with different doses and combinations which were compared with weedy check (Control) and weed free treatments. These experiments were conducted in Randomized block design with three replications. The result of the experiment revealed that the application of atrazine @ 1.5 kg/ha as pre emergence followed by spraying of halosulfuran @ 60 g/ha as post emergence at 25 DAS gave significantly higher grain yield (10,709 kg/ha, in 2015 *kharif*) and numerically higher grain yield of 8662 kg/ha in *kharif* 2016 in the treatment combination of atrazine as pre emergence @ 750 g/ha + 2,4 - D amine at 25 DAS as post emergence and 11,055 kg/ha of higher grain yield in *kharif* 2017 in the application of atrazine as pre emergence @ 1.5 kg/ha followed by Tembotrione 120 g/ha as post emergence at 25 DAS. The weed control efficiency is higher in the application of atrazine as pre emergence @ 1.5 kg/ha followed by Tembotrione 120 g/ha as post emergence at 25 DAS. The significant higher number of cobs per hectare (54,900/ha) was recorded in atrazine @ 1.5 kg/ha followed by halosulfuran @ 60 g/ha

during *kharif* 2016. The net returns and BCR were significantly higher in the application of atrazine @ 1.5 kg/ha followed by halosulfuron @ 60 g/ha (Rs. 1,05,965 and Rs.70,250 and 3.04 and 2.2 during 2015 and 2016 *kharif* respectively). The net returns and BCR was significantly higher (Rs.1,08,857 and 2.93 ) in atrazine (750 g/ha) + pendimethalin (750 ml/ha) as pre emergence which was on par (Rs.1,06,529 and 2.79) with atrazine (1.5 kg/ha) as pre emergence followed by Tembotrione (120 g/ha) as post emergence in *kharif* 2017.

**GIRDAHA/AB/2023/019**

## **Efficient use of Potassium through Balanced Fertilization for Enhancing Bt Cotton Productivity and Fertility of Vertisols in Central India**

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The field experiment was conducted on farmers' fields in intensive cotton growing area of Akola district in Maharashtra to study the response of cotton to potassium fertilization in order to optimize potassium application for quality cotton yield and maintenance of K status in soils. The experiment was carried out in RBD design replicated five times. The treatments comprised of three levels of potassium (0, 25 and 50 kg ha<sup>-1</sup>) two sources viz. MOP and SOP alone and in combination with foliar application of SOP (@1.5 % ha<sup>-1</sup>)

The pooled results indicated that the highest seed cotton yield and total uptake of Nutrients (N, P, K & S ) by cotton, was recorded with the application of 50 kg K<sub>2</sub>O ha<sup>-1</sup> (SOP) + two sprayings of 1.5% SOP followed by 50 kg K<sub>2</sub>O ha<sup>-1</sup>(MOP) + two sprayings of 1.5% SOP which were found to be on par with each other. The lowest cotton yield with lowest uptake of nutrients was observed under control treatment. The application of 50 kg



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$K_2O$  ha<sup>-1</sup> (SOP) + two sprayings of 1.5% SOP 50 kg  $K_2O$  ha<sup>-1</sup>(MOP) + two sprayings of 1.5% SOP resulted in maximum improvement in soil organic carbon followed by 50 kg  $K_2O$  ha<sup>-1</sup> (SOP) which were on par with each other. The highest available N was observed with the application of 50 kg  $K_2O$  ha<sup>-1</sup> (SOP) + two sprayings of 1.5% SOP which was significantly superior over rest of the treatments. However, the highest availability of P and K was recorded with the application of 50 kg  $K_2O$  ha<sup>-1</sup> (MOP) + two sprayings of 1.5% SOP which was significantly superior over rest of the treatments. The highest net monetary returns was obtained with the application of 50 kg  $K_2O$  ha<sup>-1</sup> (SOP) + two sprayings of 1.5% SOP followed by 50 kg  $K_2O$  ha<sup>-1</sup> (SOP) and 50 kg  $K_2O$  ha<sup>-1</sup> (MOP) + two sprayings of 1.5% SOP.

Hence, it can be concluded that the application of 50 kg K through SOP along with two sprays of SOP @ 1.5 percent was found beneficial for enhancing productivity of Bt cotton and improvement in soil fertility as well as monetary returns cotton in Vertisols of central India.

GIRDAHA/AB/2023/020

## **Effect of Phosphorus solubilizing bacteria on growth and yield of maize hybrid in Southern Agro-Climatic Zone of India**

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Maize (*Zea mays L.*), also called as queen of cereals. It is popularly known as 'corn' is one of the most versatile emerging cash crops having wider adaptability under varied climate conditions. A greenhouse study was to evaluate the effects of four biofertilizers containing an arbuscular mycorrhizal fungus (*Glomus mosseae* or *Glomus intraradices*) with or without N-fixer (*Azotobacter chroococcum*), P solubilizer (*Bacillus megaterium*) and K solubilizer (*Bacillus mucilaginosus*) on soil properties and the growth of *Zea mays*. The use of biofertilizer (*G. mosseae* and three bacterial species) resulted in the highest biomass and seedling height. Based on the study, the present study was taken to evaluate the suitable biofertilizers for maize growth and yield. Field experiments were conducted during *kharif* 2016 and 2017 to evaluate the new biofertilizers (Phosphorus Solubilizing Bacteria) in maize under irrigated condition. The experiment was conducted in Randomized Block Design with three replications with the treatment combinations of PSB – I, PSB – II, NPK Consortia with 30 kg, 60 kg and 90 kg P<sub>2</sub>O<sub>5</sub> (SSP) which were compared with absolute control (Recommended N and K). The result of the experiment in *kharif* 2016 revealed that a numerical higher grain yield (7873 kg/ha) and significantly higher cob number (52,900/ha) were recorded in the application of 60 kg P<sub>2</sub>O<sub>5</sub>/ha + PSB – II treatment. The result of *kharif* 2017 revealed that a numerical higher grain yield (12,849 kg/ha) was recorded in 60 kg P<sub>2</sub>O<sub>5</sub>/ha + NPK Consortia followed by 30 kg P<sub>2</sub>O<sub>5</sub>/ha + NPK Consortia. The net returns and BCR values were significantly higher (Rs. 49,504 and 1.71 in *kharif* 2016) in 60 kg P<sub>2</sub>O<sub>5</sub>/ha + PSB – II and (Rs. 1,22,561 and 2.75) in 60 kg P<sub>2</sub>O<sub>5</sub>/ha + NPK Consortia in *kharif* 2017.

## **Studies on collection and evaluation of genetic variability available in *Amaranthus* (*Amaranthus spp.*) under Chhattisgarh plain condition**

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The experiment “studies on collection and evaluation of genetic variability available in *Amaranthus* under Chhattisgarh plain condition” was conducted at Horticulture Research cum Instructional Farm, Department of Horticulture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during Rabi 2014-15. Twenty five genotypes of *Amaranthus* were evaluated. High magnitude of phenotypic GCV and PCV was observed for seed yield plot<sup>-1</sup>, followed by test weight, petiole length, number of leaves plant<sup>-1</sup>, stem girth, leaf breadth, leaf length, number of branches plant<sup>-1</sup> and leaf yield. The heritability estimates recorded to be high for the characters viz. dry matter per cent, fiber content, seed yield plot<sup>-1</sup>, stem girth, test weight, leaf yield plot<sup>-1</sup>, petiole length, leaf breadth and root length, leaf length, number of branches plant<sup>-1</sup>, plant height. Highest estimates of genetic advance as percentage of mean was obtained for characters namely seed yield plot<sup>-1</sup> and test weight, petiole length, number of leaves plant<sup>-1</sup>, stem girth, leaf breadth.

**Keywords:** *Amaranthus*, genetic variability, GCV, PCV, heritability, genetic advance.

# **Studies on the varietal response to different plant growth regulators for root tuber yield and yield parameters of sweet potato (*Ipomoea batatas* L.) under agro-climate condition of Chhattisgarh plains**

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The present investigation entitled “Studies on response of Sweet Potato [*Ipomoea batatas* (L.) Lam.] varieties to different plant growth regulators for vegetative growth, tuber yield and quality characters under agro-climate condition of Chhattisgarh plains” was conducted in the Horticultural Research-cum-Instructional Farm, Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) in the summer season during the year 2017-18 and 2018-19. Pooled data of 2 years revealed that, V<sub>1</sub>- Indira Nandini X P<sub>4</sub>- CCC-1000 ppm recorded significantly maximum root tuber yield parameters like number of root tubers per plant, root tuber girth (cm), root tuber yield per plant (g), root tuber yield / plot (kg), total root tuber yield (q/ha), number of marketable tuber per plot, number of unmarketable tuber per plot, weight of marketable tuber yield per plot (kg), weight of unmarketable tuber yield per plot (kg), dry weight of root tuber per plant (g), during both years (2018-19 and 2019-20) and on the basis of mean data.

**Keywords:** Sweet potato (*Ipomoea batatas* L.), varieties, Plant growth regulators, yield and yield parameters

## Sex-Sorted *In Vitro* Fertilization of Sahiwal Oocytes

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**Aim:** Important role of sex-sorted in vitro fertilization (IVF) of Sahiwal oocytes in *in vitro* embryo production.

**Objective:** A comprehensive study was planned to investigate the effect of conventional method of IVF ( $1 \times 10^6$  ml<sup>-1</sup>) and sex-sorted method of IVF ( $2 \times 10^6$  ml<sup>-1</sup>) on developmental competence of ovum pick up (OPU) derived Sahiwal oocytes.

**Materials and methods:** Culturable grade OPU derived Sahiwal oocytes were subjected to in vitro maturation in TCM-199. Matured oocytes were subjected to IVF in conventional IVF and sex-sorted IVF groups. Developmental competence of oocytes was assessed by evaluation of cleavage rate day 3 of IVF and blastocyst rate on day 7 of IVF.

**Results:** Cleavage rates and blastocyst rates were significantly higher ( $p < 0.05$ ) in conventional semen IVF (74.96 per cent vs 44.4 per cent) as compared to sexed semen IVF (49.39 per cent vs 26.4 per cent), respectively.

**Conclusion:** Cleavage and blastocyst rates were higher in conventional IVF compared to sex-sorted IVF for OPU derived Sahiwal oocytes. In spite of higher number of spermatozoa, due to the fact that spermatozoa may undergo the damage due to sex sorting process, contribute to the explanation of the low cleavage percentage in this experimental group in present study.

**Keywords:** Sahiwal, OPU, oocytes, antioxidants, Mitochondrial membrane potential, JC-1 stain, Lamin/DAPI stain

## **3s Sustainability Safety and Satisfaction in Natural Farming: Balancing Environmental Stewardship and Farmer Well-being**

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Natural farming is our Indian traditional farming system with the largest farmlands in the world, which advocate with the principles of minimal external inputs, soil conservation and biodiversity preservation. By eschewing synthetic chemicals and embracing organic techniques, natural farming fosters environmental stewardship, mitigates soil degradation and reduces greenhouse gas emissions, contributing to overall sustainability. Moreover, it emphasizes the importance of ensuring farmer safety by mitigating health risks and becomes a transparency and ethical farming practices foster trust between farmers and consumers, enhancing the overall satisfaction with the food supply chain. Additionally, it highlights the social and economic benefits of sustainable natural farming. It discusses the potential for improved livelihoods and rural development, as well as the preservation of traditional knowledge and local culture. It also addresses challenges in adopting natural farming practices on a larger scale, such as transitioning from conventional practices and marketing challenges. Consumer satisfaction is another crucial aspect of natural farming. In conclusion, Natural farming is an eco-friendly and holistic approach to agriculture, holds the promise of promoting sustainability, safety, and satisfaction for both farmers and consumers for a long-term well-being of both current and future generations.

**Keywords:** Chemical free farming, Future generations, Natural Farming and Sustainable livelihood.

# **In vitro evaluation of different plant extracts on the growth of *Corynespora cassiicola* causing target leaf spot disease of cotton under South Gujarat of India**

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Cotton (*Gossypium hirsutum* L.) is one of the most important fiber crops playing a key role in the economic and social scenario of the globe. It is also known as "The white gold" or "The king of fibers". It is a premier cash crop of our country and belongs to the family malvaceae. India is one of the major cotton growing countries in the world. India ranks first in area and second in the total production of cotton in the world. Cotton is grown worldwide for its natural fiber and oil. Cotton is primarily a raw material for a thriving textile industry and is also one of the most ancient and essential commercial crops, second only to food grains. In the present experiment, six different plant extracts were evaluated at 10 per cent and 20 per cent concentration against *C. cassiicola* of cotton under *in vitro* condition. All the plant extracts significantly inhibited the mycelial growth of the pathogen over control. The lowest mycelial growth with the maximum per cent growth inhibition at 10 per cent and 20 per cent concentrations was recorded in Garlic bulb extract (*A. sativum*) while, the highest mycelial growth with minimum per cent growth inhibition at 10 percent concentration was recorded in Onion bulb extract (*A. cepa*) and at 20 per cent concentration in Datura leaf extract (*D. stramonium*).

**Keywords:** *Gossypium hirsutum*, *Corynespora cassiicola*, Target leaf spot, Cotton

## **Efficacy of different baits for trapping fruit flies ingesting mango**

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The present investigation was carried out on to study the efficacy of different baits for trapping fruit flies ingesting mango the effectiveness of baits for trapping of fruit flies infesting mango at Horticulture Nursery, College of Agriculture, Dapoli, Ratnagiri during the months of May and June. Results indicated that the treatment T<sub>7</sub> wherein methyl eugenol was used as bait recorded significantly maximum fly catch during all the observations recorded from first to last week of May and June. Among the other bait treatments the treatment T<sub>5</sub> (*Ocimum* (leaf extracts) + DDVP) recorded significantly more fly catch than rest of the bait treatment during observations recorded on the first, second, third and fourth week. The treatment T<sub>2</sub> (Jaggery + protein hydrolysate + yeast (granules) + DDVP) was observed to be the least effective treatment which recorded significantly the lowest fruit fly population.

**Key words:** fruit flies, methyl eugenol, baits, *Ocimum* leaf extracts

## **Mechanical Characterization of Bagasse fiber reinforced Polymer Matrix Green Composites**

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Nowadays, a rapid growth in research and innovation towards the natural fiber green composites can be observed worldwide due to their advantages over synthetic fiber composites. The advantages are comparable mechanical properties, lower environmental impact, low cost



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and applicability across a wide range of applications. In the current research, mechanical behavior of bagasse fiber(10%wt./wt. 15%wt./wt. and 20%wt./wt.) reinforced composites has been experimentally investigated using Polypropylene(Propel 1110 MAS), Epoxy resin LY 556 and Hardener HY 951 as matrix materials. The thermosets matrix green composites fabricated by Open Molding Method (Hand Lay-up). The Thermoplastics matrix composites fabrication under the three ways (i) Direct Injection molding process, (ii) Extrusion-Injection molding process and (iii) Extrusion - Compression molding process. The thermoplastics matrix composites have been fabricated by Extrusion - Injection molding method under the processing conditions. The developed composites have been tested as per ASTM D3039 M-17 and ASTM D7264 M-15 for tensile and flexural(3-Point bending) properties respectively for analyzing of morphological characteristics. A significant increase in both tensile and flexural properties has been observed when polypropylene is reinforced with bagasse fiber, but a decrease of 13% in tensile strength only has been observed with Epoxy resin LY 556 matrix. Finite Element of Scanning Electron Microscope analysis has been carried out to study the fracture behavior of the developed composites. The results obtained, revealed that bagasse fiber reinforced polypropylene shows better mechanical properties than bagasse fiber reinforced epoxy resin green composites. The Green composites can be evaluated by predictive models, usually by means of Finite Element Analysis or Finite Element Model models. In this work, a green composites material of Epoxy resin matrix LY 556 reinforced with discontinuous bagasse fibres (short/chopped fiber) was produced. The mechanical properties of the matrix and the reinforcement of the green composites were obtained. Mechanical characteristics testing under the Standard of ASTM D 3039 and ASTM D 7264 for the Tensile and Flexural loads were performed on the green composites specimens. Finally, the mechanical behavior of the green composites material subjected to Tensile and Flexural loads was studied numerically by means of finite element analysis.

## **Biochemical Profiling of Mango Genotypes Affected by Black Banded Disease: Comparing Healthy and Infected Stem Bark**

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This study delves into the biochemical changes occurring in the stem bark of six mango genotypes afflicted by black banded disease. The focus was on assessing the levels of total sugars, total phenols, and total alkaloids in both healthy and infected bark tissues. The findings revealed substantial variations between the two conditions. Total sugar content exhibited a significant reduction in infected bark across all genotypes, indicating a potential diversion of nutrients towards the pathogen. Among the genotypes, Kesar displayed the highest mean total sugar content, while Totapuri exhibited the lowest. This trend was consistent for both healthy and infected bark. Notably, the reduction in total sugar content was most pronounced in Alphonso, with a 28.80% decrease, followed closely by Totapuri. Conversely, phenol content demonstrated a marked increase in infected bark compared to healthy tissue. This suggests a heightened defensive response to the pathogen's intrusion. Mallika displayed the highest mean phenol content, indicating a robust resistance mechanism. Interestingly, Alphonso exhibited the lowest increase in phenol content, emphasizing potential variations in genotypic responses to the disease. Total alkaloid content, known for its toxic properties against microorganisms, insects, and herbivores, showed a reduction in infected bark. This may be attributed to the volatile nature of alkaloids, leading to their loss during pathogen-induced degradation of plant cell walls. These findings provide valuable insights into the biochemical alterations occurring in mango genotypes in response to black banded disease. Understanding these responses could be instrumental in developing strategies to enhance disease resistance in mango cultivars.

**Keywords:** Mango, Black band, biochemical alterations, sugars, phenols

# **Advancing Aquaculture Through Vaccination: From Disease Management to Sustainable Growth**

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Aquaculture has witnessed remarkable growth as a response to escalating demands for seafood and sustainable production. However, the industry faces difficulties, most notably disease outbreaks, which negatively affect the economy and environment. Multiple factors, such as environmental stress, overcrowding, and poor water quality, contribute to disease outbreaks. Increased aquaculture techniques increase the risk of disease transmission, affecting domesticated species and nearby wild populations. Aquatic organisms' immune systems are stimulated through vaccination, resulting in targeted pathogen recognition and response. Strong vaccination programmes result in decreased antibiotic use, decreased disease frequency and severity, and increased productivity and well-being of aquaculture species in addition to preventing infections. When disease prevention in aquaculture is examined, it is clear that infectious agents spread easily in large populations, whether they are carp in muddy ponds or Atlantic salmon in clear waters. For the prevention of disease, prudent management and hygienic practices are essential. The revolutionary effect of vaccines in salmon farming, such as immersion vaccines against vibriosis, highlights their effectiveness in lowering the need for antibiotics and increasing production. So, it's important to focus on the critical function of vaccination in aquaculture, farming aquatic organisms, and managing disease. The significant expansion of aquaculture is a response to rising consumer demands for sustainable seafood production. Despite its successes, the industry still faces obstacles, particularly disease outbreaks that may negatively affect the economy and the environment.

# **Oilcakes as emerging organic nematicides against root knot disease caused by *Meloidogyne incognita* via promoting growth, yield, and biochemical performance of cabbage crop**

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Root-knot nematode, *Meloidogyne incognita* is one of the most pathogenic, soil-borne endoparasite infecting almost all vegetables, including cabbage. Control procedures with the use of synthetic nematicides against this pest are unsafe because of its negative impact on both environment and humans. The present study investigated the efficacy of oil cakes namely neem, castor, groundnut and cotton as emerging organic nematicides against *M. incognita* both *in vitro* and pot conditions. *In vitro* study showed the oil cake extracts were observed on juveniles (second stage, J2s) mortality and egg hatching. The maximum J2s mortality and hatching inhibition were recorded in neem cake extract. While lowest mortality and hatching inhibition were recorded in cotton cake extract. Neem cake extract completely destructed the morphology of J2s by rupturing the cuticle of posterior, middle and interior portion of J2s. Pots study demonstrated that the plants cultivated in oil cakes amended soil significantly experienced the reduction in nematode infestation *viz.*, number of galls, number of egg mass/root system, gall index, egg mass index and reproduction factor. However, neem cake treatment at 100 g/pot showed the maximum growth, yield, photosynthetic pigments (chlorophyll 'a', 'b' and carotenoids) and nitrate reductase activity (NR activity) of cabbage crop by reducing nematode infestations. Moreover, an improvement in the number of stomata and stomatal pore size was also seen in neem cake treated plants at 100 g/pot by scanning electron

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microscopy (SEM). These findings recommended the importance of neem cake as an eco-friendly organic nematicide that effectively restricted the damaging impacts of *M. incognita* on cabbage crop.

**Keywords:** Oil cakes, Cabbage, Egg hatching, Juveniles mortality, *Meloidogyne incognita*, Scanning electron microscopy

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# IFS - A Success Story of Innovative Young Farmer

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This paper discusses about the success story of farmer practicing Integrated Farming System (IFS) for sustainable livelihood. Present study was conducted during 2018-19 in Bayyaram village of Bayyaram mandal in Khammam district of Telangana State. A case study approach was followed to document the success of IFS farmer. Mr. Vidyasagar hails from Bayyaram village of Bayyaram mandal in Khammam district of Telangana State. He adopted different IFS components such as Horticulture, Dairy, Poultry, Piggery and Fishery units. He is hardworking nature, an innovator and motivated young farmers. He closely supervised multiple enterprise units and followed new technologies in IFS to get sustainable livelihood. He used new methods of cultivation in IFS and believed that diversification with various components of farming systems results in desired profitability for IFS farmers. Hence, integration of different components with higher input recycling increased farm productivity of different components and also he was able to provide employment opportunities to other farmers through IFS.

**Keywords:** Integrated Farming System, input recycling, higher income, success

## **Influence of Nitrogen and Zinc on Growth, Yield and Economics of Sorghum**

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A field experiment was conducted during *kharif* 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) to study the “Influence of Nitrogen and Zinc on Growth, Yield and Economics of Sorghum (*Sorghum bicolor* L.)”. To Study treatment consisting of three levels of Nitrogen *viz.* 60, 80 and 100 kg/ha and three levels of Zinc *viz.* 15, 20 and 25 kg/ha. There were 10 treatments, each of which was replicated three times and laid out in randomized block design. The results showed that treatment 9 [Nitrogen 100 kg/ha + Zinc 25 kg/ha] recorded significant higher plant height (238.83 cm), higher dry weight (122.37 g), higher length of ear head (27.51 cm), higher seed yield (4430.43 kg/ha), higher stover yield (7246.58 kg/ha), higher number of grains/head (981.34) and higher harvest index (38.75 %) was recorded in treatment 9 [Nitrogen 100 kg/ha + Zinc 25 kg/ha]. Similarly, maximum gross return (1,46,993.65 INR/ha), maximum net return (99,186.03 INR/ha) and highest benefit cost ratio (2.08) was also recorded in treatment 9 [Nitrogen 100 kg/ha + Zinc 25 kg/ha] as compared to other treatments.

**Keywords:** Sorghum, Nitrogen, Zinc, Growth, Yield, Economics

## Analyzing the influence of *Trichoderma viride* on ginger's total phenol and proline content in combating *Meloidogyne incognita*

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Ginger, a widely utilized spice on a global scale, holds significant economic importance as a major cash crop. The Koraput district in Odisha is one of the India's largest ginger growers. This plant loses yield to *Meloidogyne incognita* infestation alone or in a disease complex. However, ginger plants in this region face a significant challenge in the form of yield loss caused by infestation from the nematode species known as *Meloidogyne incognita*, either individually or as part of a disease complex. Several nematicides are readily available to keep infection below the economic threshold, but environmental degradation and economic issues render them unviable. Whereas, *Trichoderma viride*, a biological control agent, emerges as a promising alternative to lower the nematode population below ETL and boost the plant development. This study selected two germplasm, Suravi (resistant) and Suprabha (highly susceptible). The Total phenol content and proline content of fresh ginger rhizome were examined with the hypothesis that *Trichoderma viride* inoculation will significantly affect the selected properties in presence of *Meloidogyne* infestation compared to other treatments. *Trichoderma viride* was inoculated 15 days prior to nematode inoculation (TV→MI) recorded as having highest total phenol content; 1.64 and 1.5 mg g<sup>-1</sup>, whereas nematode-infected alone (MI) plants had the highest rhizome proline content; 18.24 and 19.32 mg g<sup>-1</sup> in Suravi and Suprabha respectively over control.

**Keywords:** *Trichoderma viride*, proline, ginger, total phenol, *Meloidogyne incognita*

## **Agricultural Extension: A Tool for Bridging the Technological Gaps on Farmers Field**

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Regional Agricultural Extension Education Centres (RAEEC) under Directorate of Extension Education, Vasant Rao Naik Marathwada Krishi Vidyapeeth, Parbhani are established at Ambajogai, Latur, Aurangabad and Parbhani to disseminate the agricultural technology among the farmers of Marathwada region comprising eight districts. RAEEC Ambajogai is working for Beed and Osmanabad, RAEEC Latur for Latur and Nanded, RAEEC Parbhani for Parbhani and Hingoli while RAEEC Aurangabad for Aurangabad and Jalana districts. Among various crop production factors management of insect pests and plant diseases are the crucial factors determining the crop yields at field level. The impact of climate change and weather variabilities, created enormous difficulties at farmers level to harvest crop yields with its full potential, mainly in agronomical crops of the region like soybean, redgram, gram while to some extent horticultural crops like papaya, banana and chilli. Dryspell of more than 15 days and heavy rainfall coupled with high humidity and low solar radiation increased the infestation of stem borer in soybean and rhizoctonia and phytophthora wilt in redgram respectively. Soybean followed by gram is the major cropping system of the region which created the problem of wilting in gram. Undernutrition of micronutrients and low organic carbon content of the soil created unhealthy and virus infected growth of papaya, banana, and chilli. Extension agronomist of the RAEEC and subject matter specialist visited and listed out the major diseases on farmers field and provided the intergraded approach to overcome it. RAEEC of Ambajogai and Latur developed system to approach 40000 farmers of each district with collaborative work with Agriculture department. RAEEC are playing important role in bridging the technological gaps on farmers field by implementing published research in effective way.

**Keywords:** Agricultural Extension, technological gap



## **Green synthesis of copper nanoparticle using *Azadirachta indica* leaf extract and its effect on *Trichoderma viride***

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This study focused on the green synthesis of copper nanoparticles (CuNPs) using leaf extract from *Azadirachta indica*, commonly known as neem, and its impact on *Trichoderma viride*. The copper nanoparticles (CuNPs) were synthesized using a leaf extract from *Azadirachta indica* as a precursor and an aqueous solution of CuSO<sub>4</sub>·5H<sub>2</sub>O as a reducing agent. The green-synthesized CuNPs were negatively charged and had a moderate dispersion. They were spherical in shape and had an average diameter ranging from 152.32 to 440 nm, with sizes ranging from 141.8 to 3091 nm and a polydispersity index (PDI) value of 0.286.

The researchers exposed *T. viride* to various doses of CuNPs, ranging from 1 to 1000 ppm/L. During the initial 48 hours the different doses of CuNPs observed their effects on the growth and growth rate of *T. viride*. After that time period, no significant effect on growth and growth rate was observed. The colony zone length of *T. viride* varied when exposed to different doses of CuNPs, but there was no consistent effect observed. The application of different CuNPs doses also affected the colony zone color of *T. viride*. Moreover, an increase in CuNPs doses led to increased fuzziness in the extending zone of *T. viride* at 96 hours. However, the different doses of CuNPs had no significant impact on other cultural characteristics of *T. viride*, such as colony form/shape, elevation, margin/border, surface texture, sporulation initiation, opacity, conidiation, and exudates on the colony.

## **Evaluation of Chemicals against Purple Blotch of Onion caused by *Alternaria porri* for Seed Production**

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A present investigation for the management of purple blotch of onion (*Allium cepa*) was carried out at Department of Plant Pathology and Department of Vegetable Science, College of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during 2018- 19. In the experiment among the different treatments, treatment (T9) i.e. bulb dip (Copper oxychloride @ 0.25% + Streptomycin @ 200 ppm) + spraying with (Mancozeb @ 0.25% + Carbendazim @ 0.10% + Copper oxychloride @ 0.25%) treatment recorded lowest per cent disease intensity i.e. 15 per cent and it showed highest per cent disease control i.e. 55.13 per cent and followed by treatment (T6) i.e. spraying with (Mancozeb @ 0.25% + Carbendazim @ 0.10% + Copper oxychloride @ 0.25%). The maximum seed yield obtained in treatment T9 i.e. 1022 kg/ha which was found significantly superior over rest of the treatments and followed by T7 bulb dip (Copper oxychloride @ 0.25% + Streptomycin 200ppm) + spraying with (Mancozeb @ 0.25% + Carbendazim @ 0.10%) i.e. 1003 kg/ha. Different chemical treatments effectively controlled the onion purple blotch with increased seed yield over control in the range of 26.62 % to 68.98 %.

## **Effect Of Water Soluble Fertilizer And Humic Acid On Growth And Quality Of Rose Under Protected Conditions**

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A field investigation entitled “Effect of water soluble fertilizer and humic acid on rose under protected conditions.” was carried out at College of Agriculture, Nagpur (MS.), Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola. Dist. Akola during *rabi* season in year 2021-2022. The experiment was laid out in Factorial Randomized Block Design with four levels of 19:19:19 water soluble fertilizer [Control, 200 g 19:19:19, 300 g 19:19:19 and 400 g 19:19:19] and three levels of humic acid [Control, 500 ppm humic acid, 750 ppm humic acid] with twelve treatment combinations replicated thrice. The result of the present investigation revealed that, significantly maximum plant height and plant spread were recorded in treatment combination (300 g 19:19:19 + 750 ppm humic acid). In respect of quality parameters like diameter of flower stalk, length of flower stalk at bud initiation, diameter of bud, length of bud, diameter of flower, length of stalk after opening of flower, number of petals flower<sup>-1</sup>, longevity and vase life were found significantly maximum were recorded in the application of 400 g 19:19:19 water soluble fertilizer with 750 ppm humic acid. However, highest yield plant<sup>-1</sup> and plot<sup>-1</sup> were recorded in applications of 300 g 19:19:19 water soluble fertilizer and 750 ppm humic acid (F<sub>3</sub>H<sub>3</sub>).

**Keyword:** Rose, water soluble fertilizer, protected condition etc.

# **Ergonomic Risk Factors Associated with Workers Involved in Shaping and Crushing Activity in Stone Masonry Work**

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Construction is one of the important industries which employ a large number of people in its workforce. Job opportunities in the hilly regions are very less due to low education level, therefore, the majority of the people are involved in stone masonry work to sustain their lives and it become a second important source of income in hilly areas after agriculture. The present study was purposively conducted in the Kumaon region of Uttarakhand, India, with the objective – of assessing the ergonomic risk factors associated with this work. Methodology – A Modified Nordic Musculoskeletal based questionnaire was used for assessing pain or discomfort and a Rapid Entire Body Assessment sheet was used for assessing postural load among workers. It is basically a labour intensive job, where most of the activities are performed manually. Occupational health and safety hazards are more pronounced in manual crushing and shaping of stones operations. Results revealed that an old traditional tool (hammer) without any palm support was used in crushing and shaping activities therefore workers were in direct contact with hard surfaces and complained about pain in the palm portion. While performing these activities workers were adopting awkward postures for long periods of time and were at risk of injuries and musculoskeletal disorders. REBA scores indicated that in both activities the higher MSD risk was noticed in the lower back, wrist/ hands and knees. It was also found that workers were not using and personal protective equipment while working and at risk of injuries. A significant association was found between musculoskeletal disorder and body regions especially, in the lower back, wrist and knees in both activities.

**Keywords-** crushing, shaping, stone masonry, musculoskeletal disorders, injuries, posture

# GRAS compounds: Alternatives to conventional fungicides

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Numerous post-harvest diseases are caused by various fungi and bacteria found during fruit storage and transportation. These pathogens have the ability to cause an infection either in the field prior to harvest or after harvesting. Post-harvest diseases can be managed by using physical, chemical and biological methods, although each has significant limitations. One of the most significant causes for financial losses in global market for horticulture produce is post-harvest deterioration due to fungal diseases. Control of post-harvest diseases has relied on continuous application of traditional chemical fungicides for many years. However, need for non-polluting alternative is increasing due to problems with people health and environment problems related to production of chemical residues. Minimal-toxicity substances with low environmental and mammalian toxicological effects are assessed as food preservatives or as generally recognised as safe (GRAS) compounds. Among them, organic or inorganic salts like carbamates, silicates, sorbates, benzoates etc., demonstrate important benefits for possible commercial use, including their accessibility, low cost and high solubility in water. These substances were evaluated under *in-vitro* and *in-vivo* conditions on fresh fruits. Pathogens were artificially inoculated on fruits to conduct laboratory and small-scale experiments. However, naturally infected fruits were used for semi-commercial or commercial trails. These coatings could be utilized for organic or “zero residue” fresh fruit cultivation system instead of fungicides amended with commercial waxes. Aqueous solution of GRAS organic and inorganic salts as antifungal treatments were used to regulate major post-harvest diseases of stone fruits.

**Keywords:** Safe compounds, fruits, diseases, control, food preservatives, toxicology

## **Extractive organisms enhance water and nutrient quality in Freshwater Integrated Multi-Trophic Aquaculture system.**

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The current study was conducted to assess the GIFT tilapia's production capabilities in a freshwater-integrated multi-trophic aquaculture system. In order to evaluate the growth, survival, water quality, and physiological response of GIFT-fed fish in 1000 l outdoor tanks, the experiment was conducted over 60 days using floating weed *Lemna minor* as an inorganic extractive and bivalve *Lamellidens marginalis* as an organic extractive. Only GIFT was designated as the control (C) treatment, followed by T1 with GIFT and *L. minor*, T2 with GIFT and *L. marginalis*, and T3 with GIFT, *L. minor*, and *L. marginalis*. In contrast, *L. minor* was transplanted to cover 25% of the tank's surface area. The stocking densities for GIFT and *L. marginalis* were 4,00,000 fingerlings ha<sup>-1</sup> and 750 kg ha<sup>-1</sup>, respectively. At a 4% body weight rate, the fish were given floating pelleted feed containing 30% crude protein. Among different growth parameters, the growth, biomass, survival, daily weight gain (DWI), and daily growth index (DGI) were highest in T3. Significant differences ( $p < 0.05$ ) were observed between different treatments in pH, electrical conductivity, DO, total hardness, and TDS among various water quality parameters. Transparency was found to be relatively high in T3. The control group had higher levels of inorganic nutrients such as ammonia, nitrite, nitrate, phosphate, and potassium, whereas T3 and T1 had lower levels, respectively. Overall, results indicate that the FIMTA of GIFT with *L. Minor* and *L. marginalis* can ameliorate water quality and enhance productivity.

**Keywords:** FIMTA, Extractive organisms, IMTA, GIFT, *Lemna minor*, *Lamellidens marginalis*

# **Advancing Agricultural Sustainability: Analysing Stability for Future Resilience**

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Stability analysis in Agriculture seeks to gather researchers, practitioners, and stakeholders from diverse fields to explore and discuss its critical aspects. As global populations and environmental challenges continue to grow, the need for resilient agricultural systems has never been more essential. This poster aims to bridge the gap between theory and practice, bring up innovative solutions that can enhance the stability and sustainability of agriculture in a rapidly changing world. Role of stability in: (1) Stability of crop yields under various environmental stressors, including climate change, pests, and soil degradation, and developing strategies to enhance crop resilience. (2) Analyzing the role of biodiversity in stabilizing agricultural ecosystems and evaluating the provision of ecosystem services for sustainable farming practices. (3) Exploring cutting-edge technologies and data-driven methods for controlling and monitoring agricultural stability, including precision agriculture, remote sensing, and data analytics. (4) Evaluating the role of government policies, international agreements, and local governance structures in promoting agricultural stability and sustainability. (5) Evaluating the stability of food supply chains and exploring innovations to enhance the resilience of food systems in the face of disruptions. Stability analysis in agriculture is a valuable tool used to assess and improve the performance and resilience of crop production systems. It involves studying how different factors, such as environmental conditions, crop varieties, and management practices, affect the stability of crop yields over time.

**Keywords:** Sustainability, Stability, Biodiversity, Ecosystem, Technology

## **Variability in *Phloeospora maculans* (Bereng) Allesch. causing leaf spot disease of mulberry (*Morus* spp.) in Kashmir**

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Diseases are major limiting factor in mulberry cultivation for production of both quantitative and qualitative leaf. Among the mulberry foliar diseases, leaf spot is one of the most wide spread disease of mulberry and has posed a serious threat to silk industry. The disease directly affects leaf yield of about 5 per cent due to defoliation, which may however, reach up to 35 per cent in the most severe conditions resulting in severe economic loss to the farmers. In addition, it also causes 20-25 per cent loss due to destruction of leaf lamina and makes it unpalatable to silkworms. Knowledge of variability of the fungal population associated with an infection improves the disease control strategies. Pathological, morphological and cultural methods were employed to ascertain the variability in 27 isolates of *Phloeospora maculans* collected from Srinagar, Bandipora and Baramulla districts of Jammu and Kashmir, India. Pathological variability in different isolates of *P. maculans* was observed following detached leaf technique using healthy leaves of mulberry cultivar Serpentina. A significant variations in colony characteristics (colony colour, colony texture, underside colour of Petri plates) of different isolates of *P. maculans* was observed on Potato Dextrose Agar (PDA) media. Besides, various isolates of *P. maculans* cultured on PDA medium showed significant variations in their colony diameter, colony growth and mycelial dry weight. The isolates collected from same or different mulberry cultivars from same location also showed a visible variation in their growth. Conidial characteristics such as shape, size, colour and septation also varied in different isolates of *P. maculans*.

**Key words** Mulberry, Leaf spot, *Phloeospora maculans*, Variability



## **Effect of COVID-19 on Interpersonal Relationship among Late Adolescents**

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Late adolescents have been severely damaged by social exclusion. Human to human interaction is significantly impacted by this pandemic situation, which results in a loss of interpersonal communication. This has a direct impact on the social relationships we have with the people we know in society. Researchers have found that late adolescents are more likely to experience loneliness due to difficulties forming social connections. The pandemic crisis has fundamentally altered how we all perceive relationships. This would undoubtedly have an effect on society as a whole and may even have a longer-lasting effect on our individual relationships. Certain psychologically significant variables are contributing to this pandemic isolation. Although the pandemic is believed to have an impact on late adolescents' mental health and wellbeing, there are significant individual variations in how late adolescents are affected. Many late adolescents were able to continue working on college assignments from home while still connecting with online. The COVID-19 pandemic may have a good impact on those late adolescents who are resilient or even resilient in a negative way. However, late adolescents from more disadvantaged and lower-income contexts particularly felt the effects of the pandemic; they dealt with issues with virtual connectedness, a loss of family income, greater rates of illness and mortality in the community. As a result of not being able to meet their loved ones in person owing to the current scenario, the results reveal that young adults are feeling irritated, disappointed, lonely, bored and fearful of losing their friends. The ability to control these outcomes by consciously creating connections and developing empathy.

**Keywords-** Late adolescents, pandemic, interpersonal, social relationships and resilient

## **Fish Proteins: Nutritional Significance, Structural Diversity, and Health Implications for Humans**

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Fish has been a mainstay of human diets since ancient times and is an excellent source of high-quality proteins and other nutrients. This study discusses the nutritional value, structural variation, and functional significance of fish proteins and how they operate in fish. We examine the many proteins found in fish, their health benefits, and how they impact the dietary intake of humans. We also consider future directions for the field and how the environment affects the structure of fish proteins. This study fully explains the proteins found in fish, focusing on their significance for human nutrition and health.

## **Isolation, morphological Characterization and chitinase production ability of *Trichoderma* spp. isolated from saline soil**

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*Trichoderma*, soil-borne filamentous fungi, are capable of parasitising several plant pathogenic fungi. Fourteen isolates of *Trichoderma* spp. isolated from different locations of Amravati, Akola and Buldhana districts located in saline tract of Purna valley in Vidarbha region

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of Maharashtra state and given code to each isolate were characterized for their cultural, morphological. The sequencing of these isolates showed fourteen different species. Significant chitinase activities of all *Trichoderma* isolates has been recorded in growth medium. TrNd-14 (Nandura) found to possessed highest chitinase enzyme i.e. 0.65 units/mg of protein.

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# Management of bulb rot of onion caused by *Erwinia carotovora* pv. *carotovora*

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The bulb rot caused by *Erwinia carotovora* pv. *carotovora* is major important disease of onion is difficult to control without application of bactericides and fungicides respectively. *Erwinia carotovora* pv. *carotovora* causes 40 to 80% losses in onion. In present investigation studies were undertaken to manage bulb rot disease of onion through the use of bactericide and fungicides. Efficacy of different chemicals was tested by filter paper disc diffusion method against *Erwinia carotovora* pv. *carotovora*. Maximum growth inhibition of *Erwinia carotovora* pv. *carotovora* recorded in copper oxychloride @ 0.25% + streptomycin @ 200 ppm (23.00 mm), followed by streptomycin @ 200 ppm (18.00 mm). Under field condition, treatment with bulb dip in copper oxychloride @ 0.25% + streptomycin sulphate @ 200 ppm + spraying with copper oxychloride @ 0.25% was found most effective treatment against bulb rot of onion as it recorded minimum disease incidence (19.67%) with maximum disease control (53.46%). Maximum seed yield obtained in treatment with bulb dip copper oxychloride @ 0.25% + streptomycin 200ppm + spraying with mancozeb @ 0.25% + carbendazim @ 0.10% + copper oxychloride @ 0.25% i.e 1022 kg/ha which was found significantly superior over rest of the treatments.

## **Developmental study of *Ocimum* leaf folder *Orphanostigma abruptalis* (Lepidoptera: Crambidae) on sweet basil in ambient condition**

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Sweet basil (*Ocimum basilicum* L.) is an annual, aromatic, herbal plant, belonging to the family Lamiaceae. It is often referred to as the "King of the herbs" due to its numerous applications in medicine, cosmetics, and the food and pharmaceutical industries. The experiment was conducted during the year 2021-22 at Herbal Garden, RPCAU, Pusa (Samastipur) Bihar. The ocimum leaf folder, *O. abruptalis*, is listed as a serious pest of sweet basil among all of the insect pests able to infect sweet basil (*Ocimum basilicum* L.). The larvae seriously harm the plants by adhering to the underside of the leaf, folding them lengthwise from the midrib, and webbing them until they start falling off. The findings of this experiment revealed that the total life cycle of ocimum leaf folder was completed in 25-36 days in laboratory conditions with incubation period of 3-6 days, larval period with 9-14 days, pupal period with 4-6 days, total developmental period was 16-25 days and adult longevity was 9-12 days on fresh sweet basil leaves. In fifth instar larvae body shape was similar to fourth instar except more elongated and the fully matured caterpillar having 16.80 mm length and 2.03 mm width. Adult male was brown, with three wiggly brown lines across each forewing and two across hind wings, about 6.85 mm and 14.52 mm of body length and wing span, respectively, the hind wings had dark black colored margins, and it lasted for 7- 9 days. While the female moth was light coloured, about 7.60 mm and 16.75 mm of body length and wing span with light black wing margins and it lasted for 9 to 12 days.

# **Application of CRISPR/Cas-Mediated Genome Editing in Fruit Crops**

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A healthy, balanced diet must include fruits since they are an important source of fibre, important vitamins, and trace minerals. Important research goals include extending fruit shelf life and improving fruit quality. Traditional approaches, however, have substantial drawbacks that impede the study from progressing, such as a drawn-out procedure, poor efficiency, and challenges in targeting certain genes. The clustered regularly interspaced short palindromic repeats (CRISPR)/Cas9 technique has lately grown in popularity due to its high efficacy, simplicity, and low cost. It is normal practise to totally modify genetic material and evaluate gene function using the CRISPR/Cas9 technology. CRISPR/Cas9 technology's most recent advancements for improving fruit quality. For instance, the CRISPR/Cas9 system may precisely modify the RIPENING INHIBITOR gene (RIN), Lycopene desaturase (PDS), Pectate lyases (PL), SIMYB12, and CLAVATA3 (CLV3) to modify fruit ripening, bioactive compounds, fruit texture, fruit colouring, and fruit size. Fruit quality can be improved by using the CRISPR/Cas9-mediated mutagenesis method to target certain genes. For the human diet, fruit crops, which comprise both climacteric and non-climacteric fruits, are the main suppliers of nutrients and fibre. Since its widespread adoption in many plants in 2013, the genome editing technique CRISPR/Cas (Clustered Regularly Interspersed Short Palindromic Repeats and CRISPR-Associated Protein) has led to remarkable improvements in the genetics of numerous fruit crops that are significant from an agronomic perspective. Here, we cover current advancements in fruit crop CRISPR/Cas genome editing, including research into how plants evolve and protect themselves. The genome editing method CRISPR/Cas (Clustered Regularly Interspersed Short Palindromic Repeats and CRISPR-Associated Protein) has significantly improved the genetics of numerous fruit crops since its widespread adoption in many plants in 2013. These improvements are significant from an agronomic standpoint.

## Effectiveness of Botanicals on Mortality of Pulse Beetle, *Callosobruchus chinensis*.L (Coleoptera: Bruchidae) in Stored Chickpea

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The Effectiveness of botanicals on mortality of pulse beetle, *Callosobruchus chinensis* L. in stored chickpea was studied invitro at Department of Entomology, SHUATS, Prayagraj, India during 2020-2021. The experiment was conducted at ambient room temperature of  $28\pm 2^{\circ}$  C and relative humidity of 65 to 70% and was laid in Completely Randomized Design with twelve treatments (Neem oil, Castor oil, Pungam oil @2ml/100gm of seeds and plant powders Neem leaf powder, Neem seed kernel powder, Vasambu rhizome powder, Turmeric powder, Custard apple leaf powder, Eucalyptus leaf powder, *Lantana camara* leaf powder, Notchi leaf powder @2g/100gm of seeds, insecticide (Rynaxypyr) @0.01ml/kg of seeds) and untreated control. All the treatments were found to be significant in recording percent mortality of *Callosobruchus chinensis* L. as compared to control. Among the different treatments used, maximum percent mortality of *Callosobruchus chinensis* was observed in the chickpea treated with plant oils: Neem oil, castor oil and Pungam oil (100%) after 96hours. Among the plant powders Vasambu rhizome powder (100%) recorded highest percent mortality of *Callosobruchus chinensis* followed by Turmeric powder (98.33%), *Lantana camara* leaf powder (95.00%), Custard apple leaf powder (91.67%), Neem leaf powder (85.00%), Eucalyptus leaf powder(83.33%), Notchi leaf powder (81.67%), insecticide (Rynaxypyr) (65.00%) and Neem seed kernel powder (56.67%) after 96hours. The least percent mortality was observed in seeds treated with Neem seed kernel powder (56.67%). However all the plant oils: Neem oil, castor oil and Pungam oil and plant powder: Vasambu rhizome powder proved best in giving 100% mortality of *Callosobruchus chinensis* after 96hours of treatment.

**Keywords:** Botanicals, *Callosobruchus chinensi*, Mortality, Pulse beetle, Vasambu rhizome powder.

## **Drumstick based Agri-horticultural Systems under rainfed condition**

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(Gujarat)

A field experiment was conducted, to study the suitable intercrops in drumstick plantation under rainfed condition during the kharif season of the 2020-21 at Centre for Natural Resources Management, Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar, Gujarat. The experiment was laid out in a randomized block design with different treatments viz., drumstick sole, greengram sole, pearl millet sole, fodder sorghum sole, castor sole, drumstick + greengram, drumstick + pearl millet, drumstick + fodder sorghum, drumstick + castor. The soil of the experimental field was loamy sand in texture with good infiltration capacity. Amongst different systems, drumstick + greengram recorded significantly the highest drumstick equivalent yield (9503 kg/ha) and Land Equivalent Ratio (1.79). Drumstick + Greengram system also incurred the maximum net returns (Rs74182/ ha), Benefit Cost Ratio (4.56) and Rain Water Use Efficiency (11.10 kg/ha.mm) followed by Drumstick + Castor.

**Key words:** Agri horticultural system, Drumstick, Economics Land equivalent ratio and RWUE

# **Developmental study of *Ocimum* leaf folder *Orphanostigma abruptalis* (Lepidoptera: Crambidae) on sweet basil in ambient condition**

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Sweet basil (*Ocimum basilicum* L.) is an annual, aromatic, herbal plant, belonging to the family Lamiaceae. It is often referred to as the "King of the herbs" due to its numerous applications in medicine, cosmetics, and the food and pharmaceutical industries. The experiment was conducted during the year 2021-22 at Herbal Garden, RPCAU, Pusa (Samastipur) Bihar. The ocimum leaf folder, *O. abruptalis*, is listed as a serious pest of sweet basil among all of the insect pests able to infect sweet basil (*Ocimum basilicum* L.). The larvae seriously harm the plants by adhering to the underside of the leaf, folding them lengthwise from the midrib, and webbing them until they start falling off. The findings of this experiment revealed that the total life cycle of ocimum leaf folder was completed in 25-36 days in laboratory conditions with incubation period of 3-6 days, larval period with 9-14 days, pupal period with 4-6 days, total developmental period was 16-25 days and adult longevity was 9-12 days on fresh sweet basil leaves. In fifth instar larvae body shape was similar to fourth instar except more elongated and the fully matured caterpillar having 16.80 mm length and 2.03 mm width. Adult male was brown, with three wiggly brown lines across each forewing and two across hind wings, about 6.85 mm and 14.52 mm of body length and wing span, respectively, the hind wings had dark black coloured margins, and it lasted for 7- 9 days. While the female moth was light coloured, about 7.60 mm and 16.75 mm of body length and wing span with light black wing margins and it lasted for 9 to 12 days.



## Effect of Modified Freezing Diluent on Post-Thaw Casa Parameters of Poor Freezable Sahiwal Bull Semen

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**BACKGROUND:** There is a gap between the frozen semen doses produced and the frozen semen doses required. One way to address this issue is by procuring semen doses from poor freezable bulls by altering the conventional freezing protocol. **OBJECTIVE:** The present study aimed to ascertain the impact of modified freezing diluent with extra- (trehalose) and intra-cellular cryoprotectants (glycerol) on the sperm kinematic parameters of poorly freezable ejaculates. **MATERIAL AND METHODS:** The semen samples were collected from three Sahiwal bulls (6 ejaculates each)) and were split into two. Split 1 considered as a control and was extended using a Tris fructose egg yolk glycerol extender with 6.4% glycerol (v/v) subjected to conventional freezing. While split 2 was extended using a Tris fructose egg yolk glycerol extender with trehalose (25%) and glycerol (5%) and underwent a modified freezing protocol. **RESULTS:** Analysis of the post-thaw sperm kinematic parameters revealed that the treated sample significantly ( $p \leq 0.05$ ) surpassed the control sample in preserving the CASA parameters of poor freezable ejaculates. Finally, a modified freezing protocol with trehalose and glycerol successfully preserved sperm motility.

**Keywords:** Bull; CASA; poor freezable; modified; trehalose

## Evaluation of gibberellic acid and sulphur levels on growth and yield of onion (*Allium cepa* L.)

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The field experiment entitled “Evaluation of gibberellic acid and sulphur levels on growth yield and quality of onion (*Allium cepa* L.)” was conducted at ARC, Department of Horticulture, Faculty of Agriculture Science & Technology, Rabindranath Tagore University, Raisen, (M.P.) during *Rabi* season of 2022-23. The experiment was laid out in eight treatments with Factorial Randomized Block Design. The results of the experiment revealed that the current recommendation of GA<sub>3</sub>- 100 ppm with applications of sulphur 45 Kg/ha was recorded better than other treatment combination on growth parameters likewise, plant height, number of leaves per plant at 30, 45, 60 and 90 DAT, fresh and dry weight per plant at 45 DAT and leaf area index at 30, 45, 60 and 90 DAT and yield attributes *viz*; bulb diameter, fresh bulb weight, bulb weight per plot and bulb yield per ha during experimentation. Among the treatments, G<sub>2</sub>- GA<sub>3</sub>100ppm and application of sulphur S<sub>4</sub>- sulphur 45 Kg/ha recorded significantly highest value of growth and yield attributes as compared rest of the treatments. The maximum net returns (Rs. 186502.00 ha<sup>-1</sup>) was obtained from the treatment combination of G<sub>2</sub>- GA<sub>3</sub> 100 ppm + S<sub>4</sub>- Sulphur 45 Kg ha<sup>-1</sup> and minimum net income (Rs. 100923.00 ha<sup>-1</sup>) was recorded in the treatment combination of G<sub>1</sub>- 50 ppm +S<sub>4</sub>- sulphur 00 Kg ha<sup>-1</sup> along with agronomic practices for nutrient management. Thus, it was concluded that it was found that application of gibberellic acid 100 ppm with 45 Kg/ha sulphur was economically viable and if could be adopted may enhance the profit of the cultivators of this region.

**Keywords:** Onion, Gibberellic acid, Sulphur, yield, quality

# Soil Properties, Yield and Nutrients Uptake by Rice as Influenced by Integrated Nutrient Management (INM) in a Vertisol

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The impact of increased inorganic fertilizer use on crop production has been large, but ever increasing cost of energy is an important constraint for increased use of inorganic fertilizer. The experiment was laid out in eleven treatments with RBD design with four replications. Experimental results it was concluded that the yield components such as number of tillers hill<sup>-1</sup>, length of panicle, no. of grains panicle<sup>-1</sup> and test weight were highest in the treatment which received 50% NPK+50% N through GLM (T<sub>9</sub>). The highest grain and straw yield were recorded value of 4.41 and 9.95 t ha<sup>-1</sup> in the treatment T<sub>9</sub> i.e., received 50% NPK+50% N through GLM and lowest value of 0.92 and 2.03 t ha<sup>-1</sup> in T<sub>1</sub> (control) respectively. Application of 50% NPK+50% N as FYM or GLM recorded significantly higher content of N, P, K and S in grain and straw and its uptake by grain and straw of rice. However, the application of 50% NPK + 50% N as wheat straw gave the maximum K content in grain and straw. Results on micronutrient Zn, Cu, Fe, Mn and HWS B content in grain and straw and uptake by grain and straw revealed that the 50% NPK+50% N as FYM or GLM recorded the maximum content of Zn, Cu, Fe, Mn and HWS B in grain and straw, respectively. The available N, P and S in post harvest soil was highest in the treatment T<sub>9</sub> while K content in soil was highest in 50% NPK+50% N through WCS. The available Zn, Mn and HWS B content was highest in the treatment T<sub>5</sub> (50% NPK+50% N as FYM) while maximum availability of Cu and Fe was observed in T<sub>9</sub> (50% NPK+50% N through GLM). It should be recommended that conjoint use of chemical fertilizer with organic manure (50% NPK+50% N through FYM) can be the best practice for nutrient build up, translocation for assimilation of nutrient content and their uptake and optimum yield.

**Keyword:** Rice, N, P, K, FYM, grain and straw yield,

## Agroforestry – A Tool for Soil Conservation

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Soil conservation is a major global concern as agricultural practices continue to have an impact on the Earth's delicate ecosystems. Agroforestry has evolved as a viable strategy to combat soil degradation and advance long-term ecological balance. It is a sustainable land-use system that blends agricultural crops with trees and or shrubs. An overview of the function of agroforestry in soil conservation is given in this abstract, which also underlines its potential to help preserve the soil. Numerous benefits of agroforestry systems support soil conservation. The adverse effects of temperature and wind on soil fertility, soil flora and fauna are effects are ameliorated by agroforestry systems. The inclusion of trees and shrubs in these integrated landscapes improves soil organic matter, nutrient efficiency, nitrogen fixation, erosion protection, soil biomass production, and soil carbon sequestration. Crop combinations, multi-storey tree gardens, alley cropping, and windbreaks or shelterbelts are some of the common agroforestry practices employed in the tropics to control erosion. Trees' deep root systems aid in soil compaction and nutrient leaching, while their leaf litter functions as natural mulch, shielding the soil from evaporation and erosion. Agroforestry plants demonstrate a higher degree of nutrient reuse by plants than conventional agricultural systems. In particular, Nair et al. (2018) shows how agroforestry techniques in various areas have successfully stopped soil erosion, resulting in improved soil fertility and productivity. Smith et al. (2020) also demonstrated how agroforestry systems have the ability to encourage soil carbon sequestration. Increases in organic matter, whether in the form of surface litter or soil carbon, are strongly correlated with soil improvement under trees and in agroforestry systems. Agroforestry has a lot of potential for preserving soil, but there is a need to implement comprehensive strategy to be implemented effectively to creative sustainable method for preserving soil is agroforestry.

**Keywords:** Soil conservation, Agroforestry, Trees

## Ohmic Heating for the Recovery of Head Rice

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Ohmic heating is a novel technology for processing of food. This technology works on the principle of Ohm's law. Many food processing works can be done through this technology such as parboiling, sterilization, blanching, pasteurization etc. In this research an ohmic heating model was developed to parboil the paddy. Time-temperature combination of parboiled paddy was analyzed by using of this model. Parboiling is a hydrothermal treatment performed prior to milling process of food products. The result was found after parboiling of paddy in ohmic heating model, time-temperature profiles of parboiled paddy at various voltage gradients i.e., 24.44, 25, 25.56, 26.11 and 26.67 V/cm up to temperature of 96°C. The mixture of paddy and water was taken in the ratio of 1:3. The best result was found on 26.67 V/cm at 96 degree centigrade in 24 minutes. After milling of parboiled paddy, the recovery of head rice yield was found 88.09 percent. Ohmic heating is very beneficial to increase head rice recovery of parboiled paddy in less time.

**Keywords:** Ohmic heating, parboiling, head rice, temperature, milling.

## Relative Efficacy of Chemical, Bioagent and Organic Ammendments in Managing Root Rot Complex of Piper Longum

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Root rot complex induced by *Phytophthora*, *Fusarium*, *Rhizoctonia*, *Sclerotium* and root knot nematode is major threat in Piper longum

growing areas of Vidarbha region of Maharashtra. Experiment was carried out in field to observe the effect of chemical, bio-agent and organic amendments against root rot complex of *P. longum*. At 15, 30, 45 and 60 DAT minimum disease incidence was recorded in treatment T4 : FYM (@ 20t/ha) + Fluopyram 400 SC drenching (@1.2 L/ha) + Neem Cake (@ 500 kg/ha) + *T. asperellum* (@1 kg/ha) + Copper oxychloride (0.30 %) + Mancozeb (0.25%) i.e. 26.30, 28.02, 30.84 and 30.10 % respectively which was at par with treatment T8 : FYM (@ 500kg/ ha) + Fluopyram 400 SC (@1.2 L/ha) + Karanj Cake (@ 500 kg/ha) + *T. asperellum* (@ 1kg/ha) + Copper oxychloride (0.30%) + Mancozeb (0.25%) i.e. 27.53, 29.04, 31.18 and 31.40% respectively after soil application / drenching. Whereas, maximum disease incidence was originate in control i.e. 32.56 %.

**GIRDAHA/AB/2023/058**

## **Role of Stakeholders in Agricultural Innovation System**

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Generating and applying new knowledge is important for all enterprises, including farming. New knowledge enhances the productivity, competitiveness, and sustainability in farming, but it is not widely adopted. In this situation one has to search new ways and means. Limitations of NARS and AKIS have provided the reasons for Agricultural Innovation System (AIS) in India. AIS help to understand how the process of agricultural innovation takes place and how its relevance and quality can be enhanced. The transfer of technology is an important role played by the stakeholders through informal meetings in their villages with friends or neighbours twice to thrice in a week, where they exchange the information. Media has also played an important role in creating awareness among the stakeholders and the people. It was worked independently with

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professional interest. Various stakeholders play different roles that may broadly classified as facilitator, communicator, collaborator coordinator, knowledge source, networking policy formulator and implementer in AIS. The present study was conducted in all six districts (Banaskantha, Patan, Sabarkantha, Gandhinagar, Mehsana and Aravalli) of North Gujarat region. From each district, 5 researchers, 5 extensionist, 5 in-charge of NGOs, 5 manager of private agencies, 10 owner of agro-service providers and 10 progressive farmers were selected. In all, 30 researchers, 30 extensionist, 30 in-charge of NGOs, 30 managers of private agencies, 60 owner of agro-service providers and 60 progressive farmers were selected. This way, 240 stakeholders were included in the study. Majority (86.67%) of the researchers executes their excellent role in AIS. In case of extensionist, little more than half (56.67%) of them performed their excellent role in AIS. Further, 53.33 per cent of the In-charge of NGOs performed their excellent role in AIS. With respect to manager of private agencies, two-third (66.67%) of them performed excellent role in AIS. As far as the agro-service providers were concerned, 58.33 per cent of them performed their good role in AIS. While, 06.67 per cent of agro-service providers executed their excellent role in AIS. Moreover, majority (70.00%) of the progressive farmers performed their good role in AIS.

GIRDAHA/AB/2023/059

# **Effect of Different Post-Harvest Handling Methods, Fungicides and Packaging Methods on Shelf Life of Banana (*Musa paradisiaca* L.) CV. Grand Naine**

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The experiment was carried out during the year 2019-20 & 2020-21 at Progressive farmers field, Boriya, Tal: Petlad, Dist: Anand and Farm Laboratory, Department of Horticulture B. A. College of Agriculture, Anand Agricultural University, Anand, Gujarat to study the “effect of different post-

## G H Raison University, Saikheda and Just Agriculture Education Group

harvest handling methods, fungicide treatment and packaging on shelf life of banana cv. Grand Naine” It was laid out in CRD (Factorial) with three replications. It consisting of three factors (i) Postharvest handling method (Traditional (H<sub>1</sub>) and improved method (H<sub>2</sub>) of harvesting) (ii) Postharvest treatments (Without fungicide (F<sub>1</sub>) and treated with fungicide (F<sub>2</sub>) *i.e.* Dipping of hand in Carbendazim 50 % W.P. @ 0.1 % solution for 5 min.) and (iii) Postharvest packaging *viz*, Plastic crate (P<sub>1</sub>), Box packing (P<sub>2</sub>), Plastic crate + cushioning material (P<sub>3</sub>), Box packing + cushioning material (P<sub>4</sub>), Plastic crate + cushioning material + plastic covering (P<sub>5</sub>) and Box packing + cushioning material + plastic covering (P<sub>6</sub>).

The individual effects of treatments and their interactions on shelf life of banana were recorded. Significantly higher shelf life *i.e.* 9.75 days and lowest infected percentage of bruising (11.56 %) was recorded under improved harvesting method (H<sub>2</sub>) in pooled data. However, physiological loss in weight (%) and spoilage per cent (%) were found non significant with respect different harvesting methods in pooled results. Fruits treated with fungicide F<sub>2</sub> (dipping of hands with Carbendazim 50 % W.P. @ 0.1 % for 5 min.) were noted significantly higher shelf life (9.44 days), lowest PLW (15.63 %), spoilage per cent (14.51 %) and bruising percentage (15.49 %) on pooled basis. Among the different packaging, fruits packed in P<sub>6</sub> (Box packing + cushioning material + plastic covering) were recorded significantly higher shelf life (9.92 days), lower physiological loss in weight (11.52 %), spoilage per cent (10.81 %) and bruising percentage (10.38 %) in pooled analysis.

Among the different treatment combinations, H<sub>2</sub>F<sub>2</sub> were recorded significantly higher shelf life (10.50 days) and lower spoilage per cent (11.91 %) in pooled results. With respect physiological parameters, treatment combination H<sub>2</sub>P<sub>6</sub> were recorded significantly highest shelf life (11.25 days), lowest PLW (9.70 %), spoilage per cent (8.17 %) and bruising percentage (7.07 %) on pooled basis. Treatment combination F<sub>2</sub>P<sub>6</sub> recorded significantly higher shelf life (10.75 days) and lower spoilage per cent (8.90 %) in pooled analysis. While, combined effects between H<sub>2</sub>F<sub>2</sub>P<sub>6</sub> ((Improved method of harvesting + Fungicide treatment (dipping of hands with Carbendazim 50 % W.P. @ 0.1 % for 5 min.) + Box packing + cushioning material + plastic covering)) were recorded significantly higher shelf life (12.67 days) and lower spoilage per cent (5.38 %) in pooled results.



## **Economic valuation of river water: A case of Jhelum basin, Kashmir**

This study aims to quantify the value of river water used for potable purposes in the Jhelum basin of Kashmir. A case study was conducted on the Kakapora Water Treatment Plant in Pulwama district for a cost-benefit analysis. The government's investment proved to be profitable, with a benefit-cost ratio (BCR) of 1.014. Annual variable and fixed costs were calculated at ₹ 19.34 lakhs (31.3%) and ₹ 42.46 lakhs (68.7%), respectively. The cost and price (value) per liter of filtered water were determined to be ₹ 0.0499 and ₹ 0.0504, respectively. The total number of gallons of water used by the entire population was 15.52 lakhs per day, and the total volume of water consumed by 3.01 lakh people was 56.64 crore gallons, with a value of ₹ 10.81 crores per year. Quantifying the significance of river water in the Jhelum basin will contribute to the existing literature and aid in designing suitable policies for improved resource management."

**Keywords:** Valuation, River Jhelum, Potable water, Ecosystem services, Cost-benefit analysis

## **Evaluation of sensory qualities of paneer whey beverage blended with sugarcane (*Saccharum officinarum*) juice**

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Dairy industry has emerged as a fast growing and large scale producer of novel and nutritionally enriched milk based products, with proficient, which is a very good achievement in the world market. Whey based products exist and get hold of positively to this innovative groups. Whey is the watery part of milk that remains after separation of curd or coagulated products that result from acid or proteolytic enzyme mediated coagulation of milk. It is major by-product of dairy industry, during manufacture of products like paneer, channa, chakka, cheese, casein, etc. It is considered to be reliable source of number of high quality and biological active proteins, carbohydrates and minerals. Sugarcane juice is rich in enzyme and has many medicinal properties. 100 ml of sugarcane juice provides 40 kcal of energy, 10 milligram of iron and 6 microgram of carotene (Parvathy, 1983). This investigation was carried out with a view to evaluate sensory qualities and estimate cost for production of *paneer* whey beverage with different levels of sugarcane juice. The *paneer* whey beverage was prepared by using different levels of sugarcane juice @ 0, 5, 15, 25 and 35 in treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> respectively. In that addition of 5 per cent sugar in proportion to whey, ginger juice 0.5 per cent and lemon juice 0.05 per cent added in all the treatments. The overall acceptability of *paneer* whey beverage prepared with 25 per cent sugarcane juice level (T<sub>4</sub>) was significantly superior and more acceptable than other levels of sugarcane juice. The overall acceptability score for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> were 6.74, 7.24, 7.91, 8.66 and 8.16 respectively. The cost of paneer whey beverage for different treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> and T<sub>5</sub> were 7.50, 9.85, 14.55, 19.25, 23.95 (₹) respectively, for 1 litre of paneer whey beverage prepared by blending with different levels of sugarcane juice.

**Keywords:** Paneer whey, Sugarcane juice, Lemon juice, Ginger juice, Sensory, Cost.

# Comparative Analysis of Packaging Materials for Prolonging the Shelf Life of Lime Fruits in Refrigeration and Ambient Storage Environments

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A research was conducted to explore the effect of gunny bags (T1), Nylon net bags (T2), HDPE (High density polyethylene: T3) and LDPE (Low density polyethylene: T4) packaging and open crates (T5) on shelf life extension of lime fruit stored at ambient temperature ( $32\pm 1^\circ\text{C}$ ) and refrigeration temperature ( $9\pm 1^\circ\text{C}$ ). Experiment was designed with completely randomized design. The fruits were washed with water and surface dried under a fan. The fruits were divided into five groups' and packed in respective packaging materials as mentioned above and were stored at room temperature and refrigerated temperature. In our research study significant effect of packaging materials and storage intervals was observed on most of the parameters. Samples were analyzed for its firmness, acidity, total soluble solids, TSS/acid ratio, weight loss, juice percentage, technological index, instrumental colour ( $L^*$ ,  $a^*$  and  $b^*$ ).

Highest mean values of weight loss (26.03 and 15.79 %), firmness (29.96 and 25.04 N), total soluble solids (7.48 and 7.40 °Brix) and TSS/acid ratio (1.20 and 1.13), least juice percentage (40.59 and 44.75 %), technological index (3.00 and 3.30 %), acidity (6.42 and 6.78 %) and drastic change in colour ( $L^*$ : 46.79 and 45.22,  $a^*$ : 0.02 and 1.28,  $b^*$ : 32.34 and 32.41) were found in sample (fruits packed in open crates) T5 (in ambient storage for 40 days and refrigerated storage for 70 days respectively).

While, lowest mean values of weight loss (16.18 and 11.50 %), total soluble solids (7.29 and 7.25 °Brix), TSS/acid ratio (1.08 and 1.04), gradual change in colour ( $L^*$ : 44.02 and 43.95,  $a^*$ : -0.87 and 0.35,  $b^*$ : 31.62 and 31.48) and firmness (28.40 and 25.59 N), whereas highest acidity

(6.75 and 7.06 %), juice percentage (44.35 and 49.44 %) and technological index ( 3.24 and 3.58 %) were found in sample (T3: HDPE packaged fruits) (in ambient storage for 40 days and refrigerated storage for 70 days respectively).

**Keywords:** Lime fruits, packaging materials, Shelf life and HDPE

**GIRDAHA/AB/2023/063**

## **In vivo Screening of Rabi sorghum varieties and hybrids against charcoal rot pathogen *Macrophomina phaseolina* (tassi) goid**

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Charcoal rot disease caused by *Macrophomina phaseolina* (Tassi.) Goid is one of the most destructive and wide spread disease of sorghum (*Sorghum bicolor* L.) Moench), causing accountable losses of about 21-64 per cent. The field experiment comprising field evaluation of 31 varieties and hybrids including 2 checks against charcoal rot disease was conducted during Rabi 2021-22. The results revealed that, the charcoal rot percentage was ranged from 10.00 to 21.00 per cent. The highest charcoal rot per cent (21.00 %) by *Macrophomina phaseolina* was observed in SPV 2842 followed by SPV 2847, SPV2758, SPV 2826, SPV 2832 and SPV 2841 whereas, E36-1 (RC) was recorded lowest (10.00 %) charcoal rot per cent which was significantly superior over all the entries. Whereas, Charcoal Rot Index ranged from 10.20 to 22.20. Lowest CRI was recorded in Resistant check E36-1 (10.20 %) which was at par with SPV 2757, SPV 2827, SPV 2848, M 35-1 and significantly superior over all the entries. The screening of varieties / hybrids experiment results categorized as per the charcoal rot reaction and CRI scale given by Das *et al.* All the 29 varieties / hybrids screened; were categorized in moderately resistant (MR).

**Keywords:** In vivo, Screening, Rabi sorghum, Charcoal rot, *Macrophomina phaseolina* (tassi) goid,

## **Assessment and Management of Black Banded Disease in Mango Orchards of Karnataka, India**

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The survey conducted in major mango-growing regions of Karnataka revealed critical insights into the prevalence and impact of black banded disease. The disease was widespread, affecting all surveyed areas and various mango genotypes. Incidence rates ranged from 0 to 91.37 percent, signifying the significant threat it poses to mango cultivation in the region. A total of thirteen talukas across six districts viz., Bengaluru, Dharwad, Gadag, Ramanagara, Tumakuru and Uttara Kannada districts were surveyed. Notably, disease severity was observed in all 13 taluks, reaching levels between 0 to 41.66 percent. The village of Srigiripura in Magadi taluk, Ramanagara district, exhibited the highest severity at 34.00 percent. Ramanagara district emerged as the most heavily impacted area, with a disease incidence of 91.37 percent and severity of 29.18 percent. The study also shed light on the influence of factors like tree age, agro-climatic zones, and soil type on disease prevalence. Trees aged 21 years or more showed the highest disease incidence (97.20 percent) and severity (25.68 percent). Agro-climatic Zone 5 displayed the highest disease incidence (84.95 percent) and severity (24.91 percent), emphasizing the role of environmental conditions in disease spread. Furthermore, the type of soil was found to play a significant role, with laterite soil exhibiting the highest disease incidence (84.62 percent), and red soil displaying the highest severity (25.00 percent). Additionally, the impact on different mango genotypes was assessed, revealing Alphonso as the most susceptible, with an incidence rate of 87.23 percent and severity of 23.30 percent. These findings provide crucial data for formulating effective strategies to manage and mitigate the impact of black banded disease on mango cultivation in Karnataka. They serve as a foundation for targeted interventions to safeguard the mango industry in the region.

**Keywords:** Black Banded Disease, Mango, Karnataka, Disease Incidence, Disease Severity, Mango Genotypes.

## **Effect of foliar spray of nano zinc fertilizer on photosynthetic pigments of Rice (*Oryza Sativa L.*) cultivar**

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Rice (*Oryza Sativa L.*) commonly regarded as Queen of cereal crops, is the world's most nutritious staple food rich in carbohydrates, mild quantity of protein, fat, a well source of vitamin-B complexes and minerals. There is discrete variability in quantity and quality of rice grains and its nutrients depending on soil composition in the area of cultivation and thus affects global food security. Nanotechnology or nano-scale particles in the dimension of 1-100 nm in parts specific beneficial influences on plant growth and development as well as crop yield. Micro-nutrient based nano-fertilizers afford ample nutrients to plants and play an essential role in biochemical characteristics. As a crucial micronutrient for plants, Zinc nutrition has a key role in plant growth, development and repair as it is a constituent of all classes of enzymes priming vital metabolic processes. The present investigation is carried out to elucidate the effect of Nano Zinc fertilizer at various levels viz., 3.125, 6.25, and 9.375 g Zn /ha on photosynthetic pigments like Chlorophyll *a* (*Chl a*), Chlorophyll *b* (*Chl b*), Total chlorophyll (*TChl*) and carotenoids contents of Rice cultivar after application of Zn fertilizer (both Nano and conventional) on 30<sup>th</sup> day. The application of Zn fertilizer both nano and conventional methods to rice plants induced significant step-up on the chlorophyll and carotenoid pigments. The treatment of foliar spray of Nano Zn at 9.375 g Zn/ha recorded highest photosynthetic pigments and absolute control (devoid of NPK and Zn fertilizer) marked for least pigment contents. *Chl a* and *Chl b* contents were in the range of 1.15-1.99 mg/g and 0.37-0.68 mg/g of rice leaves, respectively with total chlorophyll content in the array of 1.52-2.71

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mg/g and carotenoid content varied between 0.25-0.35 mg/g of rice plant leaves. It was observed for synergistic increase in photosynthetic pigments with enhanced concentrations of Nano Zn fertilizer sprayed to rice fields. Foliar spray of Nano Zn at 9.375 g Zn/ha showed significant impact on progress of photosynthetic contents such as *Chl a* (72% increase), *Chl b* (83% increase), total chlorophyll (78% increase) and carotenoid contents (38% increase) compared to absolute control. In view of these observations, the technology of foliar application of Zn fertilizer at Nano level aid to improve the photosynthetic efficiency of rice plants and may explore for better crop yield.

**Keywords:** Nano Zinc, Chlorophyll, Carotenoids, Rice

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## Unlocking Clonal Variability in *Morus alba* : Insights into Morphometric Characteristic

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White mulberry (*Morus alba* L.) is a fast-growing, multipurpose species mostly used for its fruit, energy production and silkworm rearing. Its fruits are highly palatable and nutritious which in either in combination leaves and bark producing unique properties of antioxidant, and used to treat many disease including type II diabetes and found as antifungal and antibacterial. A clonal evaluation trial consisting of 24 clones in Randomized Block Design with three replications have been evaluated to assess clonal variation to estimate genetic parameters, examine correlations, and perform a principal component analysis. Data were collected on various morphometric includes basal diameter, crown area, number of primary branches, lamina width, lamina length, petiole length, leaf area, and green leaf yield. Out of the 24 clones, six clones namely, Kanva 2, S 30, Phillipino, White China, S146 and K2MS were found to be outperformed for growth traits. These findings provide valuable

insights into the clonal variability of *Morus alba* L. clones regarding their growth and morphometric characteristics. The results contribute to a better understanding of the species' growth patterns, offering potential avenues for future genetic improvement and sustainable utilization of this valuable resource.

**Keywords:** Mulberry, morphometric, clonal variability and genetic improvement

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## **Performance of HYDRUS for Simulating Soil Moisture and Nitrate Movement Distribution**

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Temporal distribution of soil moisture content (SMC) and Nitrate N ( $\text{NO}_3\text{-N}$ ) distribution under different scenarios i.e. (A) surface drip irrigation (SDI) with conservation agriculture (CA), (B) conventional flood irrigation (CFI) without CA and (C) CFI with CA during crop growth were characterized by HYDRUS-2D. Hydraulic inputs of model comprising hydraulic conductivity, saturated and residual soil water content, soil texture, shape parameters and pore connectivity parameter were either measured in field or obtained by inbuilt rosetta pedotransfer function. Maximum yield and water productivity were observed under scenario A (2489 kg/acre, 3.08 kg/m<sup>3</sup>) and lowest under scenario B (2274 kg/acre, 1.406 kg/m<sup>3</sup>). Scenario A has a uniform SMC and  $\text{NO}_3\text{-N}$  distribution at the root zone.  $\text{NO}_3\text{-N}$  was observed 2.46-18.12% higher in 0-30 cm soil depth under scenario C than B, while in lower depth (<45cm)  $\text{NO}_3\text{-N}$  was 31.45% lower under scenario C as compared with B. Additionally 5.40% higher yield was recorded in scenario C than B. Model predicted daily SMC and  $\text{NO}_3\text{-N}$  distribution with satisfactory performance (Model efficiency coefficient 0.864 and  $r^2 = 0.873$ ).

**Keyword:** Conservation Agriculture; Drip irrigation; Flood irrigation; Nitrate N distribution; Soil moisture distribution



**Toxicity Evaluation of a dual fungicide SAAF  
(Carbendazim 12% and Mancozeb 63%)  
through physiological markers in *Oreochromis  
mossambicus***

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The study was designed to evaluate the acute toxicity induced by SAAF in freshwater fish, *Oreochromis mossambicus*. Fungicides are widely used for pest management and increase crop output. When used in excessive doses, they are also exceedingly dangerous to non-target organisms. The present investigation is about changes in biochemical parameters in *Oreochromis mossambicus* due to toxicity induced by the application of fungicides in paddy-cum-fish ecosystem in India. The SAAF fungicide, a mixture of carbendazim (12%) and mancozeb (63%) is used to combat fungal diseases such as sheath blight, sheath rot, blast, and leaf spot diseases of rice plants. The present research aimed to determine the toxicity and evaluate the effect of sublethal concentrations of SAAF on some biochemical, haematological, and histological parameters of *Oreochromis mossambicus* after 10, 20 and 30 days. *Oreochromis mossambicus* were exposed to different concentrations of SAAF (10.5 mg/lit, 11.5mg/lit and 12.5 mg/lit) respectively and LC50 was determined. LC50 for SAAF was detected to be 13.5mg/lit using SPSS Vs.21. After 30 days of exposure, the individuals exposed to toxicity were sacrificed and the parameters were checked in the treated fish. Among biochemical parameters, total glucose, cholesterol, stress-related enzymes AST and ALT showed a significant increase while total protein showed a substantial decrease, whereas among haematological parameters, Haemoglobin, RBC, and PCV had risen and WBC and MCV showed a marked decrease. The tissue necrosis was quite prominent in the gill, heart, liver, kidney, and muscle after 30 days of exposure to the fungicide.

**Keywords:** *Oreochromis mossambicus*; SAAF, Biochemical parameters, Haemaological parameters, Histological parameters

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## **Protective Irrigation Planning for Rainfed Cropping at Balapur Station for Climate Resilient Agriculture**

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Climate change is now affecting the agriculture disastrously. The yield of crops is reducing due to erratic nature of precipitation. Protective irrigation is become inevitable for sustaining the crop productivity. In this study reference evapotranspiration, effective rainfall and crop water requirement were computed using CropWat 8.0 model. The reference evapotranspiration varies from 6.99 mm day<sup>-1</sup> to 3.76 mm day<sup>-1</sup>. The Cotton and Pigeon pea crop requires at least 42.8 mm/month, 124.2 mm/month, 123.0 mm/month, 115.7 mm/month, and 19 mm/month irrigation water during September, October, November, December and January respectively. Peak irrigation requirement of cotton and pigeon pea was found in the month of November. There is no need of protective irrigation for soybean crop due to low irrigation requirement during Kharif season. The amount of protective irrigation for Cotton and pigeon pea requires protective irrigation in the month of October (>132mm) followed by December (>130mm) and November (>65mm).

**Keywords:** Reference evapotranspiration, effective rainfall, crop water requirement, CropWat 8.0.

## **Morphometric Characterization and Farming Practices of Manipuri Local Goat**

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Manipur had a population of 38,697 goats as per the 20<sup>th</sup> Livestock Census. The trend in goat population showed a decline of 40.61% when compared to the 19<sup>th</sup> Livestock Census. At present, there is not a single breed of goat registered from the State; therefore, the present study was designed to characterize the phenotypic characters, feeding and management system of Manipuri local goats. Surveys were conducted from Imphal West, Imphal East, Senapati, Churachandpur and Tengnoupal Districts of Manipur. The study showed that these local Manipuri goats are medium to short in stature, with colour combination of black, brown, white with occasional black patches. Ears are flat and leaf-like, medium sized and drooping. Horns are small and are short cylindrical in shape, and sometimes curved backward and upward. The flock size per family ranges from 3 to 20. The ear length, horn length, muzzle circumference, neck length, body length, tail length, heart girth, body height, canon bone length, distance between horns, rump height, hind girth, canon bone diameter, head length and rump length at above 12 months were 16.75±0.05, 5.96±0.01, 11.71±0.11, 28.04±0.08, 56.22±0.22, 9.26±0.06, 63.44±0.16, 53.96±0.11, 11.04±0.04, 4±0.03, 56.44±0.47, 75.33±0.53, 7.32±0.05, 20.99±0.03, and 66±0.03 centimetres respectively. The common diseases observed were diarrhoea, parasitic infestation, skin infections, and bloat. As the population of the goats are declining due to reduction in the total population, systematic approaches for conservation of this indigenous breed is required to save the breed from extinction.

## **Studies on Seed Germination of Khirni (*Manilkara hexandra* L.) Seedlings under Shade Net House Condition**

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Studies were carried out on seed germination and subsequent growth of Khirni (*Manilkara hexandra* L.) seedlings under shade net house condition at Department of Horticulture, Late Shri. Vasant Rao Naik Marahwada Agricultural University, Parbhani (M.S.), India during the year 2006-07 and 2007-08. Among the various seed soaking treatments given to Khirni seed, GA<sub>3</sub> 200 ppm seed soaking treatment for 24 hours was the best for increasing germination percentage and subsequent growth of Khirni seedlings under shade net house condition. While the treatment control i.e. no soaking recorded least germination percentage and subsequent growth of Khirni seedlings.

**Keywords :** GA<sub>3</sub>, seed germination, subsequent growth, Khirni, shade net

## **Assessment of greenhouse gas emissions (CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O) from Integrated farming systems in Western Vidarbha- Maharashtra**

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The study was conducted at research farm of Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, India during 2017-18 to 2021-22 to measure and evaluate the greenhouse gas emissions (CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O) from different components of IFS irrigated model of 1.00 ha from Western Vidarbha. IFS-GHG estimator-Version-1.1 developed by

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IIFSR, Modipuram based on Default country specific or IPCC emission factors (CO<sub>2</sub> equivalent per kg of N or per litre fuel) has been used for calculating GHG emission. The results demonstrated that, the mean sinking of GHG was recorded 8796 kg CO<sub>2</sub> equivalents against total emission of 2964 kg CO<sub>2</sub> equivalents which showed net mean GHG balance of - 5832 kg CO<sub>2</sub> equivalents from all enterprises of 1.00 ha IFS model. The major part (57 %) of total greenhouse gas emissions was contributed by all livestock by emitting methane and nitrous oxide due to enteric fermentation and manure management system. The crop production including all agronomic cropping systems, fodder crops and kitchen garden together contributed 37 per cent of GHG emission. The plantation of forest and horticulture trees contributed negligible amount of GHG emissions (6%). The horticultural fruit crop and agro-forestry component contributed highest of the total mean carbon sink (56 %). Instead of burning all crop residues, its incorporation in soil contributed 44 per cent of the total mean sink of carbon. It is concluded that, the incorporation of all crop residues and inclusion of plantation of at least four suitable agro-forestry trees on boarder of farm and horticultural fruit crop on at least 0.25 ha per ha of IFS module shown a promising option to enhance adequate negative balance of carbon, which is highly climate resilient.

**Key words:** Carbon, GHG emission, IFS

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# **Agro-morphological characterization and nutritional diversity of *Coix lacryma-jobi* L.: A potential crop under changing climate regime**

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*Coix lacryma-jobi* L. (Family - Poaceae) is popularly known as Job's tear due to its large, shining, pear shaped fruits showing remarkable resemblance to tear drops. Coix is a potential grain crop, the seeds are rich in proteins, minerals and crude fat. Coix is also used in traditional Indian and Chinese medicines and for preparing beverages, as feed, fodder, for making ornaments etc. In the present study, 124 accessions of coix were studied for 20 quantitative agro-morphological traits. Analysis of variance showed that genotypes differed significantly for agro-morphological traits such as days to germination, first leaf unfolding, angle between leaf and stem, leaf blade length, 100 seed weight and seed length/width ratio. Genotypic and phenotypic coefficient of variation, heritability (bs) and genetic advance as per cent mean were also computed for the quantitative traits. The highest value for GCV was observed in number of tillers/plant (49.65%) followed by 100 seed weight (41.41%) and number of seeds per plant (34.96%). The lowest (19.14%) and highest (100%) broad sense heritability were estimated for total seed weight/plot and days to germination as well as days to first leaf unfolding, respectively. High heritability estimates coupled with high genetic advance as *per cent* mean were found in number of tillers/plant, number of seeds per plant, 100 seed weight and seed length/width ratio. High heritability paired with high genetic advance as percent of mean provides the most effective selection condition for a specific trait.

Seeds were also evaluated for mineral elements content, total phenol content and total anti-oxidant capacity assay. Based on mean values of agro-morphological traits, superior performing genotypes SH/TM/2021-16 was identified for number of tillers/plant (4.67), number of seeds/plant (1461.60), SH/TM/2021-6 for 100 seed weight (75g), IC-629198 for seed weight/plant (175g) and seed weight/plot (1600g), and SH/TM/2020-32 for seed length/width ratio (3.33). Superior genotypes - IC-334314 was also identified for highest moisture content(14.5%), IC-89381 for highest ash content (5.64%), SH-2022-72 for sugar content (1.93%), IC-540256 for starch (63.7%); highest content of dietary fibre (22.8%) was recorded in IC-521339, highest crude fat content (6.41%) in IC-591727, highest phenol content (0.96%) in IC-374506, highest flavonoid content (0.82%) was recorded in IC-486143. The highest content of antioxidant capacity based on FRAP assay was recorded in IC-416824 (1.15mg/g), while highest content of Fe (18.8 mg/100), Zn (7.2mg/100), Cu (1.14mg/100) and Ca(24.5 mg/100) were recorded in SH-TM-2020-32, SH-2020-19, IC-419448, and IC - 89390, respectively.

# Design and Construction of a Vertical Pipe Hydroponics System

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Hydroponics is a method of growing plants purely using water and nutrients, without soil. The proposed hydroponic system is built upon the concepts of embedded system. The water and nutrient supply to the different varieties of crop is controlled and monitored at regular time intervals. Problems due to the increase in agricultural land use change can be solved by hydroponic system applications. Many hydroponic studies have been conducted in several countries while their applications in Indonesia requires modification and adjustment. Hydroponic systems have been utilized as one of the standard methods for plant biology research and are also used in commercial production for several crops, including lettuce and tomato. This research was conducted at School of Agricultural Sciences, G.H. Raisoni University, Saikheda to design and construct a Vertical pipe hydroponic system with semi continuous and continuous nutrition systems. This hydroponic system was made from polyvinyl chloride (PVC) pipes with a length of 6 m, a diameter of 90 mm with A-frame type tower whose height from the surface is 7 feet in which laying of PVC pipes with suitable spacing and used hydroponic cup with media Cocopit + Vermiculite + Perlite in proportion 3:1:1 . In semi-continuous irrigation treatment, we install drip emitters nearby plant for providing irrigation and nutrients to plants in fixed intervals by drip irrigation system. The proposed platform can be used both for quantitatively optimizing the setup of the indoor farming and for automating some of the most labour-intensive maintenance activities. The results of these studies indicate that this system is very suitable for a narrow area.

**Keywords:** Hydroponics system, design of pipe type hydroponic system, Water culture, automated system, Vertical farming

GIRDAHA/AB/2023/075

## **Development of the process for preparation of aerial yam (*Dioscorea bulbifera*) cookies**

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An investigation entitled “**Development of the process for preparation of aerial yam (*Dioscorea bulbifera*) cookies**” was undertaken at the Department of Fruit, Vegetable and Flower Crops, Faculty of Post Harvest Management, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, District Ratnagiri, during the year 2017-2018.

The study aimed to standardize the recipe for the aerial yam cookies from aerial yam flour and to study the storage behaviour of aerial yam cookies at ambient conditions. For this experiment, the Factorial Completely Randomized Design (F.C.R.D.) was used. The experiment was carried out with five treatments comprising of different proportions of aerial yam flour and *maida* i.e. 0:100, 20:80, 30:70, 40:60, 50:50 in the aerial yam cookies and the product was analysed for physico-chemical and sensory qualities initially and during 10, 20 and 30 days of storage.

The physical parameters except diameter, all other parameters such as thickness and volume of the cookies decreased with the increase in the level of aerial yam flour in the cookies. An increase in L\* values with decrease in the a\* and b\* value for colour of the cookies was observed during storage.

The present study revealed that all the chemical parameters except moisture and reducing sugars, all other chemical parameters such as TSS, titratable acidity, total sugars, ash, crude fat and crude fiber



content exhibited a decreasing trend during storage period of 30 days at ambient condition.

From the results of present studies, it can be concluded that the aerial yam cookies could be stored up to 30 days at ambient condition, when packed in 400 gauge low density polyethylene (LDPE). Based on the sensory qualities and economics, the aerial yam cookies could be prepared by using 20 per cent aerial yam flour level with higher overall acceptability.

**Keywords:** Aerial Yam, Cookies, Colour, physico-chemical Qualities and Storage, etc.

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## **Harmonizing Harvests: Maximizing Sustainable Gains through Cotton and Pigeon Pea Intercropping in Organic and Conventional Farming**

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In the arid and semiarid regions of the Indian subcontinent, pigeon pea (*Cajanus cajan*) plays a pivotal role in the dietary landscape. Often grown alongside cotton as an intercrop, its productivity in both conventional and organic farming systems has remained largely unquantified due to cotton's status as the primary cash crop. In a field experiment conducted during the 2020 kharif season, the influence of intercropping and farming methods on various parameters was evaluated. The findings revealed that pigeon pea outperformed cotton as a competitive crop, displaying higher yields when intercropped, irrespective of the farming system. Interestingly, intercropped cotton did not yield more than sole cotton but maintained a comparable output under both organic and conventional farming. This intercropping pattern, therefore, seemed to favor pigeon pea yields without compromising cotton yields, offering potential advantages in terms of economic returns. Particularly noteworthy

is the fact that the minimum support price for pigeon pea has recently surpassed that of cotton. Moreover, cultivating these crops organically can fetch premium prices and contribute to ecological sustainability. This research underscores the potential benefits of incorporating pigeon pea into intercropping systems, especially in organic farming, in the context of evolving agricultural markets and environmental concerns.

Keywords- Yield traits, Intercropping, Land equivalent ratio, cotton, pigeon pea

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## **Development and nutritional characterization of Gluten free cookies prepared by using sorghum and oatmeal**

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The main objective of this study was to produce tasty and healthy bakery snack like cookies by using sorghum and oatmeal instead of white wheat flour (maida). Generally, peoples are not utilizing sorghum to produce bakery product because it is lack in gluten. The white wheat flour is high in gluten but some individuals have a gluten allergy, which is an autoimmune disease that causes atrophy of the intestinal villusities and crypt hyperplasia, called celiac disease. The treatment consists of dietary and total exclusion of gluten from the diet. Celiac Disease is a global disease and affects almost 1 % of the world's population. The products prepared from white wheat flour are lacks in dietary fiber and micronutrients which are important health promoting components. So, in the present research oatmeal are used because oats are rich source of dietary fiber but more importantly, oats are high in fiber, specifically,  $\beta$ -glucan. Oatmeal is a tonic for general debility, treats anorexia, is good for convalescence and fatigue, lowers blood cholesterol levels and helps to control hormonal activity. The sorghum oatmeal cookies also contain other ingredients like castor sugar, margarine, milk compound, baking powder and choco chips to enhance the

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taste and textural properties. Sorghum oatmeal cookies shows better sensory and storage stability upto 5 months at room temperature.

**Keywords-** Sorghum, oatmeal, maida, cookie, celiac disease, fibre.

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# Report of Pea Rust in Namsai District of Arunachal Pradesh

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Garden pea is a herbaceous annual plant which belongs to the family of Fabaceae. It is a good source of protein and dietary fibre. One of the most common diseases that have been infected in pea is the rust disease caused by *Uromyces fabae*. Pea rust symptoms were observed abundantly in the Instructional Farm of Arunachal University of Studies, Namsai. Initial symptoms are observed in the undersurface of leaves, stem and petiole as yellow aecia. These pustules then turn orange or brown in colour. After this stage uredopustules with orange coloured powdery mass is observed on all the green parts of the plant including the pods and finally turn to teleutospores. The uredinial stage was observed under microscope. The disease incidence was observed to be 18.56 per cent on the crops sown in November and 89.45 percent for the crops sown in January. Correlation analysis showed that the environmental conditions were favourable for the late sown crops hence the disease incidence also increased in the crops sown in January case. The yield also decreased considerably.

**Keywords:** pea, disease incidence, pea rust, uredopustules

## **Nutraceutical enriched beverage from underutilized crops of Northeast hill region**

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Hill regions of Northeast India is a hub for a wide range of underutilized crops. *Sohiong* (*Prunus nepalensis*), mulberry (*Morus indica*) and chow chow (*Sechium edule*) are nutraceutically rich indigenous crops found in the state of Meghalaya. However, due to its high perishable nature and short season availability it has to be utilized at the earliest, more commonly done through fresh consumption. Therefore, this study was an attempt to add value to these crops through processing to develop a blended beverage, thereby reducing the postharvest losses as well. Chow chow for beverage development is unheard of to date and blending it with mulberry and *Sohiong* gives a natural anthocyanin rich product (2.84 to 9.67mg 100ml<sup>-1</sup>). Pulp of chow chow, mulberry and *Sohiong* were blended to eight treatment combinations in the ratios of 10:5:5, which were adjusted to 15°Brix TSS and 0.3% acidity. This beverage contained nutraceuticals viz. phenols (87.68mg GAE/L), flavonoids (107.52mg CE/L), antioxidant activity (94.19mg AEAC/L), anthocyanins (5.61mg/100ml) and ascorbic acid (6.11mg/100ml) in considerable amounts with high consumer appeal (6.10 to 8.53 out of 9 point hedonic scale). Therefore, this blended beverage from seasonal available underutilized crops is a potential product which exhibited superior quality during storage and thus can be up scaled for commercialization for livelihood enhancement of hilly populace.

**Keyword:** Underutilized crops, blending, beverage, novel product.

# **The Effect of Dandelion Leaves (*Taraxacum officinale*) on Blood Parameters in Rohu (*Labeo rohita*): A Preliminary Study**

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Aquaculture plays a pivotal role in fulfilling the global demand for fish production, serving as a crucial means to meet the ever-increasing need for fish resources. Nonetheless, concerns have been raised regarding the potential negative impacts on fish health and the environment due to the utilization of synthetic feed additives and antibiotics in fish farming practices. In this context, the present study aimed to investigate the effect of dandelion leaves (*Taraxacum officinale*) as a natural dietary supplement on blood parameters in rohu (*Labeo rohita*). Rohu, a commercially important freshwater fish species, was subjected to a controlled feeding trial in which dandelion leaf powder was included in the diet at varying concentrations. After the end of the feeding trial, blood samples were collected to assess haematological parameters. The study focused on evaluating the impact of dandelion leaves on key blood parameters, including haematocrit, haemoglobin concentration, total erythrocyte count, total leucocyte count, Mean Cell Volume, Mean Cell Haemoglobin and Mean Cell Haemoglobin Concentration. The findings indicate that the inclusion of dandelion leaves in the rohu diet led to significant ( $p < 0.05$ ) changes in certain blood parameters compared to the control group. Haematological parameters showed a trend toward improved erythropoiesis with increased haematocrit and haemoglobin levels. Additionally, dandelion leaf supplementation has affected white blood cell counts, suggesting potential immune-boosting properties. These findings indicate that dandelion leaves may have a positive impact on blood parameters in rohu, potentially improving their overall health and resilience. This study contributes to the ongoing efforts to develop sustainable and environmentally friendly approaches to fish nutrition in aquaculture.

**Keywords:** Aquaculture, Antibiotics, Haematological parameters, Sustainable aquaculture, *Taraxacum officinale*.

# Identification of Gram Negative Bacterial Isolates of Bovine Mastitis Obtained from the California Mastitis Test (CMT) Positive Milk Salmpes

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A total of 5 isolates were obtained as gram negative from the 45 isolates obtained from the California mastitis test (CMT) positive milk samples of bovine mastitis pathogens, ones subjecting to the purification through streak plate technique and preliminary identification such as gram staining. The colony morphology on the streaked plates were noted as circular, convex, entire colonies of 3 isolates (M14, M27, M33) and puntiform, flat, entire colonies of 2 isolates (M38, M42) and gram staining of the selected isolates revealed as gram negative short rods. The Gram negative isolates of 5 numbers were subjected to Indole, methyl red, Voges-Proskauer's and citrate utilization tests. As per the results obtained for these biochemical tests, the 3 isolates (M14, M33, M38) were belonged to *Escherichia* genus with species *E. coli*; while one (M27) was identified as *Salmonella enterica* and last one of Gram-negative isolate (M42) matched with *Alcaligenes* sp.

# Gender-based constraints in community mango orchards: A conceptual framework of livelihood improvement

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Community mango orchards are agricultural spaces where mango trees are collectively grown and managed by a farming community. These orchards represent a sustainable and community-driven approach to agriculture and food production, income generation, environmental benefits and community building. While community mango orchards can offer numerous benefits, there exist several challenges in these orchards. To assess the gender-based constraints in community mango orchards, ICAR-CIWA conducted a study in the community orchards of Baskitala and Harekrushnapur villages of Mayurbhanj district of Odisha, covering 60 farm households. The constraint analysis revealed that majority of farm women (43%) and male farmers (41%) stated 'poor profitability during juvenile phase of orchard' as a major concern. Additionally, 20% farm women expressed technological constraints in judicious crop management, while 20% male farmers expressed their concern over marketing constraints and distressed sale. A conceptual framework was constructed keeping in view the concerns expressed by the growers of community orchard for strengthening profitability from orchard for sustainable livelihood. The livelihood improvement framework includes technological interventions in managing the fruit drop, unfruitfulness in off-year, Canopy management, integrated nutrient and pest management and post-harvest handling for sustainable maintenance of orchards for improved productivity. The framework also highlights intercropping in mango orchards for sustainable livelihood generation. Strengthening market linkages, market information, formation of farmer producer groups and appropriate storage and transportation are some of the approaches for overcoming the marketing constraints and distress sale of mango.

**Keywords:** Community orchards, mango, constraints, livelihood

## **Versatile Potato Planter for Hill Region: Tubers of All Sizes**

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The potato, scientifically known as *Solanum tuberosum* L., holds the distinction of being the world's third most crucial crop and the foremost among non-cereal food crops. It plays a pivotal role in ensuring food security for the rapidly growing global population. In terms of human consumption, potatoes rank as the third most significant food crop worldwide, trailing only rice and wheat. In the realm of potato production, India takes the second spot, contributing substantially to the world's output with 50.19 million metric tonnes cultivated across 2.17 million hectares. China follows closely behind, producing 91.82 million metric tonnes over an area of 4.91 million hectares. Traditional potato planting methods are predominantly manual, characterized by their time-consuming, labor-intensive, and costly nature. Within these planting processes, the seed metering mechanism assumes utmost importance. The precision of row-to-row spacing during planting hinges on the effectiveness of this seed metering mechanism, which serves as a critical component of planters. Its performance directly influences crop development and yield. The seed metering mechanism's efficiency is closely tied to the design and operational variables of the planter. In our experimentation, we used three different cup sizes, denoted as C1 (small), C2 (medium), and C3 (large), all crafted from cast iron, to accommodate various tuber sizes. Notably, the small cup exhibited greater variability in spacing compared to the larger cup. The primary causes of irregular seed spacing were instances of doubled or skipped plantings, with the larger cup displaying the highest percentage of doubled plantings.



## **Assessment of Correlation Analysis for Yield and Yield Contributing Traits among Tomato (*Solanum lycopersicum* L.) Genotypes**

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Tomato (*Solanum lycopersicum* L.) is one of the most economically valuable crops worldwide, making it imperative to understand the complex interplay of various factors influencing tomato yield. During the research, we investigate Correlation analysis enhances our understanding of the relationships between the variables. We employ Pearson correlation coefficients to assess the strength and direction of linear associations. The results indicate strong positive correlations between morphological traits of diverse genotypes of tomato. This research article contributes to the existing body of knowledge by providing a comprehensive assessment of the path coefficients and correlations among key factors influencing tomato yield. Our findings have practical implications for tomato growers, enabling them to make informed decisions regarding selection of different tomato genotypes strategies to optimize yield.

**Keywords:** Tomato, Genotypic, Phenotypic, Yield, Correlation, Genotypes

## Effect of insecticide pre mix (Chlorpyrifos 50% + Cypermethrin 5% EC) on ground nut ecosystem

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Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli 415 712, Dist- Ratnagiri (M.S.)

The present investigation was carried out to study the effect of insecticide pre mix (Chlorpyrifos 50% + Cypermethrin 5% EC) on ground nut ecosystem during *summer* season of the year 2019 and 2020 at Regional Fruit Research Station, Vengurla, Dist. Sindhudurg, (M.S.).

There were three treatments insecticide pre mix Chlorpyrifos 50% + Cypermethrin 5% EC (625 + 62.5g a.i/ha), Chlorpyrifos 50% + Cypermethrin 5% EC (1250 + 125g a.i/ha) and untreated control plot of ground nut. The pesticides first spray was applied at pest initiation on groundnut and second spray was done 14 days after first spray. Observation on different phytotoxic symptoms like yellowing, stunting, necrosis, epinasty and hyponasty of symptoms were recorded based on percentage leaf damage by visual score (1-10) and later the per cent phytotoxicity was calculated. There were no any phytotoxic symptoms produced on groundnut crop. Two sprays of pre – mix insecticides were found safe to the groundnut crop at recommended. Whereas, the data on number of natural enemies revealed that there was no any adverse effect seen on population natural enemies.

**Keywords:** Pre-mix insecticide, phyto-toxicity, groundnut, natural enemy.

# **Bio-efficacy of insecticide pre mix (Chlorpyrifos 50% + Cypermethrin 5% EC) against ground nut leaf miner in *Konkan* region**

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The present investigation was carried out to study the bio-efficacy of insecticide pre-mix (Chlorpyrifos 50% + Cypermethrin 5% EC) against ground nut leaf miner in *Konkan* region during *summer* season of 2019 and 2020 at Regional Fruit Research Station, Vengurla, Dist. Sindhudurg, (M.S.).

There were eight treatments *viz.*, Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 375 + 37.5 g a.i./ha, Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 500 + 50 g a.i./ha, Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 625 + 62.5 g a.i./ha, Chlorpyrifos 50% EC @ 225 g a.i./ha, Chlorpyrifos 50% EC @ 600 g a.i./ha, Cypermethrin 10% EC @ 60 g a.i./ha, Deltamethrin 2.8% EC @ 12.5 g a.i./ha and untreated control tested against leaf miner infesting ground nut. The results of two sprays against leaf miner infesting ground nut revealed that the lowest leaf miner damage was recorded by the treatments Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 625 + 62.5 g a.i./ha, Chlorpyrifos 50% EC @ 600 g a.i./ha, Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 500 + 50 g a.i./ha and Deltamethrin 2.8 EC @ 12.5 g a.i./ha after two sprays during 2019. Whereas, in year 2020 the leaf miner damage was lowest in the treatment Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 625 + 62.5 g a.i./ha, Chlorpyrifos 50% EC @ 600 g a.i./ha, Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 500 + 50 g a.i./ha, Deltamethrin 2.8% EC @ 12.5g a.i./ha and Chlorpyrifos 20% EC @ 225 g a.i./ha after second spay.

Results on yield basis proved that the treatment Chlorpyrifos 50% EC + Cypermethrin 5% EC @ 625 + 62.5 g a.i./ha recorded maximum yield 2175 Kg per ha and 2205 Kg/ha during both the years.

**Keywords:** Bio- efficacy, pre-mix insecticide, leaf miner, groundnut.

## **Effect of Silicon Amendments in Enhancing Resistance of Rice Plants against Brown Plant Hopper *Nilaparvata lugens* (Stal.)**

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A field experiment was conducted during Kharif 2018 and 2019 and Rabi 2018 and 2019 in the Central Research Farm of Odisha University of Agriculture and Technology, Bhubaneswar, to evaluate the efficacy of different sources of organic (DAE and RHA) and inorganic form ( $\text{CaSiO}_3$ ) of silicon at different doses were tested on rice cv., Swarna against brown plant hopper in rice. A population build up to the tune of 11.59, 17.2 and 23.16 hoppers /hill have been registered by highest dose of DAE,  $\text{CaSiO}_3$  and RHA respectively at the peak activity of hopper as against 65.59 hoppers/hill in control, exhibiting their supremacy in arresting the pest. During Rabi in rice cv., TN 1 the population build up to the tune of 15.59, 16.42 and 15.65 hoppers /hill have been registered by highest dose of DAE,  $\text{CaSiO}_3$  and RHA respectively at the peak activity of hopper as against 57.27 hoppers/hill in control. However, the performance was at par with that of medium doses indicating the importance of these silicate fertilizers at moderate doses for economic and effective management of BPH in rice.

# Identification of Staphylococcal Bacterial Isolates of Bovine Mastitis Pathogens Obtained from the California Mastitis Test (CMT) Positive Milk Samples

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A total of 45 number isolates of the California Mastitis Test (cmt) positive milk samples of bovine mastitis pathogens were collected in nutrient broth from the department of veterinary microbiology, Veterinary Science College, Bangalore. The collected isolates subjected to the purification through the streaking technique, the colonies obtained on the streaked plated were noted for the colony morphology to evaluate its form, elevation and margin. Selected colony from the plate were subjected to the preliminary and specific tests to study its genus and species identity. Among the 45 isolates 18 number isolates (M1, M7, M8, M10, M11, M16, M20, M21, M23, M24, M25, M28, M29, M32, M35, M37, M41, M43) showed puntiform, raised, entire with elevated margin with Gram positive bunches of cocci and placed as staphylococci. Further these isolates were subjected to the specific tests like Voges-Proskauer's, urease production, utilization of mannitol, arabinose and maltose for the identification of species. Based on the above-mentioned biochemical tests, the isolates were identified as *Staphylococcus delphini* (M1); *S. gallinarium* (M16), *S. carnosus* (M20); *S. equorum* (6 - M7, M10, M23, M24, M37, M41); *S. aureus* (3 - M35, M28, M21) and *S. epidermis* (6 - M8, M11, M25, M29, M32, M43).

# Gender-based constraints in community mango orchards: A conceptual framework of livelihood improvement

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Community mango orchards are agricultural spaces where mango trees are collectively grown and managed by a farming community. These orchards represent a sustainable and community-driven approach to agriculture and food production, income generation, environmental benefits and community building. While community mango orchards can offer numerous benefits, there exist several challenges in these orchards. To assess the gender-based constraints in community mango orchards, ICAR-CIWA conducted a study in the community orchards of Baskitala and Harekrushnapur villages of Mayurbhanj district of Odisha, covering 60 farm households. The constraint analysis revealed that majority of farm women (43%) and male farmers (41%) stated 'poor profitability during juvenile phase of orchard' as a major concern. Additionally, 20% farm women expressed technological constraints in judicious crop management, while 20% male farmers expressed their concern over marketing constraints and distressed sale. A conceptual framework was constructed keeping in view the concerns expressed by the growers of community orchard for strengthening profitability from orchard for sustainable livelihood. The livelihood improvement framework includes technological interventions in managing the fruit drop, unfruitfulness in off-year, Canopy management, integrated nutrient and pest management and post-harvest handling for sustainable maintenance of orchards for improved productivity. The framework also highlights intercropping in mango orchards for sustainable livelihood generation. Strengthening market linkages, market information, formation of farmer producer groups and appropriate storage and transportation are some of the approaches for overcoming the marketing constraints and distress sale of mango

**Keywords:** Community orchards, mango, constraints, livelihood

# Harnessing the Power of Artificial Intelligence (AI) in Geographic Information Systems (GIS)

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The unification of Artificial Intelligence (AI) into Geographic Information Systems (GIS) represents a pivotal advancement in the field of spatial data analysis and decision-making. Advancements in AI, particularly in machine learning, deep learning, and computer vision, have empowered GIS professionals to grasp advanced algorithms and techniques for spatial data processing and analysis. By merging the capabilities of AI and GIS, a new frontier has emerged, offering solutions to complex geospatial challenges. Several AI algorithms such as Support Vector Machine (SVM), Principal Component Analysis (PCA), etc. have found diverse applications in GIS, enhancing the capabilities of spatial data analysis, interpolation, interpretation, and decision-making. AI tools in GIS help in: (i) spatial interpolation through Neural Networks for estimating values at unobserved locations based on observed data points; (ii) land use & cover classification using remote sensing data; (iii) predicting distribution of species in different geographic areas, for biodiversity conservation; (iv) natural hazard prediction such as earthquake, landslides, and floods by applying AI tools on historical data; (v) image segmentation and object detection using Convolutional Neural Network (CNN); (vi) real time geo-spatial data analysis for decision making in disaster response. We can use machine learning and AI to analyse raster and image data using techniques like object detection, classification, segmentation, change detection, and feature extraction using various GIS software's. In summary, AI plays a crucial role in enhancing the capabilities of GIS, enabling more accurate and intuitive spatial data analysis and decision-making across wide range of applications and industries. The fusion of AI and GIS is still developing, creating new opportunities for tackling difficult geospatial problems.

**Keywords:** Spatial data, Machine Learning, Deep Learning, Interpolation, Neural Networks

## **To Study the Toxicity Effect of Super Thermal Power Project on Ecology in Narmada River in Madhya Pradesh**

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Heavy metal pollution is a global problem. It has harmful effects on human health and aquatic organisms. At Gadwarwa, the concentration and transport of copper, zinc and cadmium under high and low flow conditions of the Narmada River were investigated. A total of 35 surface water samples taken from the river were examined. Copper (Cu) was the most abundant heavy metal in the Narmada River, followed by zinc (Zn) and cadmium (Cd). Zinc concentrations were found to be low in both high and low flow conditions, while copper concentrations were found to be low in low flow conditions. Further research revealed that the chrome river had high conductivity and pH levels. The final conclusion of the study was that both the concentration of heavy metals and the throughput of the above mentioned NTPC Super Thermal Power Project Gadwarwa are minimal.

**Keywords:** Narmada River, industrial tributary, heavy metal pollution, heavy metal transport.



## Identification of Streptococcal Isolates of the Bovine Mastitis Pathogens Obtained from the California Mastitis Test (CMT) Positive Milk Samples

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Bovine mastitis isolates of 45 numbers from positive milk samples of California Mastitis Test (CMT) in and around Bangalore area obtained from the Department of Veterinary Microbiology, Veterinary College, and Bangalore were transferred in nutrient broth. A total of 45 numbers of the isolates were purified on nutrient agar media by streaking method. The purified isolates were further subjected to preliminary and specific tests to arrive at genus and species level identification. Among them isolates of 22 numbers having Gram positive cocci in chains, oxidase negative, catalase negative and only fermentative were assigned to the genus *Streptococcus*. Further these isolated subjected specific tests to characterize there species level. Isolates of streptococci were subjected to Voges Proskauer's, esculin hydrolysis, arginine utilization, sucrose fermentation to identify the species. A total of 10 isolates (M4, M6, M9, M12, M13, M22, M39, M40, M44, M45) were identified based on positive results for Voges-Proskauer's, esculin hydrolysis, arginine utilization, sucrose fermentation as *Streptococcus uberis* after comparing with identification key. Similarly, another 12 streptococcal isolates matched with identification of *S. agalactiae* (M2, M3, M5, M15, M17, M18, M19, M26, M30, M31, M34, M36) based on specific tests where in the isolates hydrolyzed esculin and fermented sucrose where as VP test arginine tests were negative.

## **Performance of spring maize crop under different establishment methods and moisture conservation practices**

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A field experiment was conducted during *spring* season of year 2019-21 and 2020- 21 at **Govind Ballabh Pant University of Agriculture & Technology, Pantnagar- 263145, Uttarakhand, India**, to study the influence of establishment methods and different soil moisture conservation practices on spring season maize yield and quality parameters. The experiment was laid out in Factorial randomized complete block design (FRCBD) with two establishment methods (flat and furrow sowing) and four different moisture conservation practices (straw/ plastic mulching, earthing and mulching+ earthing) in three replications. The soil of the experimental field was clay loam in texture, low in available nitrogen, medium in available phosphorus, high in available potassium, high in organic carbon content and neutral to alkaline in reaction.

Experimental results revealed that the highest total grain yield (88.73 q/ha) and stover yield (156.77 q/ha) were obtained in the treatment having furrow sowing and mulching with plastic sheet, followed by earthing in furrow sowing. The quality parameters of maize crops (in %) viz. OM and CP (9.10 %) were influenced significantly with different moisture conservation practices and establishment methods, the highest value are observed in furrow method of sowing along with using plastic mulch. Plant height, stem girth, number of leaves and dry matter accumulation per plant were observed maximum in furrow establishment and plastic mulch and the lowest in flat sowing with control. The net return and B: C ratio was more under furrow establishment as compared to flat sowing method, and the highest value (1.91) was observed in using plastic mulch followed by earthing.

Thus for the spring sown hybrid maize, furrow sowing and application of plastic mulch may be advocated to achieve higher yield, conserve moisture and enhance water use efficiency.

**Keywords:** Maize, Establishment, Moisture conservation, Mulch, Furrow.

## Screening Of The Antimicrobial Susceptibility (AMS) Of The Lactic Cultures Used In Dahi

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Lactic cultures used in the dahi preparation such as *Lactococcus lactis ssp lactis 1*, *Lactococcus lactis ssp. lactis 2*, *Lactococcus lactis ssp. Cremoris*. Subjected to the antibacterial susceptibility test using 18 various antibiotic discs [Ampicillin, Azithromycin, Bacitracin, Cefoperazone, Ceftriaxon, Erythromycin, Kanamycin, Levofloxacin, Nalidixic acid, Neomycin, Ofloxacin, Pefloxacin, Penicillin, Rifampicin, Spectinomycin, Streptomycin, Tobramycin, Vancomycin]. Disc zone measuring > 10mm and < 10mm, interpreted as resistance and susceptible. Out of 18 antibiotics, 5 antibiotics such as ampicillin, cefoperazone, ceftriaxone, kanamycin, penicillin, vancomycin showed resistance in all the 3 lactic cultures with no zone of inhibition. Among the 3 lactic cultures, *Lactococcus lactis ssp. lactis 1* and *Lactococcus lactis ssp. cremoris* showed resistance to nalidixic acid, while *Lactococcus lactis ssp. lactis 2*, resisted azithromycin, erythromycin and rifampicin. Susceptibility of dahi cultures were noticed in other 9 antibiotics like bacitracin, levofloxacin, neomycin ofloxacin, pefloxacin, spectinomycin, streptomycin and tobramycin with inhibitory zone range of 14 to 18 mm diameter. The screening helps in the evaluating the cultures resistance or susceptibility to the selected antibiotics. The resistance factor poses public health significance, since there is possibility of transfer of resistance factor from the lactic to other intestine microbes when consumed by the mankind.

## **Black Wheat: A Future-Focused Nutritional Solution for Enhanced Health and Well-being**

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Biofortified Black wheat is known for its anthocyanin content. This black wheat has created interest among the food processing industry people of common due to presence of many phytochemicals such as anthocyanins, phenolic and flavonoid contents and high antioxidant activity. Owing to presence of many of these functional compounds black wheat is said to possess many health benefits like act as antioxidants and help in prevention of cardiovascular diseases , diabetes , inflammation, cancer, obesity and aging. For assessment of these phytochemical properties of black wheat in relation to feasibility of black wheat for preparation of value added products like noodles and cookies were evaluated. In this the chemical composition (protein and minerals as major), phytochemicals(crude and total anthocyanin content, soluble phenolic and total phenolic content, condensed tannin content, essential amino acids and antioxidant activity) were assessed for prepared products and found that most of values for listed phytochemicals and nutrients were either optimum or more than required as recommended daily allowances for respective nutrients. This in turn proves the importance of study and feasibility of utilizing black wheat for value addition and getting products to be prepared with high nutraceutical profile.

**Keywords:** Bio,fortified Black wheat, phytochemicals, anthocyanin ,total phenolic content, condensed tannin content, essential amino acids and antioxidant activity

## Assessing the Ecological Ramifications of Drone-Based Pesticide Application on Soil Microbiota in Rice Ecosystem

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The ecological consequences of aerial pesticide application by drones on soil microbiota in rice fields were investigated in this study. The quantitative and qualitative effects of different pesticide treatments, both applied *via* drones and taiwan sprayer, were examined on soil bacteria, actinomycetes, and fungi. The average population of total bacteria and pseudomonas in the rhizosphere soil tended to be slightly higher in the drone-sprayed treatments compared to the taiwan sprayer treatments. It is evident that the drone spraying treatments resulted in higher average populations of actinomycetes and fungi ( $124.75 \text{ CFU} \times 10^5 \text{ g}^{-1} \text{ soil}$  and  $21.12 \text{ CFU} \times 10^4 \text{ g}^{-1} \text{ soil}$ , respectively) compared to the taiwan sprayer treatments with average populations of  $127.75 \text{ CFU} \times 10^5 \text{ g}^{-1} \text{ soil}$  for actinomycetes and  $22.5 \text{ CFU} \times 10^4 \text{ g}^{-1} \text{ soil}$  for fungi. Qualitative assessment of microbial groups revealed that, the abundance of G -ve bacterial groups are higher when compared to G +ve bacterial groups in rhizospheric soil before harvest of the crop. The distribution of fungal genera varied due to pesticide applications. The mean per cent occurrence of *Curvularia* spp., *Penicillium* spp., and *Trichoderma* spp. was slightly higher in the drone-sprayed treatments (9.85%, 8.51%, and 8.33%) compared to the taiwan-sprayed treatments (2.48%, 2.24%, and 2.00%). However, the mean per cent occurrence of *Aspergillus* species (*A. ochraceous*, *A. niger*, and *A. flavus*) was relatively higher in the taiwan sprayer treatments (9.14%, 12.81%, and 4.09%) when compared to the drone-sprayed treatments (3.75%, 2.31%, and 0.83%). Overall, this study underscores the need for further research to comprehensively understand the implications of different pesticide application methods on soil microbial communities and their potential impact on soil fertility and ecosystem functioning over time.

## **Study of the Antimicrobial Susceptibility (AMS) of Streptococcal Isolates of Bovine Mastitis Obtained from the California Mastitis Test (CMT) Positive Milk Samples**

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A total of 22 *Streptococcal* spp. identified from the California Mastitis Test (CMT) positive milk samples of bovine mastitis pathones subjected to AMS for 18 antibiotics discs (HI Media, Mumbai), [Ampicillin, Azithromycin, Bacitracin, Cefoperazone, Ceftriaxon, Erythromycin, Kanamycin, Levofloxacin, Nalidixic acid, Neomycin, Ofloxacin, Pefloxacin, Penicillin, Rifampicin, Spectinomycin, Streptomycin, Tobramycin, Vancomycin] which were commonly employed in the dairy farm. The isolates were grown for 24 h at 37 ° C in nutrient broth, each culture transferred to sterile labeled Petri plate and then poured 10-15 ml of sterile molten Muller Hinton Agar (MHA). After the incubation for about 24-48 h at 37 ° C the isolates were, evaluated as resistant, intermediate or susceptible based on the presence or absence of zone of inhibition around the discs, measured the diameter of inhibitory zone declared the observation comparing with CLSI,2017. Among the total isolates *Streptococcus uberis* M45 and *Streptococcus agalactiae* M36 resisted 15 and 16 antibiotics, respectively among 18 antibiotics used in the study. *Streptococcus uberis* M45 isolate showed highest susceptibility to ceftriaxone, nalidixic acid with each of 25 mm diameter of inhibitory zone, while *Streptococcus agalactiae* M18 isolate exhibited highest susceptibility towards ampicillin, kanamycin, levofloxacin and tobramycin with 25 mm each zone of inhibition. Statistically significant ( $P=0.05$ ) differences occurred among all the isolates of streptococci with respect to AMS against 18 antibiotics. Among all streptococcal isolates. Ofloxacin exhibited the susceptibility and resistance of 50 % each of streptococcal isolates, while the Pefloxacin and Penicillin showed 100 % resistance to all the isolates. Streptococcal isolates (22) displayed 4 %, 14 % and 82 % of susceptibility, intermediate and resistance against Rifampicin.

# Effect of Integrated Weed Management Practices on Growth and Yield of Black Gram (*Vigna mungo* L.)

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A field experiment was conducted under inceptisol during *Kharif* season, 2021 at Agricultural Farm, School of Agricultural sciences, G.H. Rasoni University, Saikheda, (M.P). The experiment was carried out in Randomized Block Design with eight treatments each replicated thrice on the basis of one year experimentation. The treatments which are T<sub>1</sub>: 1kg/ha of Pendimethalin, T<sub>2</sub>: 1.5kg/ha of Alachlor, T<sub>3</sub>: 50g/ha of Quizalofop-p-ethyl, T<sub>4</sub>: 1kg/ha of Pendimethalin plus 30 DAS of once hand weeding, T<sub>5</sub>: 1.5kg/ha of Alachlor plus 30 DAS of once hand weeding, T<sub>6</sub>: 50g/ha of Quizalofop-p-ethyl plus 30 DAS of once hand weeding, T<sub>7</sub>: At 20 and 40 DAS of twice hand weeding, T<sub>8</sub>: Weedy check used. Black gram variety "TAU-1" was used as a test crop.

Along with this, T<sub>4</sub> -1kg/ha of Pendimethalin plus 30 DAS of once hand weeding have significantly affect and T<sub>7</sub> - At 20 and 40 DAS of twice hand weeding closely proved to be next superior treatment strategy in improving growth and yield attributing characters including plant height, number of branches per plant, dry matter accumulation, number of nodules per plant, pods per plant, seeds per pod and seed test weight of black gram over rest of the treatments.

It was further noted in the present study that pre-emergence application of T<sub>4</sub> - 1kg/ha of Pendimethalin plus 30 DAS of once hand weeding were found statistically equivalent and significantly superior treatments in enhancing the net returns of Rs 52720.93 /ha and highest B:C ratio of 2.23, T<sub>4</sub> - 1kg/ha of Pendimethalin plus 30 DAS of once hand weeding was found the most effective and lucrative treatment.

**Keywords:** Black gram, Growth, Yield, Plant height, Net return

## Potential and Prospects of Seabuckthorn Processing in Ladakh

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Ladakh, a high altitude cold desert region in the Indian Himalayas offer a vast scope and potential for value addition of local produce and is noted for various functional crops such as buckwheat, barley, seabuckthorn, apricot, walnut, and so on. Seabuckthorn (*Hippophae rhamnoides* L.), also known as *Tses-ta-lulu* in Ladakh, is a wildy grown ecologically and economically important prickly shrub. The berry is generally known as 'Ladakh Gold' and it is one of the potential underutilized nutritious fruits with different uses ranging from medicinal to cosmetic, and have the potential to change the economy of inhabitants of Ladakh. It is a powerhouse of antioxidant, full of bioactive chemicals, vitamins, and minerals that give balanced nourishment to improve health and nutritional security. Ladakh remains the major site for a natural seabuckthorn resource, accounting for about 70 per cent of the country's total seabuckthorn area. Despite being the most populous inhabitant of Ladakh, it is underutilized and only used to a limited extent by the locals. Due to their thorny character, less than 5 per cent of the natural berries present in Ladakh are harvested, while 90 per cent of the harvested crop in Ladakh is sold after primary processing for value addition. Seabuckthorn is a valued crop with enormous potential for sustainable development, nutritional security and livelihood enhancement of rural communities in the Ladakh region. Processing, development of modern low-cost processing and value addition technologies and value addition supported with proper marketing intervention will ensure good return to the locals thereby improving their socio-economic status and will boost agriculture sector.

**Keywords:** Seabuckthorn, Antioxidant, Underutilized, Processing, Nutritional security



# Enhancing Biosecurity Measures for Ornamental Fish: Protecting a Precious Aquatic Trade

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The risk of infectious disease transmission, biosecurity procedures is implemented to prevent the entrance and spread of hazardous organisms in the aquarium, such as viruses and bacteria. These measures are taken in aquaculture to safeguard fish species from invading species and other harmful creatures. Ornamental fishes are considered one of the most important means of home entertainment due to their diversity and picturesque colours. Additionally, ornamental fishes are used for commercial purposes as a new industry all over the world. However, the global spread of ornamental fish trade has led to the transmission of diseases that adversely affect other aquarium fishes to some extent. Parasites and their infected hosts have been co-introduced to non-native environments, damaging biodiversity, ecosystems, industries, and dependent local communities. Therefore, it is assumed that diseases will continue to emerge as a serious challenge to the aquaculture industry. Most wild-caught aquarium fish from India come from the Eastern Himalayas and Western Ghats, hotspots known for their remarkable freshwater biodiversity and endemism. Around 200 freshwater fish species originating from the Eastern Himalayas have been procured for commercial purposes, albeit with less than half of them being exported on a consistent basis. In a similar way, approximately twenty out of over one hundred species that have ventured into the commercial realm from the Western Ghats are regularly transported. The remaining species, due to their scarcity and exceedingly challenging procurement, are deemed non-feasible for trade. Thus, they cannot meet a constant market demand and are extremely sensitive to handling and transportation.

**Keywords:** Aquarium, diseases, ornamental fish, import-export market, quarantine, transportation

## **An analysis of the morphology of adult dung beetles in the Hassan district of Karnataka**

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One of the ecosystem's essential components for sustaining and controlling it was the dung beetle species, which represent a well-established community across an ecosystem. Using past reports from India as a guide, we explain the findings of a morphometric analysis of mature dung beetles in the current work. The beetles were manually gathered from the ground on and around the campus of the veterinary college because there were light sources present at night. The samples were examined with a stereozoom microscope. The images were made using a digital camera attached to a Lawrence and Mayo stereomicroscope and a Nikon DSLR D-7000. The current study on the morphometric analysis of adult dung beetles, including *Heliocopris bocephalus*, *Catharsis molossus*, *Catharsius sagax*, *Bolbohamatum calanus*, *Oryctes rhinoceros*, and *Onthophagus bonasus*, revealed fourteen different morphometric parameters that vary with these beetles' physical characteristics. The current study provides the path for more investigation into the dung beetle species that are found in India's various regions. Additionally, studies at the molecular level need to be conducted employing a wide range of species and mentioning the significance of various specimens. It was also the first publication to present the morphometric information on these dung beetles from the nation's western ghat region.

# **Water-in-oil-in-water double emulsion as carrier matrix for Encapsulation of bioactive peptides from Sahiwal cow milk**

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In the recent past several studies have been carried out to explore the health benefits of native Indian cow milk. Bioactive peptides from Indian cow milk have not been explored much. Our study was aimed at understanding the health attributes of Sahiwal cow milk peptides and their encapsulation in water-in-oil-in-water ( $W_1/O/W_2$ ) double emulsion (DE) for their incorporation in functional foods. Different peptides were obtained by hydrolyzing Sahiwal cow milk using different enzyme: substrate concentrations (E:S) (1:200, 1:400, 1:600, 1:800, 1:1000). Functional properties viz. antioxidant assay, ACE-inhibitory assay and MTT assay of these peptides were determined. Owing to its better functional attributes over other E:S combinations, protein hydrolysates obtained by E:S = 1:600 was selected for its encapsulation in DE. Double emulsion was prepared by first optimizing the primary emulsion i.e., water-in-oil ( $W_1/O$ ) followed by selection of outer aqueous phase ( $W_2$ ). Primary emulsion ( $W_1/O$ ) prepared using sunflower oil and 2% salt concentration was found to be more stable and has smaller particle size and better encapsulation efficiency than the remaining formulations. The outer aqueous phase ( $W_2$ ) was prepared using different protein sources as hydrophilic emulsifiers. DE with 2% WPC in the outer aqueous phase ( $W_2$ ) had higher encapsulation efficiency, smallest particle size and good physical stability. The results obtained in the present investigation indicated that Sahiwal cow milk possesses functional peptides which can be effectively encapsulated in double emulsion for their supplementation into functional foods.

***In vitro* Comparative Efficacy of different Fungicides against *Fusarium oxysporum* f.sp. *radicis-cucumerinum* causing Root and Stem Rot of Cucumber (*Cucumis sativus* L.)**

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Cucumber (*Cucumis sativus* L.) belongs to family Cucurbitaceae and most important vegetable, which is a major source of human edible products and useful fibers. Root and stem rot is the most destructive disease of glasshouse cucumber crops. Root and stem rot of cucumber is believed to be caused by a new formae specialis of *F. oxysporum*, presently designated *F. oxysporum* f.sp. *radicis-cucumerinum*. Comparative efficacy of different fungicides against *F. oxysporum* f.sp. *radicis-cucumerinum* at different percent concentrations was studied *In vitro* by poisoned food technique such as Hexaconazole 5% EC, Mancozeb 75% WP, Thiram-50%WP, Copper oxychloride 50% WP, SAFF 75 %WP (Carbendazim 12% + Mancozeb 63%), Fosetyl-Al (Aliette -80%WP), Azoxystrobin 11% + Tebuconazole 18.3% (Spectrum) and Tebuconazole 50%+Trifloxystrobin 25% (Nativo-75WP). The results stated that all the fungicides significantly inhibited the mycelial growth of the pathogen at all three concentrations. Increase in concentrations of fungicides caused a decrease in mycelia growth of the fungus thereby resulting in increased inhibition. Among the eight fungicides Tebuconazole 50%+Trifloxystrobin 25% (Nativo-75WP) was found most effective by showing minimum mycelial growth.

## **Influence of Biofertilizer and Zinc on Growth, Yield and Economics of Sorghum (*Sorghum bicolor* L.)**

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A field experiment was conducted during *kharif* 2022 at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) to study the “Influence of Biofertilizer and Zinc on growth, yield and economics of Sorghum (*Sorghum bicolor* L.)”. To Study treatment consisting of three levels of *Azotobacter chroococcum* viz. 10g/kg, 15g/kg and 20g/kg and three levels of Zinc viz. 15kg/ha, 20kg/ha and 25kg/ha. There were 10 treatments, each of which was replicated three times and laid out in randomized block design. The results showed that treatment 9 [*Azotobacter chroococcum* (20g/kg) + Zinc (25kg/ha)] recorded significant higher plant height (214.23 cm), higher dry weight (120.23 g), higher length of ear head (25.44 cm), higher seed yield (4310.02 kg/ha), higher straw yield (6810.02 kg/ha) and higher harvest index (38.75 %) was recorded in treatment 9 [*Azotobacter chroococcum* (20g/kg) + Zinc (25kg/ha)]. Similarly, maximum gross return (85752.38 INR/ha), maximum net return (58302.38 INR/ha) and highest benefit cost ratio (2.12) was also recorded in treatment 9 [*Azotobacter chroococcum* (20g/kg) + Zinc (25 kg/ha)] as compared to other treatments.

**Keywords:** *Sorghum*, *Azotobacter chroococcum*, zinc, growth, yield and economics

## **Castor semilooper, *Achaea janata* (Noctuidae: Lepidoptera) as emerging pest of pomegranate in Northern Karnataka**

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Pomegranate is one of the attractive, most remunerative farming endeavors, adaptable fruit crop and its cultivation is increasing very rapidly worldwide because of its hardy nature, wider adaptability and drought tolerance, higher yield levels with excellent keeping quality and remunerative prices in domestic as well as export market. Cultivation of high yielding varieties under the umbrella of chemical fertilizers and synthetic pesticides, change in crop cropping intensity and climate change have led to emergence of many insect and non insect pests in pomegranate. We report here the occurrence of the castor semilooper, *Achaea janata* (Noctuidae: Lepidoptera) in Vijayapur, Karnataka on pomegranate which is a devastating pest of castor in several crop growing areas of Indian continent. *A. janata* is a polyphagous pest, the caterpillars which feed on leaves, stems and fruits showed characteristic small hole symptoms on the leaves and fruits mainly during September- November. India predominantly being a tropical country favours high rate of multiplication round the year and its high pestiferous nature poses a formidable challenge to Indian agriculture warranting immediate action before it assumes a serious proportion.

## **Response of potato varieties as affected by different plant spacing with cut seed tuber planting**

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A field experiment was conducted during winter (*Rabi*) seasons of 2021-22 at Chaudhary Charan Singh Haryana Agricultural University, Hisar, India. The treatments consist of three potato varieties, *i.e.*, Kufri Neelkanth, Kufri Bahar and Kufri Lima along with four plant spacing, *i.e.*, 60x10 cm, 60x15 cm, 60x20 cm planting with cut tuber and 60x20 cm planting with whole tuber. The experiment was conducted with Factorial Randomised Block Design with three replications. The results revealed that Kufri Neelkanth performed better over Kufri Bahar for total tuber yield as well as different grades except >75 g size. Kufri Neelkanth gave 2.1 % higher total yield over Kufri lima. Among the spacings, small size tuber <25 g had not effected by different spacing treatments. Medium size tuber 25-50 & 50-75 g were recorded higher under spacing 60x20 cm planting with whole tubers, whereas, large size tuber >75 g was recorded maximum in 60x20 cm planting with whole tuber. Total tuber yield (395.8 q/ha) was recorded maximum under spacing 60x20 cm planting with whole tubers, which was statistically at par with 60x10 cm and 60x15 cm planting of tuber. It may be concluded that Kufri Neelkanth increases yield by 2.1 % over Kufri lima and planting of cut tubers at a spacing of 60x20 cm is a viable option for growing potato.

**Keywords:** Crop geometry, Tuber, Potato and Varieties

## **Comparative investigations on the yield of oyster mushrooms (*Pleurotus ostreatus* var. *florida*) making use of substrate supplements**

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In this study, oyster mushroom (*Pleurotus ostreatus* var. *florida* (Jacq: Fr) Kummer) were grown with various substrate additions to determine their effects on yield. We ran tests to out how different supplements affected the yield and growth of mushrooms. The substrate, composed primarily of sawdust and straw, served as the growth medium. The research encompassed controlled environmental conditions, including temperature, humidity, and light, over a defined study period. Our findings revealed significant variations in mushroom yield and growth parameters across the different supplement treatments. The best supplements to the substrate treatment combination were observed T<sub>14</sub>- Wheat Straw (60%), + Rice Straw (34 %) + Gram Flour (2% of the substrate) (451.69g) and (452.33g) followed by T<sub>11</sub> - Rice Straw (60%), + Wheat Straw (34 %) + Maize Flour (2% of the substrate) which increased the yield of oyster mushroom, while others exhibited nuanced effects on mushroom quality. Statistical analyses supported these observations. The implications of this research extend to both commercial and amateur mushroom cultivators. Understanding the influence of substrate supplements on Oyster mushroom growth can lead to more efficient and cost-effective cultivation practices. By optimizing substrate composition, growers can enhance yields, potentially increasing profitability and sustainability in the mushroom industry. This study also highlights the need for further exploration in the field, including investigations into the specific mechanisms underlying supplement-substrate interactions.

**Keywords:** Agricultural byproducts, Biological efficiency, Growth and yield of *Pleurotus ostreatus*, Oyster mushroom production, substrate supplements.



# Effect of Wrapping Materials Combination of Growth Regulators on Physical Characters and Storage Life of Papaya (*Carica papaya L.*) Cv. Red Lady

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The experiment was conducted to assess the effect of different wrapping materials and growth regulators on physical characters, storage life and quality of papaya cv. Red lady was stored at room temperature during the investigated. The fruits are harvested best treatment of INM (*i.e* 75% RDF+10 kg vermicompost + 100g *Azotobacter* + 100g *PSB* plant<sup>-1</sup>) fruits harvested dipped in different growth regulators and combined with packaging materials imposed in the present investigation showed lowest loss in weight (PLW) in fruits treated with CaCl<sub>2</sub> @ 3.0 % and packed with news paper (7.65%), whereas, highest PLW was found in control (38.93%). Maximum fruit firmness was observed in the fruits treated with T<sub>1</sub>- CaCl<sub>2</sub> @ 3.0 % and wrapping with news paper (2.03 kg cm<sup>-2</sup>) and T<sub>1</sub> recorded significantly minimum spoilage (23.34%) over other treatments. Maximum TSS recorded in T<sub>7</sub>-control (10.80°Brix). The storage life was found maximum in T<sub>1</sub> - fruits dipped in CaCl<sub>2</sub> @ 3.0% and wrapping with news paper (17.58 days) and followed by T<sub>3</sub>- GA<sub>3</sub> @ 100ppm and wrapping with news paper (16.25 days). However, control has shown poor storage life (9.00 days).

## Productivity of Intercrops Under Fodder Tree Species Based Agroforestry Systems in Northern Transitional zone of Dharwad Region of Karnataka

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The present field investigation was carried out in existing fodder plantation for two years during kharif and rabi seasons of 2018-19 and 2019-20 to study the effect of different fodder tree species on intercrops (Soybean and Safflower) grown under fodder tree based agroforestry system at University of Agricultural Sciences, Dharwad, Karnataka. The experiment was laid out in Randomized Block Design (RBD) with three replications in an established plantation. Fodder trees were planted at a spacing of 5 × 3 m and the plot size was 15 × 12 m with 12 trees per treatment with two intercrops soybean (kharif season) and safflower (rabi season) in the interspaces. During kharif season, the yield attributes of soybean (number of pods, seed weight, hundred seed weight, seed yield and haulm yield) were noticed highest values in sole soybean (T<sub>8</sub>). Whereas, *Albizia lebbeck* + Soybean (T<sub>2</sub>) recorded maximum values among agroforestry systems during both the periods of investigation. The highest number of root nodules and weight of root nodules were recorded in soybean as sole crop (T<sub>8</sub>) and *Albizia lebbeck* + Soybean (T<sub>2</sub>) agroforestry system. During rabi season, the yield attributes of safflower (number of capitula, seed yield and haulm yield) were recorded maximum values in sole safflower (T<sub>8</sub>). Among agroforestry systems, *Moringa oleifera* + Safflower (T<sub>6</sub>) noticed maximum values during both the periods of investigation. The fodder tree based agroforestry systems reported a significant influence on soil moisture (%) with soybean and safflower intercrops in different growth stages (20, 40, 60 DAS and at harvest) during study periods which indicated water stored in the soil helps in performance of field crops. Soil moisture (%) under soybean crop showed decreasing trend from 20 DAS to harvesting stage.

**Keywords:** Intercrop, fodder tree species, root nodule, agroforestry system, soil moisture

## Assessment of Quality Parameters of Tree Fodder of Different Fodder Tree Species Grown Under Agroforestry Systems, Karnataka

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Feeding of selected tree foliage is a traditional practice in many areas and hence, determination of nutritional quality of fodder sources is an important aspect for making balanced diet. Hence, the present investigation on biochemical and quality parameters of tree fodder under agroforestry systems was conducted at UAS, Dharwad campus during the period 2018-19 and 2019-20. The study revealed that the crude protein concentration of the leaves varied significantly with a higher value in *Sesbania grandiflora* (T<sub>4</sub>). The crude fibre content varied significantly with higher values in *Bauhinia purpurea* (T<sub>7</sub>). There was a significant variation in crude fat content recorded with a higher value of 7.31 per cent in *Moringa oleifera* (T<sub>6</sub>). The highest total ash content was recorded in *Sesbania grandiflora* (T<sub>4</sub>). The nitrogen free extract (NFE) content was recorded with a higher value in *Albizia lebbek* (T<sub>2</sub>). The palatability and selectivity for preferences (ranking) of seven tree fodders was studied based on the potential consumption of tree fodder by sheep and goats in different harvesting seasons (harvesting intervals at 4, 8 and 12 MAT). Palatability (%) increased from I pruning to II pruning and then decreased at III pruning. During the study periods, T<sub>3</sub> has fetched highest palatability (%) of tree fodder at all the stages of harvesting intervals with significant variation. Palatability study indicated that the selective ranking of tree fodder among protein sources studied for feeding sheep and goat is followed in the order from highest to lowest ranking: T<sub>3</sub>>T<sub>4</sub>>T<sub>1</sub>>T<sub>6</sub>>T<sub>7</sub>>T<sub>2</sub>>T<sub>5</sub>. The higher nutritional parameters of tree foliage indicated that T<sub>4</sub>; T<sub>3</sub> and T<sub>6</sub> agroforestry systems have produced good quality fodder for livestock. Palatability study among seven tree fodders towards sheep and goat showed that *Leucaena leucocephala*, *Calliandra calothyrsus* and *Sesbania grandiflora* are mostly preferred fodder tree species among sheep and goat and economically viable systems.

**Keywords:** Nutritional quality, crude protein, crude fibre, palatability, nitrogen free extract, total ash, crude fat, selective ranking.

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## Effect of Fertilizer Levels on Performance of Mustard crop under Agroforestry Systems

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The experiment was conducted in the new dusty acre area at the research farm of forestry, Jawaharlal Nehru Krishi Vishwavidyalaya, Madhya Pradesh India. This experiment was run on agricultural crop (Indian mustard) with two tree system (*Gmelina* and *Dalbergia*) under fertilizer treatments, the statistical tool for analysis and data interpretation by FRBD (Factorial randomized block design). The first factor was two agroforestry system *i.e.* *Gmelina arborea* + Mustard and *Dalbergia sissoo* + Mustard and second were three Fertilizer treatments *i.e.* 75%, 100% and 125% recommended dose of fertilizer (RDF) with four replications. The present studied revealed that; field emergence at 14 days after sowing (DAS), Plant height (cm) at harvest, Branches plant<sup>-1</sup> (numbers), 1000 grain weight, Biological yield (q ha<sup>-1</sup>), Seed yield (q ha<sup>-1</sup>) and Harvest index (%) were *Gmelina* significant over to *Dalbergia* factor. moreover, second factor was fertility level 125%(F<sub>3</sub>) found significant to other fertility levels (F<sub>2</sub> and F<sub>1</sub>) of parameter of mustard *i.e.* plant population, plant height, silique branches<sup>-1</sup>, silique Length, number of seed silique<sup>-1</sup>, 1000 grain weight, seed yield and harvest index. The PAR during 30 DAS of mustard the APAR and IPAR were found non- significant, 60 and 90 DAS of mustard the APAR and IPAR were found significant and Non-significant respectively.

**Keyword:** Agroforestry, Fertilizer levels, PAR, Productivity etc.

# Composition and Regeneration Status of Non Timber Forest Products (NTFPS) Species in Selected Forest Ranges of Sirsi Forest Division of Uttara Kannada District of Karnataka

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Study was conducted at Sirsi, Hulekal and Siddapur range of Sirsi Forest Division. The species diversity of NTFP species recorded highest (3.57) in the Hulekal Forest Range followed by Siddapur range (3.56) and lowest was recorded in the Sirsi range (3.49). *Olea dioica* has the highest Importance Value Index (IVI) value of 24.34 followed by *Hopea ponga* (21.10) and *Caryota urens* (17.43) in Sirsi range with 58 species and 30 families. Species with IVI Values, *Aporosa lindleyana* (24.61) followed by *Olea dioica* (21.33) and *Knema attenuate* (19.16) were dominant in Hulekal range with 70 species and 34 families. The Siddapur range dominated by *Aporosa lindleyana* has the maximum IVI (24.97) followed by *Olea diaca* (20.74) and *Caryota urens* (17.48) with 60 species and 27 families. IVI of regeneration diversity of seedlings as follows, *Caryota urens* has maximum IVI of 22.14, followed by *Syzygium cumini* (20.77) and *Aporosa lindleyana* (19.98) in Sirsi range. *Aporosa lindleyana* (17.48), *Caryota urens* (15.71) and *Syzygium cumini* (11.84) species were highest IVI of the regenerating species in Hulekal range. *Aporosa lindleyana* (27.43) followed by *Syzygium cumini* (24.63) and *Caryota urens* (16.98) recorded highest IVI of regenerating species in Siddapur range. Hulekal range recorded the highest number of regenerating individuals of 3120 followed by Siddapur (2506) and Sirsi range (2267) per 200 m<sup>2</sup>. The size class distribution showed the decreasing trend of stems from lower to higher size class exhibiting a reverse J-shape curve graph indicating promising growth of regenerating species. Some of the common NTFPs used during household survey were *Garcinia cambogia*, *Garcinia indica*, *Mangifera indica*, *Myristica malabarica*, *Cinnamomum zeylanicum* and *Sapindus emarginatus*. The TSS Marketing Society is marketing most of the NTFP's with 23 commercialized

NTFP's during 2021-22 and majority were medicinal plants. Nutmeg was the most procured and sold product, followed by *Garcinia cambogia*.

**Keywords:** Size class distribution, NTFPs, household survey, marketing Society, medicinal plants, procured and sold products

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## **Practices for control of weeds pertaining to the way weeds and chickpeas absorb nutrient throughout Agroforestry systems based on *Jatropha***

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In order to determine the impact of weed control on nutrients uptake by weeds and chickpea under *Jatropha*-based Agroforestry, a field experiment was carried out at Research Farm, Department of Forestry, JNKVV, Jabalpur during Rabi season 2019–20. Twelve herbicidal treatments were used in the experiment, which was set up using a Randomized Complete Block Design (RCBD) with three replications. These treatments included Pendimethalin 1000 g ha<sup>-1</sup>, Imazethapyr 900 g ha<sup>-1</sup>, Atrazine 1000 g ha<sup>-1</sup>, Metribuzin 300 g ha<sup>-1</sup>, Oxyfluorfen 100 g ha<sup>-1</sup>, Pendimethalin 500 g ha<sup>-1</sup> fb Imazethapyr 450 g ha<sup>-1</sup>, Pendimethalin 500 g ha<sup>-1</sup> fb Oxyfluorfen 50 g ha<sup>-1</sup>, Metribuzin 150 g ha<sup>-1</sup> fb Oxyfluorfen 50 g ha<sup>-1</sup>, Atrazine 500 g ha<sup>-1</sup> fb Metribuzin 150 g ha<sup>-1</sup>, Imazethapyr 450 g ha<sup>-1</sup> fb Atrazine 500 g ha<sup>-1</sup>, hand weeding (30 DAS) and Weedy check (control). Different herbicidal treatments have a considerable impact on how well crops and weeds absorb nutrients. The outcome showed that there were various variances in the way that weeds absorbed nutrients. Chickpea seed nutrient uptake was highest during manual weeding (42.6: 9.22: 19.2) and lowest during weedy check (14.3: 2.22: 7.25). With hand weeding, stover absorbed the most nutrients (44.4: 10.6: 32.8) and the least nutrients (23.7: 2.93: 18.2), respectively. The hand weeding process had the highest nutritional absorption (87.07: 19.85: 50.48) and the lowest (38.15: 5.16: 24.85) of the total (seed + stover) nutrients. Pendimethalin 1000 g ha<sup>-1</sup> application was shown to be the most effective herbicide among them

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(66.37: 13.85: 42.29), while Imazethapyr 900 g ha<sup>-1</sup> (49.12: 7.06: 29.39) of total (seed + stover) was found to be the least effective. Weedy check found that *Cynodon dactylon* (4.52: 2.40: 3.46 NPK kg ha<sup>-1</sup>), *Cyperus rotundus* (3.03: 1.41: 7.41), *Medicago arabica* (24.23: 3.34: 31.33), and *Vicia sativa* (15.77: 2.57: 24.37) substantially absorbed more nutrients. By hand weeding (30DAS), weeds such as *Cynodon dactylon* (0.59: 0.28: 1.78), *Cyperus rotundus* (0.29: 0.11: 0.77), *Medicago arabica* (2.14: 0.30: 2.86), and *Vicia sativa* (1.46: 0.21: 2.27 K) substantially absorbed fewer nutrients. Due of the reduced weed density and dry weight in these treatments, there was less nutrient absorption. The total weeds absorbed the most nutrients during weedy check (47.60: 9.72: 76.67) and the least during manual weeding (4.48: 0.91: 7.65). The application of Imazethapyr 450 g ha<sup>-1</sup> fb Atrazine 500 g ha<sup>-1</sup> was shown to have the maximum effectiveness (21.31: 4.20: 36.51), and Metribuzin 150 g ha<sup>-1</sup> fb Oxyfluorfen 50 g ha<sup>-1</sup> had the lowest effectiveness (13.44: 3.09: 24.80).

**Keyword:** Chickpea, Weed managements, Pendimethalin, Imazethapyr, Nutrient absorption,

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## Effect of different levels of hydrogel on various soil properties

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Water stress affects a number of functions in plant, Indian climatic condition is such that most of the part of a year remains mostly dry. In such condition maintenance of soil moisture is a very difficult task. Hence there is a need of water saving technology which will be a cost effective, long lasting, environment friendly and easily available. Hydrogel or superabsorbent polymers are the cross-linked polymers, hydrophilic in nature which can hold and retain water at a very high rate compared to their own mass. Considering above points in view an investigation was conducted to study the effect of different levels of hydrogel on various soil properties. The experiment was conducted as pot experiment in completely

randomized design taking three replications. The treatments included T<sub>1</sub>: Control, T<sub>2</sub>: 5 g kg<sup>-1</sup> Hydrogel, T<sub>3</sub>: 10 g kg<sup>-1</sup> Hydrogel, T<sub>4</sub>: 15 g kg<sup>-1</sup> Hydrogel, T<sub>5</sub>: 20 g kg<sup>-1</sup> Hydrogel, T<sub>6</sub>: 25 g kg<sup>-1</sup> Hydrogel. Soil was incubated with different doses of hydrogel for 120 days' duration. The samples were collected after incubation processed in laboratory and analyzed for physical and chemical properties of soil. The results showed that the application of hydrogel had a significant influence on the various soil properties, especially water holding capacity and bulk density of soil. Other soil properties which were significantly influenced were particle density, porosity, electrical conductivity, soil available nitrogen, phosphorus, potassium, calcium, magnesium and sulphur. However, application of hydrogel did not influence the pH of soil and organic carbon content in soil. The application of hydrogel at the rate of 25 g kg<sup>-1</sup> showed the highest values of available N, P, K and S content in soil as well as the water holding capacity. In some soil properties the treatment containing 25 g kg<sup>-1</sup> hydrogel was found statistically at par to that containing 20 g kg<sup>-1</sup> hydrogel.

**Keyword-** Hydrogel, Organic Carbon, N, P, K and S Content

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## **Assessment of Development and Consumer Acceptance of Nutritious Kodo Laddu in Tribal District of Mandla, Madhya Pradesh**

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The present investigation is that the development of nutritious laddu incorporation of kodo flour and chickpea flour, nutritional property and consumer acceptance. Millets are rich source of vitamins, minerals, phyto chemicals and amino are therefore referred to as nutri cereals. Millets are used to prepare traditional foods like papad, idli, dosa, papad, chakli, porridges as well as they have eaten in the place of rice. However now a day it is losing its importance as food due to urbanization, lack of value addition technologies and changing food preferences. Chickpea is a good source of starch, protein, minerals, fibre, vitamins and phytochemicals



they are affordable source of protein for low-income families have been known as “a poor man’s meat”. The study was carried out by Krishi Vigyan Kendra, Mandla under Front Line Demonstration. They selected total 30 farm women from two villages of Mandla district also provided training on development of kodo laddu. Kodo laddu prepared to incorporation of kodo flour and chickpea flour in ratio of 50:50 with blending of jeggery and ghee. Consumer acceptance was done on five point resulted the kodo ladoo was liked extremely by the farm women. Hence this study of millets can be help understanding, diversifying the usage the millets in ensuring food, nutrition security in the ever changing modern world.

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## **Impact of gibberellic acid, calcium nitrate, and boron on the yield and yield attributes of the Ganesh cultivar of pomegranate (*Punica granatum* L.)**

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Pomegranate production and cultivation in India have been seeing steady growth, but, sustaining consistent productivity levels while repeatedly cultivating from the same plot of land is a significant challenge. The plant is expected to have negative effects due to the use of plant growth regulators and deficits in essential nutrients. Therefore, the use of plant growth regulators and fertilisers is necessary from an external source. An experiment titled "The Impact of Gibberellic Acid, Calcium Nitrate, and Boron on the Yield and Yield Attributes of Pomegranate (*Punica granatum*) cv. Ganesh" was conducted in the 2020-21 period at the Fruit Research Station, Imaliya, Department of Horticulture, JNKVV, Jabalpur. The objective of the study was to investigate the potential benefits of foliar application of plant growth regulator and nutrients on pomegranate yield and its associated characteristics. The experiment was conducted using a Factorial

Randomised Block Design (FRBD) consisting of twenty-seven treatment combinations and three replications. The growth parameters observed in successive experiments included plant height (cm), shoot length (cm), shoot diameter (mm), days taken to first flowering, number of flowers per shoot, days taken to first fruit set, as well as physico-chemical parameters such as fruit length (cm), fruit diameter (cm), fruit weight (g), number of arils per fruit, arils weight (g), arils percentage, total sugar percentage, reducing sugar percentage, non-reducing sugar percentage, TSS (Brix), juice percentage, and yield parameters including number of fruits per shoot, fruit set percentage, and yield in kilogrammes per plant. The foliar application of CN 2% + B 0.3% + GA 350 ppm treatment has demonstrated the highest shoot length (13.11 cm, 21.04 cm, and 29.08 cm) at 30, 60, and 90 days, respectively. Additionally, this treatment has exhibited the maximum shoot diameter (1.18 mm, 1.74 mm, and 2.55 mm) at 30, 60, and 90 days, respectively, in comparison to the control group. The application of a foliar solution containing 2% CN, 0.6% B, and 350ppm GA has resulted in the highest recorded plant height of 46.40 cm, a time of 92 days for first flowering, an average of 8.90 flowers per shoot, a time of 108 days for first fruit set, a fruit length of 8.18 cm, a fruit diameter of 8.09 cm, a fruit weight of 298.92 g, a total of 576 arils per fruit, a weight of 218.10 g for the arils, an aril percentage of 70.80%, a peel-to-aril ratio of 0.43%, a total soluble solids (TSS) content of 15.70 Brix, a total sugar content of 13.80%, a reducing sugar content of 12.30%, a non-reducing sugar content of 1.65%, a juice content of 56.13%, an average of 3.11 fruits per shoot, a fruit set percentage of 57.34%, and a yield of 17.11 kg per plant, when compared to the control group.

**Keywords:** Pomegranate, Plant growth regulator, nutrient, spraying, yield, Quality

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## **Carbon sequestration in Agro forestry Systems in Shahdol Division of Madhya Pradesh.**

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Agro forestry- The Practice of growing tree and crops in Interacting combination –is recognized regional wise as well as worldwide as- An integrated approach to sustainable land use. It is estimated to be practiced over 1 billion hectares in developing state and the countries, and to lesser extent in the industrialized region of the countries. Agro forestry Systems (AFSs) are believed to have a higher Potential to sequester carbon (C) because of their perceived ability for greater capture and utilization of growth resource (light, nutrients, Micronutrients and soil water) than single – species crop or pasture land system. The estimates of C stored in AFSs range from 0.28 to 14.22 Mghac-1 yr-1 aboveground , and 28 to 290 Mg Cha-1 up to 1-m depth in the soil .Recent studies under various AFSs in diverse ecological and Environmental climatic condition showed that tree-based agricultural system, compared to tree less system, stored more C in deeper soil layers nears the tree then away from the tree; higher soil organic carbon content was associated with higher species richness and tree density ; and C3 plants ( tree) contributed to more C in the silt - + clay-size ( <52um diameter ) fraction- that constitute more stable C- than C4 plants in deeper soil profiles . The extent of C sequestered in AFSs depends to great extent on the environmental and Edaphic, climatic condition and system management. Trading of the squirreled C is a viable opportunity foe economics benefit to Agro forestry practitioners, who are mostly resource-poor farmers and Marginal farmer in developing state or countries. However, more rigorous research result is required for AFSs to be used in broad level climate change in the global agendas of Carbon sequestration.

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### **Influence of *Pseudomonas* and Biofertilis as foliar spray on growth and yield of vegetable pea and soil properties under STCR approach**

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A field experiment was conducted during the rabi season in the Experimental field, Department of Soil Science, JNKVV, Jabalpur (M.P.) under

RBD design with four replications comprising 5 treatments of two types of biofertilizers: *Pseudomonas* and Biofertilisol and scheduled combinations of inorganic fertilizers based on STCR (Soil Test Crop Response) for achieving targeted yield by using variety of vegetable pea, PSM-3. The response due to treatment of T<sub>4</sub> (TY 100 q (58:110:47) +5 t FYM+1 spray of *Pseudomonas* +1 spray of Biofertilisol) was significantly effective in increasing nodulation attributes (nodulation enumeration, biomass and leghemoglobin content) by 28.46, 47.15, and 35.29%; 78.33, 95.86, and 86.17%; and 21.70, 65.70, and 20.26%, respectively, relative to that of control. Similar increase was due to T<sub>4</sub> on plant growth parameters (height and its biomass) at different growth stages of vegetable pea viz., 30, 45 and 60 DAS by 12.74, 17.36 and 23.12%; and 81.06, 39.10 and 82.36% as compared to that of control. The uptake of nutrients (N, P, and K) by the crop at harvest, was significantly profound due to T<sub>5</sub> (TY 120 q (87:147:74) +5 t FYM) by 85.59, 90.45, and 74.81%, respectively, over that of control. The best response was recorded from the application of treatment T<sub>5</sub> (TY120 q (87:147:74) +5 t FYM) for increasing the content soil available nutrients (N, P and K) by 7.89, 29.95 and 8.25%, respectively over that from control. Effect due to T<sub>4</sub> was significantly prominent on proliferation of microorganisms viz., *Rhizobium* sp., *Pseudomonas* sp. and *Lactobacillus* sp. better by 6.788 log cfu (61.38 x 10<sup>5</sup> cfu g<sup>-1</sup> soil), 6.44 log cfu (27.67x10<sup>5</sup> cfu g<sup>-1</sup> soil) and 4.418 log cfu (26.18x10<sup>3</sup> cfu g<sup>-1</sup> soil), respectively over that from control. The same treatment T<sub>4</sub> induced best the enzyme activity of dehydrogenase by 86.99% as compared to that of control (5.23 µg TPF hr<sup>-1</sup> g<sup>-1</sup>). Yields of the crop were best harvested due to T<sub>4</sub> by 81.91% over that of control 56.93 kg ha<sup>-1</sup>. Throughout the experiment, mostly the effects from T<sub>4</sub> and T<sub>5</sub> were mutually at par. The nutrient management of all the treatments involves the judicious use of organic and inorganic fertilizers, along with microbes, to meet the nutrient needs of the crop while minimising environmental impacts.

**Key words:** Biofertilisol, Dehydrogenase, Microorganisms, Nodulation, *Pseudomonas*

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## **Effect of different levels of compost sources on organic French bean (*Phaseolous vulgaris* L.) production during rabi**

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## 5<sup>th</sup> International Conference

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The present investigation entitled “Effect of different levels of compost sources on organic French bean (*Phaseolous vulgaris* L.) production during rabi” was conducted during 2020-21 at Agronomy Organic Farm, College of Agriculture, Pune. The experiment was laid out in Randomized Block Design with ten treatments and three replications. All the growth characters viz., plant height (34.16 cm), plant spread (36.75 cm), no. of branches plant<sup>-1</sup> (6.78), no. of functional leaves plant<sup>-1</sup> (20.01), leaf area plant<sup>-1</sup>(10.67 dm<sup>2</sup>) and dry matter (24.01 g) were found significantly higher with application of 125% RDN through vermicompost. This was followed by application of 125% RDN through mushroom compost and FYM. However, substantial reduction in growth characters was observed with control. The yield contributing characters viz., number of pods plant<sup>-1</sup> (12.91), number of seeds pod<sup>-1</sup>(4.07), dry weight of pods plant<sup>-1</sup> (8.06 g), seed yield plant<sup>-1</sup>(7.28 g), straw yield plant<sup>-1</sup> (14.54 g), 100 seed weight (32.59 g) and harvest index (33.90 %) were obtained significantly higher in 125% RDN through vermicompost. However, application of 125% RDN through mushroom compost, 125% RDN through FYM and 100% RDN through vermicompost was at par with this treatment. Significantly the highest seed and straw yields (14.93 and 29.11 q ha<sup>-1</sup>, respectively) was also recorded in 125% RDN through vermicompost. However, application of 125% RDN through mushroom compost, 125% RDN through FYM and 100% RDN through vermicompost was at par with this treatment. The protein content was non-significant; However, the highest value (24.13%) was noticed with application of 125% RDN through vermicompost. The total N, P and K uptake was 81.50, 12.71 and 61.61 kg ha<sup>-1</sup> respectively, by french bean crop was found to be significantly higher with the application of 125% RDN through vermicompost. The gross monetary returns (₹149591 ha<sup>-1</sup>) and net monetary returns (₹75431 ha<sup>-1</sup>) were found significantly higher with the application of 125% RDN through vermicompost. However, higher B:C ratio (2.30) was obtained with the application of 100% RDN through mushroom compost.

**Key words:** French bean, Mushroom compost, harvest index, RDN, Seed yield, Vermicompost

# Pathological and Biochemical Variability among *Xanthomonas axonopodis* pv. *citri* Isolates Causing Citrus Canker in Acid Lime across Diverse Agro-climatic Regions of India

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In the present investigation, isolates of *Xanthomonas axonopodis* pv. *citri* (Xac) causing citrus canker were collected from fourteen agro-climatic regions of India. The pathogenic variability of Xac was studied on four different varieties of acid lime using the detached leaf assay by the pin-prick method. The isolates showed varying reactions in symptom development. Pathogenicity among different isolates was confirmed, and it was found that isolates Xac1, Xac7, Xac9, Xac11, Xac13, and Xac14 were highly pathogenic, initiating water-soaked lesions and fully developed symptoms within 10 to 12 days. Isolates Xac2, Xac3, Xac8, Xac10, and Xac12 were moderately virulent, while Xac4, Xac5, Xac6, Xac15, and Xac16 exhibited low virulence. Furthermore, all 16 selected isolates underwent biochemical characterization. They were found to be rod-shaped, Gram-negative, with colony colors ranging from pale yellow to dark yellow. Xac isolates showed negative reactions for indole production, urease test, arginine test, and MR test. The Xac isolates tested positive for the KOH test, catalase test, H<sub>2</sub>S production, hydrolysis of starch and gelatin, acid production, oxidase test, tolerance to 1% salt, and Tween 80. However, all isolates failed to produce indole.

**Keywords:** *Xanthomonas*, gram negative, colony, pathogenicity.

## Seed Borne Pathogens Transmission from Seed to Seedlings of soybean

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Seed borne pathogens play a crucial role in crop health. The presence of these pathogens on the seed material not only deteriorate the seed quality but also make seed spoilage during storage. Some of the seed borne pathogens can transmit to seedlings, posing a threat to subsequent crops. In this study, fourteen pathogens viz., *Fusarium oxysporum*, *Fusarium moniliforme*, *Macrophomina phaseolina*, *Alternaria alternata*, *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus candida*, *Phoma medicaginis*, *Curvularia lunata*, *Botrytis cinerea*, *Colletotrichum truncatum*, *Cladosporium* sp., *Penicillium* sp. and *Mucor* sp. were isolated from soybean seeds. Among them, *Colletotrichum truncatum* exhibited the highest seed to seedling transmission i.e. 15.39 per cent, followed by *Fusarium oxysporum* 14.63 per cent, *Macrophomina phaseolina* 14.28 per cent, *Fusarium moniliforme* 12.82 per cent, *Alternaria alternata* 11.77 per cent and *Penicillium* sp. 11.42 per cent. Other seed borne pathogens viz., *Curvularia lunata*, *Cladosporium* sp., *Botrytis cineria*, *Phoma medicaginis* did not get transmitted from seed to seedling and does not have apparent symptoms of these seedlings.

**Keywords:** Seeds, pathogens, soybean.

## Impact of MGNERGA on socio-economic upliftment of rural people in Jabalpur district of Madhya Pradesh

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## **G H Raisoni University, Saikheda and Just Agriculture Education Group**

The processes of the scheme have new ways of doing business which include principles of transparency and grass root democracy. The study will be undertaken in Jabalpur district of MP state. Jabalpur district comprises of 7 blocks out of which 2 blocks, namely Majhouli and Kundam were selected purposely, because of having maximum no. of MGNREGA beneficiaries. A list of beneficiaries will be prepared with the help of DDA Office and selected from each block thus the total population are 50,079. The sample size will be 245 which is calculated with the help of online sampling calculator where is population size (N) 50079, confidence level is 95%, margin of error is 5% and sample proportion is 0.2. The socio personal and economic variables of sampled beneficiaries shows that majority of the respondents belongs to middle age groups at 72.60 per cent and most of MGNREGAs beneficiaries were comes under primary school education at 37.50 per cent and maximum number of beneficiaries belongs to SC Caste indicated as 42.20% and majority of beneficiaries belonged to Joint family 80.41% and most of Family Size was belongs to Medium Categories account for 64.08% maximum percentage of beneficiaries account for 72.65% were lived in mixed type of house and beneficiaries comes in marginal land holding as about 94.69% and majority of beneficiaries solely doing labour work as 86.53% and out of the total selected beneficiaries' most beneficiaries have dual Sources of income 66.53% and 93.06% of beneficiaries were found in the low-income group majority of beneficiaries 76.33% having low social participation and most of the beneficiaries had a medium material possession as account for 45.71 and majority of the respondent 70.60% belonged to medium cosmopolitness. The majority of the respondent belonged to medium perception for the MGNREGA as account for 57.55%. The result should be indicated that the after taking benefits (53.47%) of the beneficiaries had medium income. While (40.41%) of beneficiaries had low-income generation had low-income generation after that (6.12%) of beneficiaries had high income generation. The result should be indicated that the after working in MGNREGA (49.38%) of beneficiaries had medium decision making, while (34.29%) of beneficiaries had low decision making and (16.33%) of beneficiaries had high decision making. The beneficiaries of MGNREGA are evident from the data the major constraints as expressed by the beneficiaries were, timely not widral payment, long process of application,



unliterate people, low wages, job are not available in 100 days, unskilled labour wages cut by MGNERGA staff, work disturb by local politician etc. The beneficiaries of MGNERGA is evident from the data the major suggestion as expressed by the beneficiaries were, online process for application, timely withdrawal payment, transparency and accountability, vocational training for unskilled people, additional wages for long distance, timely allotment of work, work should be available when are need it.

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## **Ideal Parameters for Rice Puffing. A comprehensive Review**

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Puffed rice is a widely popular cereal breakfast item or a light snack in many countries. It is typically produced from processed (hydro-heated) milled rice, heated under high-temperature conditions using methods such as hot air, oil, and sand, microwaving, or puffing guns. This paper provides a comprehensive review of the existing literature concerning the puffing of rice and the optimal conditions for this process. It delves into the rice pre-treatment steps and puffing techniques, including dry heat, microwave, and gun-puffing. Additionally, it discusses the ideal composition of the raw rice material. The rice pre-treatment entails wetting the rice in hot water until it reaches a moisture content of approximately 30%. Subsequently, the water is removed, and the damp rice is either steam-cooked or subjected to a dry-heat process using hot sand. The effectiveness of this treatment depends on the steam pressure and duration. After treatment, the rice is dried to achieve the optimal moisture level for puffing, typically ranging from 10.5%

to 14%. The rice is then milled to a specific degree (with a minimum milling degree of 6%). Enhancement of the expansion ratio can be achieved through salting or alcohol treatment. In India, the most common method involves puffing the rice in hot sand (at around 250°C). Alternatively, puffing can be carried out using hot air (250–300°C), oil (200–220°C), microwaving, or puffing guns.

**Keywords:** Rice, Puffing, Popping, Temperature, Treatments

**GIRDAHA/AB/2023/124**

## **Impact of varieties and foliar spray of micronutrient on growth parameters of cluster bean under teak based agroforestry system**

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Management of agroforestry system in different region has been widely focused on reducing soil erosion and water losses, environmental balance restoration, improve land use and uplifting economic benefits. This study was conducted to evaluating the impact of varieties and foliar application of micronutrient on growth parameters of cluster bean under teak based agroforestry system as well as open condition. The experiment was laid out in Randomized Block Design with Factorial concept consisting of 3 factors *viz.*, varieties, foliar spray of micronutrient iron and foliar spray of micronutrient zinc at 2 levels each in 4 replications. Among two tested varieties, variety Pusa Navbahar performed well in terms of growth as compare to local variety in both growing conditions. Furthermore, foliar spray of 0.5% FeSO<sub>4</sub> and foliar spray of 0.5% ZnSO<sub>4</sub> also recorded maximum growth parameters as compare to their control condition under both growing conditions. All interaction effect were found non-significant for most of growth parameters except plant height under both growing conditions (teak-based agroforestry system and open condition). Further, t-test analysis shows that growth parameters were higher for open condition.

**Keywords:** Cluster bean, Teak-based agroforestry system, Variety, Micronutrient, Growth parameters

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## **Pathology of visceral gout and its associated risk factors in poultry**

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In cases of visceral gout, urate deposition is found over the visceral organs. There is deposition of white chalky material over heart, liver, peritoneum and kidney. Kadaknath birds of 1-1.5 months age were brought for post mortem examination. The gross examination revealed presence of white chalky material over, heart, liver and peritoneum. The kidneys and ureters were white and filled with chalky material. This condition is more commonly seen in birds because they excrete the nitrogenous waste in the form of urates. Microscopically, urate crystals were observed in kidney. The history was of feeding maize ration along with marble chips and decreased water intake. The ground water of this area is hard and contains high salt content. This puts load on kidney and there is decreased excretion of uric acid. The uric acid then starts to deposit in various visceral organs. To avoid the risk of this condition, the birds should be supplied with clean and good quality water with optimum salt concentration, avoid dehydration and maintaining calcium phosphorus ration in diet.

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## **The effect of climate change on production of strawberry (*Fragaria × ananassa*).**

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Strawberries are a delicious and popular fruit enjoyed worldwide. They are known for their vibrant red color, sweet taste, and versatility in various culinary applications. These juicy berries are not only delectable but also packed with nutritional benefits. Strawberries are renowned for their sweet and slightly tart flavor. Their juicy flesh and tiny seeds contribute to their unique texture, making them a favorite ingredient in desserts, jams, and salads. Strawberries have specific climatic requirements for optimal growth and fruit production. Strawberries typically require a period of winter chill with temperatures between 32°F (0°C) and 45°F (7°C) to break dormancy and stimulate flower bud formation. This chilling requirement varies by strawberry variety but generally ranges from 200 to 1000 hours below 45°F (7°C). Strawberries thrive in regions with mild to warm summers, with daytime temperatures between 60°F (15°C) and 80°F (27°C). High temperatures above 85°F (29°C) can stress the plants and reduce fruit quality. Cool nighttime temperatures during the growing season help maintain fruit quality, as strawberries are susceptible to heat stress. Strawberries are considered full-sun plants, which means they require at least 6 to 8 hours of direct sunlight per day for optimal growth and fruit development. Inadequate sunlight can lead to reduced yields and poor fruit quality. Increasing global temperatures can have a significant impact on strawberry plants. Strawberries are sensitive to high temperatures, which can lead to reduced fruit set, smaller berries, and decreased overall yield. Heat stress can also make plants more susceptible to diseases and pests. Climate change can disrupt the traditional growing seasons for strawberries. Warmer winters may lead to earlier flowering and fruiting, which can be problematic if late spring frosts occur, potentially damaging the blossoms and reducing the harvest. Shifts in precipitation patterns, including more intense rainfall events and extended droughts, can affect strawberry production. Heavy rains can lead to fruit rot and fungal diseases, while prolonged droughts can stress the plants and reduce yields.

# **Agritechnology Revolutionizing Agricultural Value Chain: A Comprehensive Analysis**

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The agricultural sector is crucial to the long-term growth and reduction of poverty in agrarian economies like India's. Spices, milk, wheat, rice, and cotton are produced in large amount as the nation is the leading producer of all. As a result, agriculture paves the way for a rise in national revenue through increasing farmer's income. This has a significant impact on the country's economic prosperity and development. One of the most effective agricultural tools for fostering economic growth and reducing poverty is the Agricultural Value Chain. Effective supply chain management is facilitated; market-based regional and national economic growth is aided. The study intends to throw the light on importance of agricultural value chain, various challenges like lack of digital illiteracy, no market accessibility, lack of infrastructure etc and many agritechnology prospects like climate smart agriculture, agroecology, block-chain technologies etc associated with it. It also focuses on how advent of agritechnology facilitates a cooperative and egalitarian approach to increase farmers' efficiency and production. Therefore, profitability and longevity may be boosted and ultimately stimulate increase in the farmer's income and contribute in national income.

**Keywords:** Agriculture value chain, agritechnology, economic growth, farmer's income, economic development, supply chain management

# Assessment of Phytochemical Composition and Antioxidant Activities of the Ethanolic Extract and Aqueous Extract from *Cordyceps militaris* Mushroom

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There are many different biofunctionalities found in the medicinal fungus known as *Cordyceps militaris* (*C. militaris*). It contains polysaccharides and other components with biological significance. Because of its wide range of pharmacological applications, *C. militaris* has recently been the subject of a research, with a special emphasis on its role in the prevention of and associated molecular pathways in liver disorders. Recent years have seen a rise in study of *C. militaris* in response to increased global demand. *C. militaris* extract were analyzed for their total phenolic content and total flavonoids, in ethanol and aqueous extracts of mushroom. Two assays (DPPH, and hydrogen peroxide) were used to determine the antioxidant activity. Ethanolic extract of *C. militaris* extract shows highest antioxidant activity at CM<sub>80%</sub> as compare aqueous extract. Total flavonoids and phenolics of extract calculated as gallic acid equivalent and quercetin equivalent. Resultant shows 11.40 mg gallic acid equivalent/g of ethanolic extract and 7.64mg gallic acid equivalent/g of aqueous extract powder respectively. Whereas total flavonoid in ethanolic extract was calculates as 4.135mg Quercetin/g and 2.725mg Quercetin/g in aqueous extract. These results showed that extracts of *Cordyceps militaris* exhibited significant antioxidant activities. Moreover, *C. militaris* is a rich source of flavonoids and phenolics.

**Keyword-** *Cordyceps militaris*, phenolic content, flavonoids content and antioxidant activities

# Comparison of Molecular and Parasitological techniques for the diagnosis of Canine Trypanosomosis

M Fibi Rani

*Trypanosoma evansi*, a kinetoplastid haemoprotozoan is the most pathogenic parasite, that affects a wide range of mammalian hosts like equines, bovines, canines, felines, camels, etc., in tropical and subtropical countries, and causes a significant disease called “surra”. It is mechanically transmitted by several genera of hematophagous flies like *Tabanus*, *Stomoxys* and *Haematobia* and orally transmitted by ingestion of fresh infected meat in carnivores. Canine trypanosomosis is usually an acute infection and is characterized by intermittent pyrexia (39°C - 41°C), inappetance, cachexia, edema of the head and throat, hoarse voice, anaemia, paresis of hindquarters, staggering gait, convulsions, conjunctivitis, lachrymation, and corneal opacity, which can lead to severe immunosuppression and increased susceptibility to opportunistic infections. The clinical signs of canine trypanosomosis are not pathognomonic, so a confirmed diagnosis is required for proper treatment and management.

The present study aimed to detect the *Trypanosoma evansi* in dogs using the molecular technique *i.e.*, Polymerase Chain Reaction (PCR) assay and parasitological techniques like wet blood film examination, Giemsa staining, Leishman staining, Field’s staining and Acridine Orange Staining techniques. In the current study, 314 blood samples were collected from dogs of either sex varying in ages from 0 to >8 yr old from different places in and around Hyderabad, Telangana, India. Out of 314 canine blood samples examined, only 3(0.95%) dogs were found positive by peripheral wet blood film examination, 5 (1.59%) dogs were found positive by all the staining techniques, whereas Polymerase Chain Reaction assay targeting the partial Variable Surface Glycoprotein gene using species-specific diagnostic RoTat 1.2 VSG Forward 5’ GCGGGGTGTTTAAAGCAATA 3’ and Reverse 5’ ATTAGTGCTGCGTGTGTTTCG 3’ primers, under standardized cycling conditions has amplified a 205 bp length product in 24 dog blood

samples with an overall prevalence of 7.64% in and around Hyderabad, Telangana, India. The VSG gene present in the genome of *T. evansi* is expressed in the infected host during all the developmental stages of *T. evansi*. Considering the analytical sensitivity and specificity, it was concluded that the PCR assay that targets the partial VSG gene can be used as a quick, reliable, and more sensitive method for the diagnosis of canine Trypanosomosis at all stages of infection.

**GIRDAHA/AB/2023/130**

## **Invasive alien plant species in and around Pakke Tiger Reserve, Arunachal Pradesh, India**

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Pakke Tiger Reserve (PTR), India, is not an exception when it comes to the threat posed by invasive alien plant species (IAPs). This current study is the outcome of a floristic survey of IAPs in the PTR from 2019 to 2022 and is the first to provide an exhaustive list of IAPs in and around the PTR. A total of 43 species have so far been identified, of which 33 are herbs, 5 are shrubs, 2 are grass, and 1 is each of sedge, climber, and under shrub. Asteraceae (16) make up the bulk of the IAP families in the reserve, followed by Fabaceae and Solanaceae (5), Malvaceae (3), Poaceae, Tiliaceae, and Verbenaceae (2), and the other families with one each. 40% of species are perennial, whereas 60% are annual. The two regions that contribute the most to the IAPs of PTR are Tropical South America (69%) and Tropical West Asia (9%). Early diagnosis and monitoring strategies are critical for controlling this IAPs infestation.

**Keywords:** Invasive alien plant species, Survey, Tiger reserves and India.



# **Upheaving Nutri-Cereals for the Prosperity of Indian Agriculture through Integrated Nutrient Management**

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India's agricultural landscape is undergoing a significant transformation as the demand for nutritious and sustainable food sources continues to rise. Nutri cereals, comprising millets and other traditional grains, have garnered attention for their potential to address not only the nation's nutritional challenges but also the sustainability concerns of modern agriculture. This abstract explores the critical role of integrated nutrient management (INM) in enhancing the cultivation of nutri cereals and fostering the prosperity of Indian agriculture. Nutri cereals, such as sorghum, finger millet, pearl millet, foxtail millet, little millets, kodo millets, proso millets and barnyard millet are known for their resilience in diverse agroclimatic conditions. These grains are not only rich in essential nutrients but also exhibit a lower carbon and water footprint compared to conventional cereals like rice and wheat. As India grapples with malnutrition and faces challenges related to climate change and resource scarcity, nutri cereals emerge as a viable solution to secure both food and environmental sustainability. INM is a holistic approach that combines organic and inorganic fertilizers, crop residues, green manures, and biofertilizers to optimize nutrient availability in the soil through which Indian farmers can improve soil health, reduce the reliance on chemical fertilizers, and mitigate the environmental impacts associated with excessive nutrient application. Furthermore, the adoption of modern agronomic techniques, precision farming, and climate-resilient crop varieties can enhance the overall productivity of nutri cereals. Additionally, creating awareness among consumers about the nutritional benefits of nutri cereals can drive demand and provide economic incentives to farmers. Government policies, research investments, and market interventions are essential to promote the cultivation and consumption of these nutrient-rich grains. Hence, Indian agriculture roadmap direction

must be focused on the familiarization and encouraging millets growers by providing production, post-production and marketing support to the farmers definitely this “Nature Gift” nutri-cereals will full fill the future needs of the food and nutritional security of India.

**Key words:** Integrated Nutrient Management, Nutri cereals, Prosperity of Indian agriculture

**GIRDAHA/AB/2023/132**

## **An Evaluation of Pesticides for Immobilization and Mortality Effects Against Giant African Snail**

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*Achatina fulica* is a terrestrial mollusk known as the giant African snail that is related to environmental, economic, urban, and public health problems. As control measures for this mollusk, cooking salt (NaCl) and calcium oxide (CaO) are used, and baits are composed of metaldehyde. However, these measures have environmental toxicity and impact the soil. In this way, study evaluated the immobilization and mortality effects of selected chemical treatments on the giant African snail. Laboratory experiment was carried out at department of Entomology, College of Agriculture, Parbhani during *kharif* 2022. Randomized block design with three replication and eight treatments of pesticides and host coriander with leaf deep method use to evaluate the efficacy. In each treatment 10 snails were placed. Among the eight treatments Copper sulphate was found most superior treatment with 90% immobilization and mortality after 36 hours of application which was followed by Emamectin benzoate 0.25% + Cartap hydrochloride 7.5% GR with 80% immobilization and mortality and Fipronil 5%SC 50% immobilization and mortality after 36 hours. There was no treatment effect of Cyantraniliprole 10.26% OD. The study concludes that low-cost solutions such as Copper sulphate and Emamectin benzoate

0.25% + Cartap hydrochloride 7.5% GR can influence the immobilization of the giant African snail.

**Keyword:** Giant African Snail, immobilization, mortality, chemical treatments, Copper sulphate.

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## Blockchain Technology- A Positive Change in Dairy Industry

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The dairy sector in India has already begun the process of fully automating and going digital in both the farm and the processing. Conventional food supply chains are centralised and have problems with a single point of failure, inconsistent product quality, lost data, and product anomalies. One of the technologies that is advancing the most quickly and is widely used in several industrial sectors is blockchain. Blockchain is a framework for digital technology that "chains" together information "blocks" to produce an everlasting record. Because of the increasing variety of dairy products available on the market, the supply chain is growing more intricate and extensive, demanding trustworthiness. A dairy supply blockchain looks to be the only way to resolve the trust and quality issues in this specific situation. Blockchain technology has the potential to change current supply networks into decentralised, resilient, transparent, impenetrable, and sustainable ones. Milk and milk products are one of those food items which have a greater chance of adulteration. From the start of the supply chain all the way to consumers, this technology finally offers a high degree of openness for the dairy business and improve food safety and standards. The positive aspects of using this technology are innumerable. The aim of this review is to study the role of blockchain technology in dairy industry.

**Keywords:** Blockchain, Centralised, Industrial sector, Adulteration, Food safety

## **Agroforestry Systems: A Sustainable Tool for Climate Change Through Carbon Sequestration**

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Numerous organizations are striving to reduce CO<sub>2</sub> concentration using a variety of measures, including energy consumption reduction, CO<sub>2</sub> sequestration through forestry/agroforestry, and engineering methods. However, in the recent period of climate change, agroforestry has emerged as an economically and ecologically appealing technique for minimizing the detrimental effects of GHGs. Agroforestry is essential for lowering greenhouse gas emissions, maintaining livelihoods, and providing some partial solutions for biodiversity preservation. Agroforestry offers a unique chance to integrate the twin goals of climate change adaptation and mitigation on a global scale. Two key components of agroforestry systems, trees, and crops, are primarily responsible for CO<sub>2</sub> sequestration. Agroforestry systems also increase farm output by enriching the soil through litter fall and storing carbon both above and below ground. Agroforestry practices aid in the conservation of soil and the restoration of degraded land. In comparison to open cropland, research has shown that agroforestry systems can better control soil erosion and runoff. This results in less water, soil, organic matter, and nutrient loss. Because agroforestry systems comprised of varied tree species have a high C stock potential, boosting the adoption rate of agroforestry systems comprised of dense mixed tree species is critical in order for agricultural land regions to absorb more C. In addition to offering a variety of outputs, including fuel, food, fodder, lumber, and other ad hoc items, multipurpose tree species (MPTs) in agroforestry also contribute to the development of soil health and other ecological conditions. Typically, older trees have been involved in photosynthetic activities for a considerably longer period of time than younger trees, and as a result, they absorb and store more carbon. Due to the additional carbon pool in trees and enhanced soil carbon pool as a result of carbon input from litterfall and fine root turnover, the high carbon inside the mixed intercropping is higher than that of the sole cropping system. Farmers' adoption of agroforestry can be boosted through the

implementation of supportive policies and initiatives by government and non-governmental organizations, such as capital assistance, the construction of specialized market systems, secure land tenure, and technical aid.

**Keywords:** Carbon sequestration, Agroforestry, CO<sub>2</sub>

GIRDAHA/AB/2023/135

## **Evaluation of IPDM technologies for the management of Chilli insect pests and diseases in Nanded district.**

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Fruit borer, Trips and Leaf Curl disease on Chilli is an invasive insect pests and disease of chilli, caused severe damage to chilli crop. The field experiment was conducted on 15 farmers field with 0.1 ha area of demonstrated and farmer's practice each to evaluate the effectiveness of IPDM technology against insect pests and disease of chilli during 2022-23. The demonstration emphasized of Integrated Pest and Disease Management technology which includes use *Trichoderma*, *Metarhizium*, Yellow and Blue Sticky Traps, Pheromone traps& lures for fruit borer, Neem powder for 5% NSKE etc. Need based recommended insecticide spraying.

The Demonstration was conducted on 15 farmer's field with 0.1 ha area each. The fruit borer population was low 2.07/MRL on technology assessed field as compare to 3/MRL on farmer's field. Thrips population was 2.53 per leaf on technology assessed field and 3.27 per leaf on farmer's field. Leaf curl disease incidence was found 2.47 per cent at in technology assessed filed and 2.93 per leaf on farmer's field. The dry chilli yield of farmer's field was 6.54 qtl/ha which was lower as compare to technology assessed plot 8.98 qtl/ha. C:B ratio was 2.22 in farmers filed and 2.96 in

technology assessed plot. Farmers get Net profit of Rs. 137323 in demonstrated plot as compare to Rs. 83113 in farmer's practices.

**Keywords:** chilli, fruit borer, thrips, leaf curl, IPDM, Demonstration

**GIRDAHA/AB/2023/136**

## **Evaluation of China Aster (*Callistephus chinensis* L. Ness.) varieties for Growth, Yield and Quality Parameters in mid-hills of Meghalaya**

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China aster (*Callistephus chinensis* L. Nees) belongs to the family Asteraceae and is native of China (Navalinskien *et al.*, 2005). The genus *Callistephus* derived its name from two greek words 'Kalistos' meaning 'most beautiful' and 'Stephos' meaning 'a crown'. There is very limited information on the suitability as well as promising China aster varieties for loose flower production and cut flower production in Meghalaya. Hence, the present investigation was designed to determine the best suitable China aster cultivars for cultivation under mid-hill condition of Meghalaya. Seeds of China Aster varieties *viz.*, Arka Aadya, Arka Shashank, Arka Archana, Arka Kamini and Arka Purnima were collected from IIHR, Bangalore and were sown in plug trays during March, 2022 using three soilless media *viz.*, FYM: compost: vermiculite (1:1:1). The seedlings were transplanted in field after one month and recommended cultural practices were followed. The experiment was laid out in Randomised Block Design (RBD) with four replications. Twelve plants per replication were planted at a spacing of 30 x 30 cm and were evaluated for various physico-biochemical traits at Horticulture farm, ICAR Research Complex for NEH Region, Umiam during 2022. Among the varieties, Arka Shashank recorded maximum plant height and number of branches; Arka Kamini recorded maximum number of leaves/plant, leaf length, leaf width; variety Arka Adhya recorded earliest flower bud burst, earliest flower bud initiation, earliest flower opening and maximum number of flowers/plant; flower diameter and plant spread. SPAD reading was highest in var. Arka Archana. Arka Adhya also recorded

maximum field life, vase life, plant fresh biomass, plant dry biomass and anthocyanin content. From the experiment, it was concluded that Arka Aadya performs best among the China Aster varieties under mid-hill condition of Meghalaya.

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## **Cillage - City Development in A Village**

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Cillage is a concept in which village will be developed as city. Cillage is smart and modern village which has several facilities and enhance the lifestyle of common rural people. It will provide knowledge, education and employment to each and every common man of village and it creates better standard of living of a common rural man.

It is the model which represent to how the agriculture can be relate with ICT and with social knowledge to develop the village. In Cillage we are using the technology. Cillage is the concept which emerge the view of city in a village. It will support to stop distress migration of peoples for employment and better livelihood and generate employment in their own rural area.

In rural area to introduce integrated and advance farming. It has provide urban amenities in the village for social, economical and environmental development of village. It have help to achieve sustainable development.

Cillage center have work with its different components like Gram panchayat, extension lab, plant testing lab, processing units, etc. which have

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work with help of native peoples and special participation of extension workers, SHG's and NGO's.

Due to application of all the components of a cillage, a common village can be developed in a city which steps towards developing India. It gives direction for sustainable agriculture and eco-friendly society.

Overall after applying all the components of CILLAGE the changes occurs in cultural, social, economical, environmental and educational life of common man of a common village.

**Keyword:** Cillage, Model village, social, economical, environmental and development

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## **Impact of Climate Change on oil palm Plantation**

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A region's climate is determined by the sum of all its environmental variables over a period of around thirty years. Climate change is defined as "a change in the climate that can be directly or indirectly attributed to human activities and that modifies the global atmosphere in addition to natural climatic variability seen across comparable periods. Weather and climate have a significant impact on crop distribution and the crop's yield. Oil palm is more vulnerable to climate change due to excessive dependence on ground water. According to estimates, the amount of water needed rises by 10% for every 1°C increase in temperature. Higher temperatures can cause bunch failure by preventing pollination, reducing or even stopping photosynthesis, decreasing the quantity of female inflorescences, and aborting bunches. Higher temperature with low humidity results in rotten bunch, water stress expanded lance leaf number and upper biomass break (frond) substantially decrease oil palm productivity, decrease in tissue and



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cells dehydration, decreasing nutrients uptake, disruption in general metabolism and influences photosynthesis negatively, outbreak of pest and diseases is due to temperature fluctuations which changes the fecundity and life cycle of the pest and influences the pollination process and changes the modus operandi of the pollinators such as *Elaeidobius kamerunicus* (pollinating weevil). In some places, higher temperatures can result in higher rates of evapotranspiration and photorespiration as well as lower relative humidity. Unfavorable solar radiation causes leaf blistering, which interferes with photosynthetic activity and ultimately results in crop loss. In order to preserve agricultural sustainability and to reduce the impact of climate change on the plantation, it is essential to protect these valuable crops. To achieve this, many kinds of adaptation and mitigation strategies must be used. The most effective ways to maintain productivity, modification of present cultural practices and to adopt multiple strategies that reduce the emission of greenhouse gases to minimize the effect of climate change. the strategies adopted for conservation agriculture are renewable energy, soil and water conservation, carbon sequestration, nutrient management, intercropping, green manuring, etc. can reduce the effect of climate change.

**Keywords:** Oil palm, climate, temperature,

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## More Millets in Diet, Better Women's Health in Country

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Cereal grains are the most important source of the world's food and have a significant role in the human diet throughout the world. In addition, because of their important contribution to national food security and potential health benefits. The millet grains are now receiving increasing interest from food scientists, technologists, and nutritionists. The health benefits and nutrition provided by millets is equivalent to other major cereals like rice, wheat and maize but the technologies used to process can

work out to improve its quality in terms of nutrition and other edible properties for house hold consumption. Millets, like sorghum and Peral millet, are a traditional staple in many countries and are known to be rich in iron. However, a wide variation in the iron composition of millets has been reported, which needs to be understood in consonance with its bioavailability and roles in reducing anemia. The millets have a low-cost potential for lowering iron deficiency anemia in women and are an excellent source of iron. It is recommended that pregnant and nursing women eat large amounts of ragi to boost breast milk production of breast milk. Millet is an excellent food for women who experience excruciating agony and cramps throughout their menstrual cycle because of its high magnesium content. This makes it possible for the mother to feed the infant for a longer duration. Additionally, PCOD-suffering women should include this grain in their daily diet. Due to the fact that it controls menstruation and reduces visceral fat. The aim of this review is to study the importance of millets in women's health.

**Keywords:** Bioavailability, consonance, consumption, excruciating agony, menstruation

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## **Forecasting of Tea Production in India in Relation to Export and Import**

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Tea is one of the most important hot beverages in the world, and the tea industry is one of the oldest organized industries in India. India is the second largest producer in the world after China, with a production of 1344.40 M.kg from an area of 619773.70 ha for the year 2021-2022 (Tea Board, Government of India). In addition to this, we are the largest consumer of the beverage, with an estimated domestic consumption of 1168 M.kg for the year 2021-2022. It makes up around 87% of the total tea produced in India. India exported the most tea globally after Kenya, China,

and Sri Lanka (200.79 M.kg) and imported 25.97 M.kg in the year 2021–2022. The study utilizes the data on the production, export, and import of tea in India from 1992 to 2021 to forecast future production values. The present study employs the Autoregressive Integrated Moving Average with Explanatory variable (ARIMAX) method to capture the underlying pattern that exists in the historical data of tea production in India. ARIMAX (1, 1, 0) with constant is found to be the most accurate model among those created, with an AIC value of 240.85. The mean absolute percentage error (MAPE) was used to evaluate the model's accuracy for testing data. Tea production for the next three years was predicted using the developed model. The ARIMAX model's ability to capture patterns in time series data and to interpret the impact of exogenous variables on target variable equips it to provide reliable forecasts, helping various stakeholders in the tea industry in India adapt to market dynamics and optimize its production.

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## **Effect of different organic nutrients on flowering behaviour of spray chrysanthemums cv. Marigold and Winter Queen under Terai region of West Bengal**

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*Chrysanthemum* (*Chrysanthemum morifolium*) popularly known as Queen of East or Autumn Queen belongs to plant family Asteraceae was an important commercial flowering ornamental which had a great demand in the international and domestic markets. It has been widely used as loose flower, cut flower and as potted plant. The use of chemical fertilizers was very often in the cultivation of major flowers crops which deteriorates the

both physical and biological properties of the soil in the long term. To address this bottleneck an experiment was conducted in the instructional farm of Floriculture, Medicinal and Aromatic Plants, Uttar Banga Krishi Viswavidyalaya, Pundibari, West Bengal during the period of 2018-2020. Organic manures are known to have a beneficial effect on the soil properties with which their long term use improves the physical, chemical and biological conditions of the soil. In this experiment different organic manures viz., Azotobacter, Phosphate solubilizing Bacteria (PSB), Vermicompost, FYM, Poultry Manure, Bone Meal had been used solely and in combinations to know their effect on the flowering attributes of two cultivars namely, Marigold and Winter Queen. The pooled results indicated that the maximum number of flowers per plant was observed in Marigold those who received Poultry Manure@ 5t/ha + Azotobacter @2 g per plant + PSB @2 g per plant (15.47), while in cultivar Winter Queen which was treated with Vermi-compost @5 t/ ha(500 g /m<sup>2</sup>)+ Azotobacter @2 g per plant + PSB @2 g per plant resulted maximum number of flowers (67.55). The maximum flower diameter in Marigold was resulted in treatment combination of Vermi-compost @5 t/ ha(500 g /m<sup>2</sup>)+ Azotobacter @2 g per plant + PSB @2 g per plant (6.85 cm) and in Winter Queen the flower diameter was maximum with the same treatment combination of organic manure (8.30 cm).

**Key Words:** Chrysanthemum, Vermicompost, Poultry Manure, Bone Meal

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## **Efficacy of different baits for trapping fruit flies infesting mango**

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The present investigation was carried out on to study the efficacy of different baits for trapping fruit flies infesting mango the effectiveness of baits for trapping of fruit flies infesting mango at Horticulture Nursery, College of Agriculture, Dapoli, Ratnagiri during the months of May and June.

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Results indicated that the treatment T<sub>7</sub> wherein methyl eugenol was used as bait recorded significantly maximum fly catch during all the observations recorded from first to last week of May and June. Among the other bait treatments the treatment T<sub>5</sub> (*Ocimum* (leaf extracts) + DDVP) recorded significantly more fly catch than rest of the bait treatment during observations recorded on the first, second, third and fourth week. The treatment T<sub>2</sub> (Jaggery + protein hydrolysate + yeast (granules) + DDVP) was observed to be the least effective treatment which recorded significantly the lowest fruit fly population.

**Key words:** fruit flies, methyl eugenol, baits, *Ocimum* leaf extracts

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## Long term effects of Covid-19 on the Education, Agriculture, Horticulture and Environment in India

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The worldwide outbreak of coronavirus illness 2019 (COVID-19) is harming every element of human existence, including the physical world. Educational institutions (schools, colleges, and universities) in India were centered exclusively on conventional ways of learning, that is, they followed the traditional set up of face-to-face lectures in a classroom. Even while many academic institutions have begun using blended learning, many of them are still using outdated practices. The globe was shaken by the rapid emergence of the fatal Covid-19 sickness, which was brought on by the SARS-CoV-2 Corona virus. All educational activities were stopped in India as around 32 crore students left their current schools or universities. The COVID-19 epidemic has shown us that change is inevitable. The World Health Organization's declaration of it as a pandemic has served as a drive for educational institutions to expand and choose platforms with cutting-edge technology. The global education system was put to the test by this

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issue, and instructors were abruptly obliged to switch to an online form of instruction. Many academic institutions were forced to completely switch to online teaching-learning after first being unwilling to modify their old pedagogical style. Additionally, the COVID-19 epidemic severely damaged the Indian agriculture system. According to survey results, the pandemic has impacted marketing and production through labor and logistical restrictions, and the negative income shock has limited access to markets and raised food commodity costs, which has an impact on consumption patterns. All the participants in the Indian agriculture system were severely affected by the epidemic on a physical, social, economic, and emotional level. The state launched a number of initiatives and long-overdue changes after seeing the crisis as an opportunity. The actions required to stop the virus's spread and the resulting halt in economic activity have a big impact on the environment. Our administration has implemented several ways to combat this epidemic crisis. The effective adoption of the suggested techniques is anticipated to be beneficial for the long-term sustainability of the environment worldwide.

**Keywords:** Conventional learning, Covid-19, Epidemic crisis, Sustainability

## **Cultivation of Oyster Mushroom: An Unexpected Boon to Farmers**

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The cultivation of edible fungi is a controlled bio conservation of agro industrial lingo-cellulosic waste & residues. Now days, Mushroom evolved as good cash crop. Present work emphasized the cultivation of oyster mushroom (*Pleurotus* spp.). Mushroom cultivation fits very well in sustainable farming system with several advantages. Mushroom cultivation has been proved as boon for farmers not only for income generation but also as the integral part of integrated farming system. Cultivation practice can be performed using locally available materials, agricultural waste and low cost inputs to achieve optimal output. Cultivation process includes- Preparation of mushroom Spawn, Preparation of substrate, Spawning of substrate, Incubation and Harvesting. After harvesting, leftover residues and spent substrate acts as good soil conditioner. The development of Oyster mushroom (Grey and pink) production methodologies on agricultural waste like Paddy straw and wheat straw gives very high yield as well as the nutritional contain like carbohydrate, protein, ash, calcium, magnesium, crude fibers and lipids. Specific biochemical compounds in oyster mushrooms are responsible for improving human health in many ways. These bioactive compounds include polysaccharides, terpenoids, low molecular weight proteins, glycoprotein and immunmodulating compounds. Hence mushrooms have been shown to promote immune function; boost health; lower the risk of cancer; inhibit tumor growth; help balancing blood sugar; ward off viruses, bacteria, and fungi; reduce inflammation; and support the body's detoxification mechanisms.

## Utilization of Decomposable plastic

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A safe guard for our beautiful surrounding, a invention of Decomposable Plastics which is being prepared by common organic products. Especially those base on renewable resources from the agricultural industry are an essential innovation. Bio plastics based on starch use benefits of natural polymerization and the availability of raw material and process technology. Main features of this plastic is that increases soil nutritional value. Decomposed in soil within a 8 days, the plastic is made up of edible substances so it is not harmful if it is eaten by animals like cow, pigs etc. During decomposition it emits just 4 molecules of CO<sub>2</sub> from 10 kg of plastics which can be further reduce by photosynthesis. Constituent of plastic are Corn flour, water, glycerine, vinegar, food colour. Glycerine, it is act as a plasticizer. Corn flour acts as polylactic acid polymer. Water is used as solvent to get biopolymer. By taking in consideration all above points this is eco- friendly plastic which not only beneficial for environment but also gives consideration to humanity. By the use of organic material its value is been uplifted with the help of modified technology better plastic can be prepared and consumed.

**Keywords:** Decomposable, CO<sub>2</sub>, Glycerine, plasticizer, & Corn flour.



# **Introgression of *Vigna radiata* var *sublobata* gene pool in cultivated varieties for development *In-situ* germination tolerant lines in Mungbean (*Vigna radiata* L. Wilczek)**

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Mungbean (*Vigna radiata* L. Wilczek) is an important pulse crop commonly used for sprouting in diet with 24-25% protein content. Mungbean seeds, being protected inside the pod, but susceptible to vivipary germination which ultimately causes 60-70% reduction in yield followed by heavy rainfall in September month. An investigation was carried during 2008-09 at Agricultural Research Station Badnapur. Seven interspecific derivative dormant lines were obtained from mating wild *Vigna radiata* var. *sublobata* (Accession No. BWM-29) with cultivated mungbean *Vigna radiata* (BM-4). SPS among F<sub>2</sub> population were carried out and onwards selection from F<sub>12</sub> generation, seven dormant lines were selected and subjected to cross with six cultivated varieties SAU, Maharashtra during 2020-21. Obtained 42 F<sub>1</sub> hybrids were assessed for *In-situ* germination studies just after the plant attains physiological maturity and observation were recorded at the interval of 5 days, 10 days, 15 days and 20 days after keeping fresh seeds as well as pods in controlled condition to assess the tolerance level for dormancy. Analysis among 42 hybrids showed twelve, thirteen, nine and four hybrids were susceptible (0-5 days), moderately tolerant (6-10 days), tolerant (11-15 days) and highly tolerant (16-20 days) for *In-situ* germination. Two crosses were reported for pod dormancy but failed to achieve seed dormancy indicating waxiness of pod to control the imbibition of seed. As a result, the dormancy was transferred from wild source of mungbean BWM-29 to cultivated mungbean. While newly developed four highly tolerant *in-situ* mungbean lines will facilitate an opportunity to be used in future breeding programme.

## **Application of Artificial Intelligence(AI) in Agriculture: An Indian Perspective**

**Nishant K Sinha, Jitendra Kumar, Dhiraj Kumar, Rahul Mishra, J K  
Thakur, K C Shinogi, Jayaraman Somasundaram and M Mohanty**

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India ranks second worldwide in farm input. The importance of artificial intelligence in Indian agriculture is unbelievable. With the help of weather forecasting based on AI technology farmers anticipate weather conditions which helps them to choice the crops for cultivating. PEAT, a German digital start up has created Plantix an application that can detect nutrients deficit in soil, plant paste and diseases and help to determine the amount of fertilizer for application. Farmer get advice on water management, timely harvesting, optimum planting, nutrition management which causes sustainable agriculture. Smart irrigation means providing right quantity of water at right time for right crops and this can be achieved by using sensor based automated irrigation system based on AI. AI based technologies support farmers in the management of risk and uncertainty like increased temperature, erratic rainfall pattern efficiently. AI based computer vision technology helps to enhance the quality of the produce with high market value with more profit and help to control plant diseases. Multiple tasks in farming field like controlling weeds, harvesting fields can be done shortly with less labour. AI system uses satellite images and compare them to detect the presence of insects and which type it is if present. With AI sensors weed and weed affected area can be can be detected easily and herbicides can be precisely sprayed to reduce the amount used and time also. By using the satellite and drone images real time alerts and safety can be generated in precision farming.(346 words)

# Effect of pre harvest foliar application of chemical treatments on physical quality of Custard apple (*Annona squamosa* L.) cv. Balanagar

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Custard apple (*Annona squamosa* L.) is a semi deciduous, subtropical fruit, consumed in many countries throughout the world. Among various chemicals, potassium is one of the key elements which play an important role in determining yield and quality. Nutritional K-sprays are required to increase fruit yield as well quality attributes specially juice recovery percentage and ascorbic acid content. Potassium is needed for enzyme activation, cell division, photosynthesis, photosynthates transport and osmoregulation. Hence, an experiment was conducted to study the effect of different pre harvest foliar application of chemical treatments on quality of custard apple (*Annona squamosa* L.) cv. Balanagar, during the year 2018-19 and 2019-20, at Instructional Cum Research Orchard Arid Zone Fruit Project and laboratory of Postharvest Technology, Department of Horticulture, MPKV., Rahuri, Dist. Ahmednagar (MS). The experiment was laid out in FRBD (Factorial Randomized Block Design) with two replications. The trees of custard apple sprayed with 1% and 2% CaCl<sub>2</sub>, 1% and 2% CaNo<sub>3</sub> and 1% and 2% KNO<sub>3</sub> at 60, 90 and 60-90 days after fruit setting and control trees was spray with water. The maximum fruit weight (244.80 and 260.70 g), fruit volume (212.37 and 226.16 cc), fruit length (7.16 and 7.62 cm), fruit breadth (8.71 and 9.28 cm), fruit pulp (42.09 and 44.68%), fruit firmness (27.50 and 28.87 N), while minimum fruit rind (47.92 and 51.17%), fruit seed (5.16 and 5.49%) showed significant result with treatment combination C<sub>6</sub>T<sub>3</sub> (KNO<sub>3</sub> 2% at 60 and 90 days after fruit set). Considering Pre harvest foliar application of potassium nitrate 2 % (KNO<sub>3</sub> 2 %) followed by potassium nitrate 1 % (KNO<sub>3</sub> 1 %) at 60 and 90 days after fruit (C<sub>6</sub>T<sub>3</sub>) was found to be best for physical parameters.

**Keyword:** Custard apple, pre harvest, CaCl<sub>3</sub>, CaNo<sub>3</sub>, KNO<sub>3</sub>, Balanagar, physical parameters

## **Crop Weed Competition on Weed Growth and Yield of Direct Seeded Rice under Different Rice Eco System**

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Field experiments were conducted at Agricultural Research Station, Bhavanisagar during 2020-21 to assess the impact of crop weed competition on weed growth and yield of direct seeded rice under puddled and unpuddled condition. The experiment consisted of the following treatments *viz.*, Main plot: M<sub>1</sub>- Direct seeded rice under puddled condition, M<sub>2</sub>-Direct seeded rice under unpuddled condition; Sub Plot :S<sub>1</sub>-Weedy upto 15 DAS, S<sub>2</sub>-Weedy upto 30 DAS, S<sub>3</sub>-Weedy upto 45 DAS, S<sub>4</sub>-Weedy upto 60 DAS, S<sub>5</sub>-Weedy condition (Weedy check), S<sub>6</sub>-Weed free upto 15 DAS, S<sub>7</sub>-Weed free upto 30 DAS, S<sub>8</sub>-Weed free upto 45 DAS, S<sub>9</sub> – Weed free upto 60 DAS and S<sub>10</sub>-Weed free condition (Check). The trial was laid out in a Split plot design with three replications. The results revealed that, most of the weeds were quickly emerged in unpuddled condition than in puddled condition but the establishment was slower in unpuddled condition. The weed density and weed dry weight were significantly lower in the puddled condition and weed free up to 60 DAS, in all the stages of observation. The weed density was lower in puddled condition at 30, 45 and 60 DAS (17.8, 12.6 and 6.3 no. m<sup>2</sup>) than in unpuddled condition. Weed free condition up to 60 DAS reduced the weed density in both eco system. Similarly, the same trend was observed in weed dry weight at 30, 45 and 60 DAS. The plant height, no. of productive tillers and grain yield were significantly influenced by the treatments both under puddled and unpuddled direct seeded conditions. The higher plant, height (107.3 cm), no. of productive tillers (340) and grain yield (5685 kg/ha) were recorded in direct seeded rice under puddled condition than in unpuddled condition. Among the weed management methods, higher plant height (109.4 cm), productive tillers(364) and grain yield(5988 kg/ha) were recorded in weed free

condition upto 60 DAS than in weedy condition. The maximum yield losses were observed during 30 to 45 DAS weedy condition as compared to other stages. From this study, it could be concluded that Direct seeded rice under puddled condition reduced the weed density and weed dry weight and increased growth and yield than in un puddled condition. Also weed free condition up to 60 DAS under puddled condition recorded lower weed density, lower weed dry weight and higher growth and yield than in other weed control treatments.

**Keywords :** Direct seeded rice, weed density, weed control efficiency and grain yield

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## **Influence of Rice Transplanters and Weeders on Weed Growth, Productivity and Profitability in Mechanised Rice**

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Field experiments were conducted at Agricultural Research Station, Bhavanisagar during 2020-21 to increase the rice productivity and profitability through mechanization. The experiment consisted of the following treatments *viz.*, Main plot: Transplanters (5 models) : T<sub>1</sub>- Walking type (4 rows), T<sub>2</sub>- Riding type (4 rows), T<sub>3</sub>-Riding type (6 rows), T<sub>4</sub>-Riding type (8 rows), T<sub>5</sub>-Riding type Yanji (8 rows ), Sub plot: Weeders (3 types), W<sub>1</sub>-Cono-weeder, W<sub>2</sub>-Single row power weeder, W<sub>3</sub>- Double row power weeder. The trial was laid out in a Strip plot design with three replications. Among the different transplanters, higher field efficiency (75.%) and higher establishment percentage (96 %) were recorded in 8 row riding type transplanter (yanmar) followed by 6 rows riding type with the field efficiency of 72.04 % and establishment percentage of 90 %. The lowest field efficiency and establishment percentage were noticed in 4 rows

walking type. The results revealed that, at 15 DAT and 30 DAT, lowest weed density (1.07 and 4.11 no./m<sup>2</sup>) and higher weed control efficiency (86.01 % and 76.85 %) were recorded in 4 rows riding type with cono weeder weeding. Among all the transplanter and weeder combinations, six rows riding type with cono weeder weeding benefitted maximum plant height (127 cm), higher number of productive tillers per hill (17.6), more filled grains/panicle (115) and grain yield (5920 kg/ha). Six rows riding type with cono weeder weeding gross return (Rs.124974/ha), net return (Rs.82074/ha) and BCR (2.91) were recorded higher when compared to the other treatments and farmers practices. From this study, it could be inferred that among the various transplanter and weeder combinations, six rows riding type transplanter with cono weeder weeding was recorded higher growth and yield parameters, net return and benefit cost ratio in rice.

**Keywords :** Rice transplanters, weeders, weed density, productive tillers, grain yield and benefit cost ratio

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## **Combining ability analysis for fruit yield and its contributing characters in tomato (*Solanum lycopersicum* L.)**

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The present study was carried out in the field of Horticultural Research and Instruction Farm under Vegetable Science department, IGKV (Indira Gandhi Krishi Vishwavidyalaya) Raipur, Chhattisgarh, during the year 2020-22. The experimental material comprised of six lines (TODVR-1, TODVR-4, TODVR-5, TODVR-6, TODVR-8 and TODVR-9) and four testers (TOLCV-1, TOLCV-2, TOLCV-4 and TOLCV-6). Twenty four F<sub>1</sub> hybrids were developed and are evaluated to identify nature of combining ability of

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crosses for eighteen characters in Randomized Block Design (RBD) with three replications and line x tester analysis. Analysis of mean performance of parents data revealed that lines (female) TODVR-8, TODVR-6 and tester (male) TOLCV-4 produced highest fruit yield per hectare (q), maximum fruit yield per plot (kg) and number of fruits per plant possessed positive gca effect in desirable direction. In case of hybrids TODVR-8 x TOLCV-6 followed by TODVR-4 x TOLCV-4 and TODVR-6 x TOLCV-1 revealed the best performance for fruit yield per hectare (q) and average weight of fruit (g) in tomato. It was observed that fruit yield per plant of F<sub>1</sub> generation expressed a highly significant positive with average fruit weight (g) followed by fruit diameter (cm), fruit yield per hectare (q) and number of fruits per plant. The study of combining ability for fruit yield and its attributing characters in tomato was a paradigm for improvement of promising high-yielding genotypes with desirable characteristics.

**Key words:** Genotypes, Combining ability, gca, sca.

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# **Gummosis in Nagpur mandarin: A result of faulty planting method and management practices under Satpura plateau region of district Chhindwara Madhya Pradesh**

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The world famous Nagpur mandarin (*Citrus reticulata* Blanco) is suffering adversely due to *Phytophthora* spp. The species causing decline later stage gummosis develops rapidly under moist, cool conditions. Gummosis is the most important soil borne fungal disease of Nagpur mandarin causing mortality, slow decline and yield loss of mature trees. Primary colonization is on roots causing discoloration, root decay, bark degradation at collar region and leaf falling. Exudation of gum like

substance from bark of the trunk, which cracks open, dries up and fall down in the later stages. Symptoms are clearly seen on the above ground parts near the soil. All citrus orchards in central India and other citrus cultivation belts of India are infected by *Phytophthora* diseases. 20-50% Nagpur mandarin plants were found to be affected resulting in severe decline due to Gummosis. Citrus decline is most wide spread severe problem in citrus orchards at dist. Chhindwara Madhya Pradesh. Susceptibility of rootstocks to root rots, salinity water logging accelerate the incidence. In many cases, decline of citrus trees can be traced to mismanagement and negligence. Excessive intercropping, faulty planting method (the bud union inside the soil at the time of planting), excess or no manuring, improper use of irrigation water, are some of the common causes leading to citrus decline and gummosis at satpura plateau region of district Chhindwara Madhya Pradesh.

Phytophthora root rot and gummosis are the most important soil borne diseases of Nagpur mandarin causing mortality, slow decline and yield loss of mature trees

Phytophthora root rot and gummosis are the most important soil borne diseases of Nagpur mandarin causing mortality, slow decline and yield loss of mature trees

**Keywords:** Nagpur mandarin, Decline, Gummosis, *Phytophthora*, Soil borne

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## **Economic analysis of banana production and supply chain analysis in Erode district of Tamil Nadu.**

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This study examines substantial changes in banana acreage, output, and yield in Erode, Tamil Nadu, and its supply chain. The Compound Annual Growth Rate was used to examine time series data on area, production, and productivity from 2010-11 to 2021-2022 and primary



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data from 100 farmers. Horticulture crops in Erode district cover 63202.8 hectares in 2021-22, with banana contributing 28% and 1394810 tonnes produced. Erode has 19592.62 hectares of fruit crops, 90% of which were bananas. Bananas make up 94% of 689851 tonnes of fruit production. Erode district contributes 17% of Tamil Nadu's 102188.5 hectares of banana farming in 2021-22. Banana cultivation dropped from 10127 hectares in 2010-11 to 5246 in 2011-12. In 2012-13, the area expanded to 12098 hectares, then decreased to 10426 hectares before increasing again until 2015-16. Area dropped immediately to 10613 ha in the next years. From there, the area grew rapidly until 2022. In general, banana cultivation is growing significantly at 6.4 percent. The district produced 390842 tonnes of bananas in 2010-11. The following years, production climbed to 443923 tonnes due to area expansion, then dropped to 273072 tonnes in 2014-15. The next year, production reached 521931 tonnes before falling to 462418 tonnes. Banana production rose to 644027 tonnes. After decreasing to 533602 tonnes in 2019-20, the district produced 646575 tonnes of bananas in 2021-22, the highest production in a decade despite the yield drop. Overall, the graph shows that banana output increases with a growth rate of 8.4%.

The average banana yield was 41.46 tonnes per hectare, below the state average. The production was 38.59 tonnes/ha in 2010-11 and dropped to 24 tonnes/ha in 2014-15. Further, yield rose to 42.31 tonnes/ha. After falling in 2016-17, yield rose to 49.73 tonnes per ha in 2018-19. Further declines reached 13 tonnes (36.72 tonnes per ha). Overall, banana yield is rising slowly at 1.9%. Due to decreasing district productivity, banana production is not rising despite rising area. The survey averaged 100 farmers with red banana cost and return calculations. The Benefit Cost ratio is 1:1.4, indicating that red banana cultivation benefits farmers. It included cost, returns, marketing channel, constraints faced by the farmer. Later irrigation includes micro and regular irrigation. Erode district features several marketing channels, but Regulated markets are more efficient. On average, 31% of 100 farmers cited perishability as their biggest issue. Second, wind (21%) will severely reduce yield since banana plants are too weak to withstand it and are injured. Third, labour shortages average 15%. Family labour can be used when men and women are scarce.

## **Assessment of Dynamics with Model in Microgreens through Soilless culture**

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The model engages in dynamics of nutrient, water and climatic factors in controlled environment system. The microgreen plant has cotyledon leaf stage/one pair leaf stage and 5-10 cm plant height or 10-15 days harvesting duration. The model involves in distributing nutrient, water and climatic factors efficiently and controls critical and stable level of nutrient, water and climate in controlled environment conditions. The advanced risc machine cortex- M4 microcontroller (ARM) drives transmission signal for measuring critical level of electrical conductivity, pH, carbon dioxide, temperature, and nutrient concentrations in solution in controlled environment. The PlantTalk exposes water flow, light emitting diodes (LEDs) control and plant care. The penman-monteith and stanghellini models perform solar radiation, air temperature, humidity and wind speed in controlled environment. The priestley taylor model and hargreaves & samani model screens air temperature and solar radiation in controlled environment. The recurrent neural network and long short term memory (RNN-LSTM) tests degree levels of pH, temperature, humidity and water diffusion. The nutrient concentrations, nutrient mobility, water available nutrient, nutrient concentration in substrate, growth rate, yield and concentration gradient are evaluated with mechanistic and physiological model with machine learning (MPM-ML) model. The ambient concentrations of carbon dioxide and stable or unstable levels of carbon dioxide are measured with carbon enrichment for plant stimulations (CEPS) system in closed system. The model absolutely controls critical and non critical levels of climatic factor variations and grows plant in the stable climate under

controlled environment. The model justifies to reform ecology, ecosystem and conserve resources of natural system.

**Keywords:** soilless, microgreens, model, dynamics, factors, controlled environment

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## **Effect of different levels of nano urea and conventional fertilizer on soil health of maize (Zea mays L.) Var, P3544 in an Inceptisols of Prayagraj, (U.P) India**

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The experiment was laid down in randomized block design with three levels of conventional fertilizer (0% N, 50% N and 100% N) and foliar spray of nano urea fertilizer at three concentrations (0%,50% and 100%) respectively. The result shows that the application of different levels combination of conventional fertilizer and nano urea increased growth, yield of Maize and improved soil chemical properties. However some parameters of soil physical properties decreased. The results showed that the application of conventional fertilizer and nano urea in treatment T9 (N100, 100%P and K fertilizers + 2 sprays of Nano nitrogen (4ml/l) minimum bulk density 1.200 Mg m<sup>-3</sup> in 0-15 cm depth and 1.407 Mg m<sup>-3</sup> in 15-30 cm depth, particle density 2.359 Mg m<sup>-3</sup> in 0-15 cm depth and 2.669 Mg m<sup>-3</sup> in 15-30 cm depth, water holding capacity 59.09% in 0-15 cm depth and 49.57% 15-30 cm depth , pH 7.105 in 0-15 cm depth and 7.309 in 15-30 cm depth, EC 0.222 dS m<sup>-1</sup> in 0-15 cm depth and 0.148 dS m<sup>-1</sup> in 15-30 cm depth,% organic carbon 0.487 % in 0-15 cm depth and 0.387% in 15-30 cm depth, Available Nitrogen (kg ha<sup>-1</sup>) 247.12 in 0-15 cm depth and 199.2 in 15-30 cm depth , Available Phosphorous (kg ha<sup>-1</sup>) 39.36 in 0-15 cm depth and 31.63 in 15-30 cm depth, Available Potassium (kg ha<sup>-1</sup>) 4.34 in 0-15 cm depth and 9.37 in 15-30 cm depth was found Significant.

**Keywords:** IFFCO nanofertilizers, growth and yield parameters, maize, soil physic-chemical properties

## **Effect of Fibrolytic Liquid Enzymes Pre-treated with Cotton Stalk Based Pelleted Complete Feed on Rumen Fermentation Profile**

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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<sub>3</sub>-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.

The average values of rumen liquor pH for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> was found to be 6.68±0.04, 6.69±0.03, 6.71±0.03 and 6.74±0.04. The rumen liquor pH was significantly less on 0<sup>th</sup> day for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> and it was increased at successive month in each group. The average NH<sub>3</sub>-N values for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were found to be 20.53±0.68, 19.64±0.71, 19.46±0.68 and 18.62±0.74 mg/100 ml SRL. The rumen liquor NH<sub>3</sub>-N varied significantly (p<0.01) between the periods. The average TVFA concentration was significantly (p<0.01) higher for T<sub>3</sub> (94.86±2.25) followed by T<sub>2</sub> (90.13±2.11), T<sub>1</sub> (86.46±1.36) and T<sub>0</sub> (84.50±2.05). The rumen liquor TVFA varied significantly (p<0.01) between the periods and groups. The average

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total nitrogen values were found to be  $100.80 \pm 3.57$ ,  $109.66 \pm 3.22$ ,  $109.66 \pm 3.15$  and  $114.33 \pm 3.80$  mg/100 ml SRL for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group. The rumen liquor total nitrogen production differed significantly ( $p < 0.01$ ) among period and groups. The average TCA-ppt-N values were found to be  $42.93 \pm 2.11$ ,  $43.86 \pm 2.19$ ,  $43.16 \pm 2.27$  and  $45.73 \pm 2.11$  mg/100 ml SRL for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group. The TCA-ppt-N production did not vary significantly between the groups and periodic interval. The average NPN values were found to be  $57.86 \pm 4.23$ ,  $65.80 \pm 3.62$ ,  $66.50 \pm 4.14$  and  $68.60 \pm 4.15$  mg/100 ml SRL for T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> group. The NPN production did not show any significant variation in treatment groups. On conclusion, the rumen fermentation pattern determined monthly revealed non-significant variations for pH, however significantly lower NH<sub>3</sub>-N and higher TVFA concentrations and total nitrogen was recorded for enzyme treatment groups. However, rumen TCA-ppt-N and NPN did not alter due to enzyme treatment of cotton stalk.

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

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## Rare and Endangered Species of Plants

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India is one of the richest nation in terms of plant diversity as it is home to more than 15000 flowering and 3000 medicinal plants, from where 1100 plant species are endangered. In world 26,500 species are endangered.

## **G H Raison University, Saikheda and Just Agriculture Education Group**

Rare and endangered species of plants face numerous threats due to habitat loss, climate change, over exploitation, and invasive species. It provides an overview of the current status, conservation challenges, and strategies for the preservation of rare and endangered plant species. The first section highlights the significance of plant biodiversity and the role of rare and endangered species in maintaining ecosystem stability and functioning. It emphasizes the importance of conserving these species not only for their intrinsic value but also for the benefits they provide, such as medicinal compounds, ecological services, and genetic resources.

The second section discusses the major threats faced by rare and endangered plant species, including habitat destruction and fragmentation, pollution, climate change, and the spread of invasive species. It explores how these threats exacerbate the vulnerability of plant populations and contribute to their decline. The third section focuses on conservation efforts and strategies employed to safeguard rare and endangered plant species.

Finally, it concludes with a call to action, emphasizing the urgent need to prioritize the conservation of rare and endangered plant species. It emphasizes the importance of public awareness, education, and sustainable land management practices to ensure the long-term survival of these species and the ecosystems they inhabit. It serves as a foundation for further research and action in the field of plant conservation, promoting the preservation of biodiversity and the sustainable coexistence of humans and the natural world.

**Keyword:** Medicinal plants, rare, endangered plants and species etc.

## **Diversity Analysis and Dry Preservation of Butterflies to Understand Future Strategies in CGU Campus, Odisha**

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Butterflies are excellent markers of environmental evaluation because of their sensitive nature and changes in butterflies' habitats have a direct impact on them. Increasing urbanization may have catastrophic repercussions on both regional and global levels by causing habitat loss. The current study was conducted from January to April of 2023 in the State of Odisha within the campus of C.V Raman Global University to explore the diversity of butterflies and ways to maintain butterfly species over long-term. Altogether, 108 individuals and 17 butterfly species belonging to 3 families were documented. Nymphalidae, one of the three families, was discovered to have the most species of 11(64.72%), followed by Pieridae with 4 species (23.52%), and Papilionidae with 2 species (11.76%). An index of diversity ( $H'$ ) for the butterfly family Nymphalidae is 1.944327 and Evenness is 0.810847 indicates highest level of diversity and for the Papilionidae family Shannon diversity index is 0.529706 and Evenness is 0.764205 which shows lowest level of diversity. The recent study has revealed that there is a healthy diversity of butterflies inside the campus.

**Keywords:** Butterflies; Diversity; Preservation; CGU, Nymphalidae, Pieridae, Papilionidae

## Enhanced Enzymatic Hydrolysis of Pretreated Sugarcane Bagasse Using Cellulases and Xylanases Produced from Wheat Bran

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In the pursuit of sustainable bioprocessing solutions, this study explores the utilization of an abundant and cost-effective resource, wheat bran, for the production of cellulases and xylanases. The enzymes that were taken out were used to break down sugarcane bagasse, which is a lignocellulosic biomass with a lot of potential for making biofuels. Through a combination of optimised fermentation processes and new enzymatic strategies, this research helps to develop bioconversion processes that are both good for the environment and good for business. This helps to meet the global demand for renewable energy sources and green chemistry initiatives. The enzymatic consortium of cellulases and xylanases extracted from ascomycetous fungi, namely *Trichoderma. viride*, was found to be highly effective for the production of fermentable sugars from pretreated sugarcane bagasse. The enzymatic consortium extracted from *T. viride* has maximum xylanase, CMCase, and FPase activities of 9104 IU/g, 6.33 IU/g, and 8.09 FPU/g, 2.5 IU/g, respectively, after 6 days of incubation. Notably, at 20 FPU/g enzyme dosage, saccharification efficiency exhibited a notable elevation, emphasizing the positive correlation between enzyme concentration and the breakdown of cellulose and hemicellulose into fermentable sugars (438.36 mg/g).



## Enzyme analysis after artificial inoculation of *Alternaria*, fungi responsible for tomato fruit rot in post-harvest conditions

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Tomato (*Solanum lycopersicum*) is a fruit vegetable consumed worldwide by humans, and it may be traced back to the ancient Mesoamerican civilizations of Central and South America. Tomatoes became a staple in Mediterranean cuisine and expanded to other regions of the world over time. Tomatoes are now widely cultivated and consumed in a variety of ways, including fresh in salads, cooked in sauces, and as a key ingredient in a variety of dishes around the world. Tomatoes were first farmed by the Aztecs and Incas around 700 AD.

As in post-harvest conditions, several diseases are developed on tomato fruit as parasites or saprophytes. Fungal pathogens emit enzymes and cross-cell membrane barriers to cause disease or infect fruit. In a controlled environment, healthy fruit was sanitised with an HgCl<sub>2</sub> solution and artificially inoculated with the fungus *Alternaria*. It has been noticed that cellulase, hemicellulase, protease, lipase, and pectinase enzyme levels are higher under diseased conditions than in controls, where they are negligible. The cellulase enzyme concentration does not vary much. The level of pectinase concentration dramatically elevates after infection; this suggests pectinase is a key enzyme secreted by *Alternaria* on tomato fruit to induce disease. It is also noticed that the tissue at the site of inoculation softens rapidly as compared to other parts of tomato fruit.

**Keyword:** Post-harvest, *Alternaria*, Pectinases, Cellulase, Protease, Hemicellulase.

## **Evaluation of morphological traits of selected commercially cultivated varieties of *Solanum lycopersicum* L. under Bhopal Region of Madhya Pradesh**

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Tomatoes, which are members of the *Solanaceae* family, are among the most widely consumed vegetables in the world, with an annual production value of more than 90 billion USD. Most tomato varieties are inbred, highlighting the necessity to describe and assess morphological diversity as a resource for genotype selection with desired attributes toward ecotypes. A variety development study was conducted at the University Farm, Bhopal of the Mansarovar Global University, Sehore, Madhya Pradesh, in which sixteen promising tomato released and unreleased ecotypes/varieties with two local checks were evaluated for selected morphological features utilizing developmental, vegetative and fruit traits etc. The experiment was laid out in the Randomized Block Design with three replications and conducted for two consecutive years in 2020 and 2021. Under all of the varieties, a broad range of variation has been observed. Observations were recorded for the inflorescence and multiparous inflorescence, immature fruit colour, flesh colour of pericarp, colour of shoulder trips and intensity of green back shoulder also the width of pedical (narrow, medium and wide), colour of flesh (dark and, intermediate). Slight intensity, intermediate and no intensity of green back shoulder in five, two and rest all other while other ecotypes respectively. Narrow, medium and wide width of pedicel scars were found in six, six and four ecotypes, whereas, dark and intermediate colour flesh was present six

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and eight ecotypes respectively. Overall, the tomato ecotype VNR (THT) 9/2020 was revealed to be highly influenced and superior in all morphological characteristics for both the years as well as in pooled data. Whereas, the minimum morphological, yield, quality and economic parameters for both the years as well as pooled data were observed in the check ecotype of Shree.

**Key words:** Tomato, *Solanum lycopersicum* L , morphological, traits, ecotype, fruit, colour

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# Exploring the Potential of Castor Leaf Aqueous Extract in Improving Haematological Parameters of Goldfish Infested with *Argulus japonicus*

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*Argulus japonicus*, commonly known as fish lice, poses a significant threat to the health of ornamental and economically important fish species, such as the goldfish (*Carassius auratus*). To explore potential natural remedies for controlling *A. japonicus* infestations, this study investigated the effects of different doses of castor leaf aqueous extract on the haematological parameters of goldfish infested with *A. japonicus*. Goldfish were experimentally infected with *A. japonicus* and subsequently treated with three different concentrations of castor leaf aqueous extract along with control group (healthy goldfish). Haematological parameters, including total erythrocyte count (TEC), total leukocyte count (TLC), haemoglobin (Hb), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) were assessed after in vivo test. The results demonstrated that *A. japonicus* infection significantly altered the haematological parameters of the goldfish, including a decrease in TEC, Hb

concentration and PCV value indicating anaemia. Moreover, TLC and differential leukocyte counts revealed an inflammatory response in infected fish. Treatment with castor leaf aqueous extract showed a dose-dependent effect on the haematological parameters. Castor leaf aqueous extract treatment groups exhibited a significant improvement in TEC, Hb concentration and PCV value compared to the untreated infected group indicating a potential reversal of anaemia. Furthermore, TLC in the treatment groups showed a decrease suggesting a suppression of the inflammatory response associated with *A. japonicus* infestation. In conclusion, this study highlights the potential therapeutic effects of castor leaf aqueous extract on the haematological parameters of goldfish infected with *A. japonicus*. The results suggest that castor leaf extract may serve as a promising natural remedy for mitigating the negative haematological effects of *A. japonicus* infestation in goldfish. Further research is needed to elucidate the underlying mechanisms and evaluate the safety and efficacy of this treatment under field conditions.

**Keywords:** Argulus japonicus, Anaemia, Goldfish, Haematological parameters, In vivo

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## **Evaluation of Bio-Intensive Disease Management of Fusarium Rot in Small Cardamom (BIDMFC) with Locally Isolated Strains**

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The cultivation of small cardamom and maintenance of healthy plants have become difficult tasks due to the incidence and spread of

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Fusarium infections in recent years. Fusarium infection in small cardamom have been reported in the form of capsule infection in the field, seed rot and seedling wilt in nurseries, stem rot & stem lodging in plantations, rhizome rot, root tip rot and foliar yellowing. Field experiment was conducted at Santhanpara, Vandanmedu, Parathode and Kattappanato to evaluate the individual and combined efficacy of *Pseudomonas fluorescens* (IDK-S-1, IDK-V-2, IDK-P-3, and IDK-k-4), *Bacillus subtilis* (IDK-S-1, IDK-V-2, IDK-P-3, and IDK-k-4), *Trichoderma harzianum* (IDK-S-1, IDK-V-2, IDK-P-3, and IDK-K-4) and AMF (IDK-S-1, IDK-V-2, IDK-P-3, and IDK-k-4) strains to promote the growth and yield parameters of small cardamom and to manage Fusarium wilt disease in field conditions. The dominant pathogen which causes Fusarium wilt of small cardamom was isolated and identified as *Fusarium oxysporum* Schlecht. Five native bacterial antagonists and fungus were isolated from forest and healthy small cardamom plantation soil in different geographical regions. Under in field conditions, the results revealed that the foliar spray and drenching of combined application of PF (Pf-IDK-S-1)+BS (Bs-IDK-V-2) was found to effectively inhibit the mycelial growth of the pathogen (by 60%) when compared to application of individual strains of the bacterial antagonists. The above strains of *P. fluorescens* and *B. subtilis* (PF (Pf-IDK-S-1) +BS (Bs-IDK-V-2)) were found compatible. The soil combined application of PF (IDK-S-1) +TH (IDK-P-3) exhibited the highest disease reduction. Also, small cardamom plantation treated with PF (IDK-S-1)+ BS (IDK-V-2) strains showed a significant stimulatory effect on plant height and increased the yield up to 27% in comparison to the non-bacterized control. The combined strains also increased small cardamom capsule fruit weight. It could be concluded that synergistic consortia of beneficial bacteria isolated from rhizosphere soil are perfectly able to promote plant growth and could be exploited for sustainable management of soil borne diseases especially, Fusarium rot of small cardamom.

**Keywords:** Small cardamom, *F. oxysporum*, *Pseudomonas fluorescens*, *Bacillus subtilis*, *Trichoderma harzianum*

## Forest Conservation : A Moral Duty of Humans'

**Dr. Sunil A. Patil**

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Gangamai Education Trust's Arts, Commerce and Science College, Nagaon,  
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Currently, due to extreme urbanization, increasing pollution and industrialization, my commercial interest is increasing day by day, it is adversely affecting the surrounding natural environment and will have to face many side effects within a few days. If humans do not take timely measures against this tree cutting, the coming generation will have to face many problems. Conservation of forest resources and conservation of trees with various conservation measures is the only option. As you know that trees are a major factor in the production of natural gas and no other alternative to forest resources is available till date, tree conservation is the only option necessary for human well-being and development. Humans should not only focus on economic and practical aspects but also focus on the environment, so humans should consider it their duty to conserve trees by planting trees and transfer this precious wealth to the next generation. We are passing through an age of modernity and mechanization. We forget our negative impressions on the environment and its quality. Degradation of forest is one of the important activities of mechanized man, which is increasing day by day. Forest conservation means planting and maintaining forest areas for the benefit and sustainability of future generations. Forest conservation is also and aims to prevent rapid changes in tree species and age distribution. Forest conservation involves nurturing the natural resources of forests that are beneficial to both humans and the environment. Forests are important for human life because they provide various resources: they store carbon and act as carbon sinks, produce oxygen that is essential for life on earth, so they are called the lungs of the earth, help regulate hydrology. cycle, planetary climate, purifying water, providing habitat for wildlife, reducing global warming, absorbing toxic gases and noise, reducing pollution, protecting soil, reducing natural hazards like floods and landslides etc.

**Keywords :** urbanization, mechanization, degradation, forest conservation

# Geometric Modeling of Soil Wetting Patterns in Drip Irrigated Growing Media

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Water scarcity presents a significant challenge that severely impacts global agricultural production. Drip irrigation stands out as a vital technology, particularly in arid and semi-arid regions. In the design and maintenance of drip irrigation systems, understanding the dimensions of the wet soil zone is of paramount importance. However, existing models for predicting wetting patterns are primarily tailored to traditional soil substrates, leaving a gap when it comes to soil-based growing media. The primary objective of this study was to develop a dimensional analysis model capable of estimating both the depth and width of wetting patterns across various growing media. To achieve this, we constructed a model utilizing a semi-empirical approach combined with dimension analysis. Subsequently, we compared the model's predictions with field experiment data collected from the same soil types. These experiments involved assessing the maximum depths and widths of wetted zones under different growing media. The evaluation of model's performance, based on Root Mean Square Error (RMSE), Mean Error (ME), and Modified Efficiency (ModEF), yielded highly favorable results. Consequently, we can confidently assert that our established models can effectively predict wetting patterns for scenarios involving soil, soil + sawdust, and soil + coir pith, when water is applied through a linear source. The study underscores the practicality of employing these models in designing drip irrigation systems for soil, soil + sawdust, and soil + coirpith substrates. Furthermore, this knowledge is instrumental in optimizing irrigation practices, thereby enhancing water use efficiency. The implementation of this study, recommended model can significantly contribute to the sustainable management of water resources in agriculture

**Keywords:** Buckingham Pi Theorem, Drip irrigation, Dimensional analysis, Depth of wetting, Width of wetting

## Present state of GI-certified mango varieties in India

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The term "geographic indication" (GI) refers to a name or sign applied to products that designates a particular geographic location or origin, such as a town or region, and confers legal rights and a certification that the product, as a result of its origin, possesses particular qualities, is produced using traditional techniques, or has a particular reputation. The majority of GI is associated with agricultural products or those made from them, as is the case with wines and spirits. A geographical designation is given to many agricultural goods, such as "Basmati" for rice and "Darjeeling" for tea. By protecting these marks, parties are prevented from misrepresenting the origin of their products.

This abstract puts emphasis on varieties of mango with Geographical Indication (GI) certification in India and also discusses the characteristics and uniqueness of each certified variety. Mango (*Mangifera indica*) is a popular member of the *Anacardiaceae* family and one of the most important and cultivated crops in the world, with exotic qualities due to its origin. The Indian climate is very favourable for mango production, and this makes India the largest exporter of mango across the worldwide. In India, a total of 484 products were registered with GI, out of which 153 were in the agriculture products category. 16 mango varieties were GI registered under the process for GI certification. GI-certified products have potential for rural development because of their domestic and global demand.

**Keyword:** Geographical Indication, Mango, Agriculture, Intellectual Property Right, Rural Development.



## Growth and effect of *Purpureocillium* sp. on different media

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*Purpureocillium* sp. is a common saprophytic, filamentous fungus. It has been isolated from a wide range of habitats including cultivated and uncultivated soils from forests, grassland, deserts, estuarine sediments and sewage sludge. It has been found in nematode eggs and occasionally from females of root knot and cyst nematodes. In addition, it has been frequently detected in the rhizosphere of many crops. These species can grow at a wide range of temperatures from 8°C to 30°C with optimal growth in the range of 20° to 25°C. It has a wide pH tolerance range and can grow on a variety of substrates. Diversity in growth characters of *Purpureocillium* sp. was studied on six different media at room temperature (27± 1°C). Observation on growth and dry mycelial weight were recorded when the maximum growth was attained after 8 days in all the media tested. The effect of different culture media on the growth of fungi differed significantly. Maximum dry mycelium weight of *Purpureocillium* sp. was recorded in potato dextrose broth (6.06g) which was found to be significantly superior compared to all other broths tested. Sabour's dextrose broth (5.72g) was moderately good followed by Rose Bengal broth (5.5g). The least mycelial weight was recorded in Czapeck's liquid medium (2.5g) indicating its inability to support the growth of *Purpureocillium* sp.

**Keywords:** Media, Growth, Disease, *Purpureocillium*

## **Protection of Plant varieties and Farmers' Right Act and It's Importance in Horticulture**

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With about 49,000 plants and fungal species, India possesses an extensive biological heritage that accounts for 11% of the the globe's flora. An impressive 33% of the nations flora is made up of species that are indigenous. India has a large number of cultivars, landraces, variants, and ecotypes of both plant species and cultivatable plants in particular. It takes a tremendous deal of expertise and knowledge to create new plant kinds via breeding studies. Additionally, investing in land, scientific and professional labour, and numerous specialised tools like labs, greenhouses, etc. is necessary for mass breeding. A successful plant variety takes between 10 and 15 years to create and distribute. Despite all of the endeavours, regardless of the variety improvement, it might not be promising enough to withstand market changes, which might even entirely eliminate any chance of a favourable return on investment. As a result, it's important to evaluate the advantages of a new variety against the need to recover the large initial expenditure. To recoup the expenditures of research and development efforts, the farmer or breeder must have protection in the form of exclusive rights for the utilisation of newly developed varieties. Despite such safeguards, anyone may breed the newly released variety in conjunction with the original breeder, denying the breeder a fair chance to get compensation for their labour and financial investment. As a result, an efficient system of plant variety protection helps not only the breeder but also society as a whole by promoting the creation of new plant varieties. In order to provide a successful framework for protecting plant varieties and the rights of plant breeders and farmers, the Government of India passed the "Protection of Plant Varieties and Farmers' Rights (PPV&FR) Act, 2001."

**Keywords:** Breeder, Farmer, Government, Protection, Rights.

# Enhancing Nutrient Use Efficiency for Sustainable Agriculture

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Sustainable agriculture necessitates the optimization of nutrient use efficiency to address the challenges posed by increasing global population, resource constraints, and environmental degradation. There is a need to focus on current strategies and innovations aimed at enhancing nutrient use efficiency in agricultural systems. The focus lies on minimizing nutrient losses, improving nutrient uptake by plants, and maximizing the conversion of nutrients into desirable agricultural outputs. Key factors influencing nutrient efficiency, such as soil health, crop selection, precision farming techniques, and nutrient management practices, are discussed. Cutting-edge technologies, including advanced fertilizers, nano-agrochemicals, and biostimulants, are explored for their potential to revolutionize nutrient utilization. Moreover, the role of genetic modifications and plant breeding in developing nutrient-efficient crop varieties is examined. While challenges related to socio-economic factors, knowledge dissemination, and policy implementation remain, the pursuit of enhanced nutrient use efficiency stands as a cornerstone for achieving agricultural sustainability, increased productivity, and reduced environmental impacts.

**Keywords:** Sustainable agriculture, Nutrient use efficiency, Soil health, Productivity, Nutrient management practices

## **Impact on Socio –Economic level of Society by Dairy Entrepreneurship**

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The research study is undertaken in eight villages in four tahsils in Amravati district in Maharashtra. Data was collected from 120 milk producers; it means 15 milk producers from each village through comprehensive questionnaire. After the analysis of data and calculation of cost of milk production, results obtained in this research, it is shown that, dairy business requires only 50 percent costs and it gives 50 percent margin as profit. Comparative economics and profit margin by different milk producers showed highest B: C ration in improved buffalo milk producers and in local buffalo milk producers as 1: 2.24 and 1: 1.71 respectively. Whereas in case of cross breed cow milk producers and in local cow milk producers, B: C ratio was 1:1.53 and 1:1.10 respectively. Dairy can stand to any family as economical support. Income in all groups was highest from dairy. Family labour can minimized the cost on hired labour. It is analyzed that, dairy alone can make improvement in socio-economic level of society.

**Keywords** – milk producers, income, cost, dairy business

## **In vitro evaluation of antagonistic potentiality of Entomopathogenic fungi and bacterial symbionts of Entomopathogenic nematodes**

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The mutual interactions between symbiotic bacteria of 5 isolates of Entomopathogenic nematodes, specifically *Xenorhabdus* spp, and 2 isolates of Entomopathogenic fungi were investigated in vitro. A dual culture assay was conducted using nutrient agar supplemented with bromothymol blue and triphenyltetrazolium chloride (NBTA) medium. The findings revealed that *X.* spp exerts antagonistic effects on *Metarhizium anisopliae* and *Beauveria bassiana* by inhibiting their growth and conidial production. In a subsequent laboratory experiment, a crude extract produced by *B. bassiana* and *M. anisopliae* was examined for its activity against *Xenorhabdus* spp. The results showed that the crude extract exhibited antibacterial properties towards *Xenorhabdus* spp. at a concentration of 1000 µg/ml, effectively inhibiting their growth on NBTA medium. However, no inhibitory effects were observed at lower concentrations of 100 and 10 µg/ml. Additionally, the impact of the crude extract of *M. anisopliae* on the dispersal of infective juveniles (IJs) of *Steinernema* spp was assessed on Potato Dextrose Agar (PDA) plates. Remarkably, the results indicated that even at the highest concentration tested (1000 µg/ml), the crude extract of *M. anisopliae* did not exhibit any toxic effects on the infective juveniles. In conclusion, these findings shed light on the intricate relationships between entomopathogenic nematodes, their bacterial symbionts, and entomopathogenic fungi. This knowledge may pave the way for innovative approaches in biological pest control, offering sustainable solutions to agricultural and environmental challenges.

**Keywords:** Antibacterial activity, Entomopathogenic fungi, Steinernema, Xenorhabdus

## Induction of Dormancy in Different Maturity Groups of Rice (*Oryza sativa* L.) Varieties

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Seed dormancy in rice is controlled by its genetic and environmental factors. It is necessary to prevent pre-harvest sprouting (PHS) which is more common in rainy season. The field and laboratory experiments were conducted at the Research plots of Department of Agronomy and Department of Seed Science and Technology, Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, respectively to induce dormancy in rice using maleic hydrazide (MH) during *kharif* 2018. Ten non-dormant, three moderately dormant, eight strongly dormant and nine very strongly dormant varieties were utilized for this study. The foliar spray of MH at different concentrations viz., 5000, 10000 and 15000 ppm were imposed at the time of flowering. 5 grams, 10 grams and 15 grams of MH was dissolved in 10% NaOH to prepare the 5000 (T<sub>1</sub>), 10000 ppm (T<sub>2</sub>) and 15000 ppm (T<sub>3</sub>) solutions of MH. The spray mixture was applied with sprayer @ 500 litres per hectare to wet the panicles completely at the time of 100% flowering stage. The control (T<sub>0</sub>) was maintained without foliar spray in each entry. The induction of dormancy was tested by conducting germination test immediately after harvest up to the stage where the germination had reached to Indian minimum seed certification standards (80%). The dormancy duration was computed as the period from harvest till the germination reached to 80% in each entry. The germination percentage was recorded at every 14 days, starting from 0 DFH (Days from harvesting) up to 56 DFH. The germination percentage was more in control and lower values were observed in seeds treated with MH @ 5000 ppm followed by 10000 ppm and MH @ 15000 ppm. The treatment of MH 15000 ppm was found most effective in inducing maximum of 48.00 days dormancy period. This was followed by MH 10000 ppm which induced 36 days dormancy and by MH 5000 ppm the induction was about 22.00 days. The non-dormant varieties recorded maximum

dormancy induction by MH compared to medium, strong and very strong dormant varieties. The MH dosage of 15000 ppm was found best followed by 10000 ppm and 5000 ppm in inducing dormancy.

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## **Speed Breeding in Wheat for yellow rust resistance *via* Doubled Haploidy and Molecular Marker Approach**

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The conventional breeding programmes requires years and generations for the development of homozygous lines. To accelerate the process of achieving the homozygosity, doubled haploids (DHs) production is an important biotechnological tool. Besides achieving homozygosity, the technique also allows transgene or mutation stabilization in the genome within a considerably shorter time. The production of doubled haploids in wheat and barley has proven to be a valuable tool for plant breeders, allowing the release of a number of new cultivars. Of the different techniques used for an efficient production of haploids, chromosome elimination is the most effective and widely used in wheat. The system of inducing double haploidy in wheat using the *I. cylindrica* approach for creation of DH in wheat and in use in crosses between triticale-wheat and wheat-rye hybrids was first described by Chaudhary et al. (2019). Thereafter, Patial et al. (2021) improved upon and standardised the *I. cylindrica*-mediated chromosomal elimination strategy for enhancing the effectiveness of doubled haploid production in wheat. Patial et al. (2022) also reported the creation of the first genetic stock “DH-1” employing the *I. cylindrica*-mediated elimination procedure. This research details the advancements made in developing wheat doubled haploid lines using molecular markers and *I. cylindrica*-mediated doubled haploidy approach.

# Impact Of Edible Flowers Infusion In Green Tea On Total Phenolic Content And Amylase Activity In Both Hot And Cold Brewing

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Floral infusion is a centuries-old tradition that involves steeping of dried edible flowers like lavender, chamomile, jasmine, rose petals and other flowers in hot water to make aromatic- calm beverage. Green tea, or *Camellia sinensis*, a universal secondly consumed beverage is well-known for its therapeutic potential. Green tea blend with floral infusions found to enhances flavor and offers aromatherapy benefits by boosting antioxidants and also aids digestion. The delightful fusion of green tea with flowers provides a complex taste, soothing aromas and potential health advantages. Thus, the study was conducted to assess the total phenolic content (TPC) and impact of flower blend on tea infusion on pancreatic  $\alpha$ -amylase activity in hot and cold conditions: Green tea (Control) and green tea was infused with two flower petals hibiscus and marigold in the ratio of 3:1:1. The Green tea leaves and green tea-floral blend infusion was prepared by two methods: one involved in hot infusion for 5 mins maintained at 95 °C, while the other was cold extract by continuously swirled for 2 hours in distilled water at room temperature. The results revealed that a TPC content in Green tea blended with flowers was 161.34 mg GAE/g and 105.74 mg GAE/g for hot infusion and cold extract. However, green tea (control) showed highest TPC content and was 251.67 and 194.67 mg GAE/g for hot infusion and cold infusion, respectively. The green tea marked inhibitory activity of pancreatic  $\alpha$ -amylase activity with IC<sub>50</sub> value at 5.44 and 15.83 mg/g of tea leaves and the floral blended tea infusion displayed lesser enzyme inhibitory activity with IC<sub>50</sub> concentration at 11.57 and 33.31 mg/g of sample in hot infusion and cold extract, respectively.



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The study revealed that Green tea had highest Total Phenol content and marked for improved  $\alpha$ -amylase inhibitory activity and thus a potent nutraceutical drink to manage diabetic condition. However, Green tea blend along with hibiscus and marigold petal infusion contained limited phenolic compounds and exhibited less  $\alpha$ -amylase inhibitory activity that could be an optional drink to add in diet as a refreshing beverage

**Keywords:-** Green tea, Floral infusion, aromatherapy benefits, total phenolic content, pancreatic  $\alpha$ -amylase inhibitory activity

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## Medicinal Importance of Gloriosa Lily

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Gloriosa lily (liliaceous) has been used to induce labour in the traditional Indian system of medicine and modern therapies. Its seeds and tubers content colchicines and colchicoside. Colchicines which inducing polyploidy in plants. The widespread use of its tubers only for medicinal purpose has led to its threatened state these two chemical has many medicinal uses its cures the disease as gout, treatment of small pox, cures pimples, anti-acres, beneficial for hair growth, cures diabetes, cures abdominal pain and constipation. Products made from it are - Diajeb Power of controlling diabetes, Barley sattu, saafi hair oil for active effect for removal of dandruff, and strengthens hairs. Now comes its utilisation section: in tools of plant breeding program, decoration {ornamental use}, medicinal and pharmaceutical use, cosmetic use, agricultural products. Export potentially of tuber is more beneficial. Italy is the biggest importer. Now considering all the above points we should promote the cultivation of gloriosa lily in our vidhraba region of Maharashtra state of India. Its having not only medicinal use but also have ornamental use its having economically supportive require no hard and fast cultivation.

**Keywords:** Gloriosa lily, Colchicine, Medicinal, Pharmaceutical & Vidhraba.

## **Influence of stage of harvest on storability of soybean varieties**

**Gnyandev.B, Sunilkumar.N.M & Ningdalli Mallikarjun**

Krishi Vigyan Kendra Bidar

In any seed production programme storage of seed from harvest to next planting season assumes greater importance; soybean is predominantly a kharif crop after harvesting seeds are to be stored nearly 8-10 months without affecting the quality of seed. Therefore one has to store the seeds in good condition as the "seed saved is seed produced" an adage still holds good even today's modern agriculture.

A research study was conducted to determine the most appropriate stage of harvest to store the soybean seed for longer period. The experiment was conducted at agricultural Research Station Bidar during 2019-20, seed quality parameters studies done at seed unit, ARS, Bidar for 9 months. The study includes two varieties namely JS-335 and DSb-21 the both varieties crop were harvested at 80, 85, 90, 95 & 100 (DAS) days after sowing. The seeds harvested as per the treatment combination from field and stored seeds in ambient storage condition. The observations were at initial, 3, 6 and 9 months after storage. Irrespective of harvesting stages the moisture content of the seed, 100 seed weight, germination percentage, seedling length, seedling dry weight, vigour index were decreased gradually with increase in storage period but the electrical conductivity of seed leachates was increased gradually in storage period.

Among harvesting stages 85 DAS in JS-335 variety maintained the satisfactory germination percentage up to 9 months, whereas in case of DSb-21 90 DAS treatment maintained the highest germination % (72.1) with maximum seedling length, dry weight, vigour index and lesser Electrical conductivity. Hence it is recommended that for better storage seed crop should be harvested at appropriate stage (physiological maturity) to maintain better quality up to next sowing season and also suggested that the seed should be stored under proper storage condition.

# Poverty Alleviation in India: The Role of Agriculture

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A state of deprivation is poverty. In absolute terms, it shows a person's capacity to meet a set of minimal requirements for a consistent, healthy, and moderately productive life. Global research have revealed that the agricultural industry is more successful than other industries at eliminating hunger and poverty. Growth in agriculture benefits both rural and urban poor by increasing the amount of food available and lowering food prices. Because they have few assets and no skills other than manual labour to sell, the poor typically face many barriers in connecting with the non-agricultural economy for jobs, whereas agricultural growth can provide them with jobs close to where they live. This is because the poorest households typically rely more on agriculture for farming or employment. According to studies, increases in agricultural productivity have increased rural incomes in two ways: by directly raising farmer incomes and, most important for the poorest, by raising job and pay options. The agriculture industry is the foundation of an economy that gives the basic ingredients to mankind and now the raw materials for industrialization.

For the majority of developing nations, poverty is a major concern. Poverty reduction involves both the agricultural and non-agricultural sectors significantly. However, in an agrarian economy like India, where the bulk of the poor rely on this sector for their survival, agriculture makes a significant contribution to the elimination of poverty. Agriculture has characteristics that make it a crucial step in the growth process. It promotes growth in other areas in addition to assisting with revenue generation inside the industry. It contributes to development in a variety of ways, including by offering a means of subsistence, environmental services, and economic activity, making the sector a unique tool for development.

**Keywords:** Poverty, industrialization, agrarian economy, environmental services, economic activity,

## **Influence of stage of harvest on seed yield and quality in soybean varieties**

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Soybean (*Glycine max. L.*) is an important annual crop in the world and is called the wonder crop of the 20<sup>th</sup> century, soybean is classified as an oil seed crop rather than pulse by the UN FAO and is popularly known as meat of fields in china, and this is called miracle crop because of highest protein content and oil content. The world 30 % of edible oil is comes from soybean in the world. Simply by using quality seed we can achieve the 15-20 % excess yield. Major constraint in soybean seed production is the loss viability during storage, of course short shelf life of soybean seed, storability of seed is mainly a genetic characters and it is influenced by pre storage history of seed, seed maturation and environment factors during pre and post harvest stages. As such harvesting of seed crop at optimum stage of seed maturation is essential to obtain better quality. Harvesting of seed crop is a crucial factor as it directly impacts on seed quality. Soybean seed with a thin seed coat, high protein, and oil the embryo place outwards is susceptible during threshing operations as the seeds are being rubbed. There is need to ascertain the optimum stage of harvesting to obtain higher quality seeds.

A field experiment was conducted at Agricultural Research Station Bidar during kharif 2018 and 2019 to determine the most appropriate stage of harvest on seed yield and quality characteristics of soybean in JS-335 and DSb-21 varieties. The research plots were laid out in replication using factorial RCBD design. Accordingly stage of harvest treatments crop were harvested at 80,85, 90, 95 & 100 days after sowing (DAS) in both variety, the threshing of seed crop were done by manual with beating by stick and threshed. The results revealed that among harvesting stages JS-335 variety seeds harvested at 85 DAS showed highest seed yield and quality characters than the early and delayed harvesting stages. Likewise in case of DSb-21 variety the crop harvested at 90 DAS recorded highest seed yield and quality parameters compared to other stages of harvest.

## Flowers-The Hub for Novel Nutraceuticals

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Nutraceuticals have received considerable interest because of their presumed safety and potential nutritional and therapeutic effect. Nutraceutical is any substance that may be considered a food or part of a food and provides medical or health benefits, encompassing, prevention and treatment of diseases. The term “Nutraceutical” was coined by combining the terms “Nutrition” and “Pharmaceutical” in 1989 by Dr. Stephen DeFelice, Chairman of the Foundation for Innovation in Medicine.

Flowers are not only grown for aesthetic purpose, but also have some nutritive and medicinal properties. Flowers, as a natural resource, have been attracting more and more attention owing to their great potential for novel nutraceuticals. The considerable nutraceutical activity in terms of antioxidant power of flowers derived from their richness in general phenolic compounds. This biological activity is proportional to the content in carotenoids, flavanoids, (especially anthocyanins), simple phenolic acids and also vitamins and essential oils. Flowers nutritional value is provided by the pollen (rich in proteins and amino acids), nectar (rich in sugars), and corolla tissues (rich in pigments, vitamins, and microelements)

Similar nutraceutical activities have been demonstrated in a wide range of species that are “functional” to particular pathologies such as hypoglycemic, antimicrobial, anti-alzheimer, the prevention of liver injury, analgesic, anti-obesity, visual health, neuroprotective, anti-bacterial , anti-obesity, and diuretic properties. They can also help combat cardiovascular diseases. Utilization of edible flowers to develop functional foods is increasing day by day in global food and pharma industry which has

opened immense opportunity for the rise of the edible flower market. Hence flowers have opened new possibilities in alleviation of malnutrition, diversification of agriculture, an alternative source of income as well as the rescue of wild edible flower species threatened by anthropogenic activities.

**Keyword:** Nutraceuticals, flowers, industry etc.

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## **Influence of seed size on storage potential of soybean varieties**

**Gnyandev.B, Sunilkumar.N.M & Ningdalli Mallikarjun**

Krishi Vigyan Kendra Bidar

Soybean (*Glycine max L.*) is considered as a miracle crop because of its dual qualities like high protein and oil content in seed. In the world soybean growing in Brazil, Argentina and United States are projected to produce over 82% of the world's soybean. While though soybean is of China origin, China is leading importer 92 million metric tons per year. India is a marginal player in the world soybean occupies 11.4 million ha area and production is just over 11.5 million tons in 2016 as against the world's estimated soybean production of 346 million tons. Our average productivity is around 1000 kilos per hectare. In India soybean established itself as a major rainy season crop. The major soybean growing states are Madhya Pradesh, Maharashtra, Rajasthan, Karnataka, Telangana and Chattisgarh. The crop is fast spreading in southern states soybean could play a significant role in improving socio-economic status of the farmers.

In any seed production programme, storage of seeds from harvest to next planting season assumes greater importance. Soybean is predominantly a kharif crop the seeds are to be stored for nearly 8-10 months without affecting the sowing quality of seed. Therefore one has to store the seeds in good conditions as the "seed saved is seed produced" an adage still holds good even today's modern agriculture. The storage study was carried out under ambient condition at Seed Unit Agricultural Research Station Bidar, involving two varieties namely JS-335 and DSb-21 and four size grades namely small, medium, big and bulk stored in cloth bag.

## **5<sup>th</sup> International Conference**

A storage study conducted at Agricultural Research Station Bidar involving 2 varieties namely JS-335 and DSb-21 during 2019-20 from the month of October 2019 to June 2020. The seeds were sieve graded in to small, medium big and bulk categories and stored them in cloth bag under ambient storage condition. The study revealed that both varieties maintained satisfactory germination as per the minimum seed certification standards up to 9 months. Among seed size grades groups no significant results were seen. However the smaller, medium and bulk sized seeds in both varieties were found better in storability than bigger one.

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# **Gender Inclusivity in Agribusiness: Empowering Women in the Agricultural Value Chain**

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In the realm of agribusiness, achieving gender inclusivity recognized as a critical imperative for sustainable and equitable development. The multifaceted dimensions of women's participation in the agricultural value chain, shedding light on their pivotal role in ensuring food security, economic growth, and poverty alleviation. Women comprise 33 per cent of the agriculture labour force and 48 per cent of the self-employed farmers in India. With growing urban migration by men, women are managing the agriculture sector. Women contribute to agriculture through multiple roles as cultivators, entrepreneurs, and labourers. The findings underscore the substantial contributions of women in both traditional and non-traditional roles within the agricultural sector. The study highlights that, despite facing systemic barriers, women display remarkable resilience and entrepreneurial spirit. Their involvement spans activities such as crop cultivation, livestock management, agro-processing, marketing, and entrepreneurship. Moreover, women often exhibit a high degree of innovation and adaptability in the face of changing market dynamics and environmental challenges. The traditional gender roles have shifted, and women are more involved in management positions. In addition to the nearly one million female growers serving as principal or secondary operators, more women are filling off-farm agricultural roles,

including sales and agronomy positions. The research identifies key enablers for enhancing women's participation in agribusiness, including access to credit, education, and technology and market linkages. It emphasizes the transformative impact of targeted capacity-building programs, which equip women with the skills and knowledge needed to thrive in the sector. Furthermore, the study explores the positive ripple effects of women's empowerment in agribusiness, extending beyond economic gains to encompass improved nutrition, education and healthcare outcomes for their families and communities. This underscores the catalytic role that gender inclusivity plays in achieving broader sustainable development goals. The study contributes valuable insights into the imperative of gender inclusivity in agribusiness. By illuminating the multifaceted contributions of women along the agricultural value chain. The research serve as a call to action for stakeholders across the agribusiness landscape to foster an environment that champions women's participation, thereby unlocking untapped potential for inclusive and sustainable growth.

**Keywords:** Agribusiness, Gender Inclusivity, Value chain and Entrepreneurs

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## **Heterosis and Combining ability study in Safflower for seed yield and its contributed characters**

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Safflower (*Carthamus tinctorius* L.) is one of the major edible oilseed crops grown in winter season in India. The first safflower hybrid released in India for commercial cultivation in all safflower growing regions was based on genetic male sterility system. Twenty two crosses were tested using line x tester design involving two cytoplasmic male sterile lines during rabi 2018, using Randomized block design with three replications. Twenty two crosses along with three checks 'A-1, PBNS-12,



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PKV Pink' were evaluated at the field of Oilseeds Research Unit, Dr. PDKV, Akola during rabi 2019-2020 to estimate extent of heterosis in safflower genotypes. Among all the crosses, AKS CMS 2A x GMU 1183 (46.15 % and 44.30%) exhibited highly significant and positive average heterosis for number of seeds per plant over mid and better parent. crosses, AKS CMS 2A x GMU 184 (49.26% and 34.44%) exhibited highly significant and positive average heterosis for 100 seed weight, whereas, cross AKS CMS 2A x GMU 5149 (15.28% and 9.32%) exhibited highly significant and positive average heterosis for volume weight. The highest heterosis and heterobeltiosis in desirable direction were recorded for seed yield per plant in AKS CMS 2A x GMU 1654 (246.96. %) and the cross AKS CMS 3A x GMU 1183 (206.75%) showed highest and significantly positive standard heterosis over the checks i.e. PKV PINK, AKS 207 and PBNS-12.

However, GMU 1654 (54.839) and GMU-1183 (24.606) among the tester and AKS CMS 2A (0.029) among the lines were found to be good general combiners for most of the yield contributing characters. Cross AKS CMS 3A x GMU 1183 (4.812) showed highest SCA effect for seed yield effect. Cross AKS CMS 2A x GMU 1894 (4.985) showed highest SCA effect for days to 50 per cent flowering, cross AKS CMS 3A x GMU 880 (4.061) showed highest SCA effect for days to maturity, cross AKS CMS 2A x GMU 880 (6.121) showed highest SCA effect for number of seed per capitula, crosses AKS CMS 3A x GMU 1654 and AKS CMS 3A x GMU 7593 (0.515) showed highest SCA effect for 100 seed weight and cross AKS CMS 3A x GMU 7363 (3.100) showed highest SCA effect for volume weight. CMS system has been found to be the most effective and practical approach for developing safflower hybrids. As hybrid technology has been perfected in safflower, current emphasis is on developing high yielding hybrids in this crop.

**Keywords:** Safflower, Heterosis, Heterobeltiosis, GCA and SCA

## An Evaluation of Host Preference for Giant African Snail

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The African snail *Achatina fulica* (Bowdich, 1822), originally from Africa, was introduced in India from Mauritius in 1858 and since then became an important pest, because of its resistance to abiotic conditions, hermaphroditism, polyphagous and absence of natural enemies. Giant African Snail is second worst invasive alien species in the world. During July-August 2022 Sevier outbreak of giant African snail were occurred in Marathwada region of Maharashtra. In this context, laboratory experiment was carried out at department of Entomology, College of Agriculture, Parbhani to find out host preference by giant African snail during *Kharif* 2022. Seven treatments (Mulberry leaves, Papaya leaves, Cabbage, Coriander, Spinach, Papaya Fruit, Banana Fruit) i.e., hosts were selected for evaluation of preferred food material by Giant African Snail. Hundred grams of each food material were offered to assessment. Among the treatment Coriander found most preferred host by Giant African Snail due to its high succulent nature, which were followed by cabbage and mulberry leaves. High moisture, green and leafy vegetative part was most preferred. Banana Fruit and Papaya Fruit were found less preferred by snail.

**Keyword:** Host preference, Giant African Snail, Coriander, Cabbage, Mulberry.

## Hydroponics Technology

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As per the Food & Agriculture Organization (FAO), the world population reaches to 9 billion in 2050. Increase in population brings out great challenges such as to meet the demand for food as cultivable land is being lost due to climate changes, water scarcity, among other factors. Hydroponic is an agricultural technology that dispenses with soil, which can be an alternative to address the above problem. India, a developing country has to establish a balance between agricultural growth and economic wealth. Hence, India, requires latest technology such as hydroponics to enhance agriculture. The aim of this project is to design and construct a hydroponic system which is fully automatic that can be integrated into the agriculture curriculum while introducing business skills. Poor soil fertility, less chance of natural soil fertility, frequent drought conditions and unpredictability of climate change and weather conditions, river pollution, reduction in ground water level, etc. are threatening food production under soil – based agriculture. Naturally, soil less cultivation is becoming more prevalent in present scenario. In soil less cultivation i.e; hydroponics, plants are raised without soil. Improved space and water conserving methods of food production under soil-less culture have shown some promising results all over the world. Modern agriculture is the future of the world to meet the demands for food grains. Hydroponics technology is one such method of modern agriculture which assess the food security as well as to increase the economic wealth in agriculture sector in the country.

## ***In vitro* effect of different culture media on cultural characteristics of *Sclerotium rolfsii* Sacc causing stem rot of groundnut**

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Groundnut (*Arachis hypogaea* L.) is an important oilseed crop commonly cultivated worldwide in tropical and subtropical regions. In India, stem rot occurs in all groundnut growing states, particularly more severe in Gujarat, Maharashtra, Madhya Pradesh, Odisha and Tamil Nadu. The pathogen has a wide range of host. *S. rolfsii* can colonize either living plant tissues or plant debris. Deeply buried sclerotia survive a year or less while those near soil surface remain viable for many years. The mycelial growth produced on all the culture media was abundant except Czapek's dox agar (78.33 mm). Appressed white, thick mycelia with dense cottony, raised colony were produced on Potato sucrose agar (90.00 mm), Potato dextrose agar (90.00 mm), Oat meal agar Oat meal agar (89.33 mm) and Sabouraud's dextrose agar (89.67 mm). While Conn's agar (88.33 mm), Richard's agar (85.67 mm) and Czapek's dox agar (78.33 mm) showed fluffy, flat colony, smooth margin. Yeast extract agar (83.67 mm) and Corn meal agar (87.00 mm) showed thin mycelia with flat colony and smooth margin.

**Keywords:** Groundnut, *Sclerotium rolfsii* Sacc., culture media, cultural characteristics

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## **Integrated nutrient management**

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Integrated nutrient management in plant nutrition by combining nutrients through different sources {chemical fertilizers, organic fertilizers viz., farmyard manure, oilcake, composts, vermicompost} has drawn the attention of researchers to minimize the dependency of fertilizers for sustainable production. Integrated use of manures, fertilizer, micronutrients and chemical fertilizers helped curtail the quantity of costly fertilizer to considerable extent without reducing the yields, besides the improvement in soil-health for sustainable-productivity of several crop(s)/cropping system(s). It is evident that application of balanced dose of all essential major nutrients along with other secondary and micro

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nutrients proved to be optimum for enhancing the seed yield of sesame depending on the agro climatic conditions of the growing region.

However, use of chemical fertilizers alone increase the crop yields in the initial year but adversely affected the sustainability at later stage. Furthermore, the chemical fertilizers are in short supply, derived from non-renewable sources of energy and are costly. Under these constraints, bio inoculants are the route to alternative strategy and many workers reported the beneficial effects of integrating bio fertilizers on crop growth, yield and maintenance of soil fertility. Alleviation of poverty and achievement of zero-hunger target and food security are significant challenges faced by agricultural planners worldwide. Improving many agronomic approaches, which have drastic effects on crop growth and yield, is urgently needed to report this aim. Replacement of a part of chemical fertilizers by organic manure through a simple technique of using minimum effective dose of sufficient and balanced quantities of organic and inorganic fertilizers in combination with specific microorganisms, called INM, has a bright solution in this area. Under the heading of INM practices, many subheadings can be introduced, including the use of farmyard manures, natural and mineral fertilizers, soil amendments, crop residues, and farm waste recycling, agroforestry, green manures, and compost.

The key component of the INM goal is to reach the most effective and homogeneous combination that could lead to good management and be an effective target of the fertilizers, sufficient and balanced use of their quantity and quality, and be straightforwardly uptaken by plants for higher yield without jeopardizing soil native nutrients or polluting the environment. It is ultimately viable to achieve such a target through the wise application of integrated nutrient management (INM) approach, which is known as a balanced mixture of organic, inorganic, and bioorganic microorganisms in combinations in different practices.

**Keywords:** Balanced dose, sustainability, integrating, homogeneous combination.

# Innovative Approaches to Enhance Farm Income: A Comprehensive Analysis

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Agricultural communities around the world face growing challenges to secure sustainable incomes while ensuring food security and environmental stewardship. This paper explores a range of innovative approaches that have been developed to boost farm income. It addresses the issue's multifaceted nature by examining strategies encompassing diversification, technology adoption, value chain optimization, and sustainable practices. It highlights successful case studies and research findings that demonstrate the potential of these approaches to empower farmers and enhance their economic well-being. The paper delves into the role of diversification, showcasing how farmers are expanding their revenue streams through the cultivation of high-value crops, livestock rearing, agroforestry, and ecotourism. Technological advancements are explored, with a focus on precision agriculture, IoT applications, and data-driven decision-making, all of which contribute to increased productivity and profitability. Moreover, the review discusses the significance of adopting innovative business models, such as cooperative farming, direct-to-consumer marketing, and niche market targeting, to capture more value from agricultural products. A critical aspect of the paper is the emphasis on sustainable practices that not only enhance farm income but also ensure long-term ecological balance. Conservation agriculture, organic farming, and regenerative practices are examined in the context of their positive impacts on both economic and environmental dimensions. In summation, this comprehensive review offers a panoramic overview of a diverse range of strategies poised to revolutionize the income landscape of the agricultural sector. By embracing innovation, farmers can secure their livelihoods while contributing to a more robust and sustainable global food system.

**Keywords:** farm income, diversification, innovation, Conservation agriculture

# **Innovative approaches to increase the farmers' income**

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The target of doubling farmers' income in a short period requires identification of the sources of income growth and enabling conditions for harnessing their growth potential. Agriculture is the main source of farmers' income in India, and in this paper, we examine the sources of agricultural growth, and suggest technological, institutional policy options for making agriculture a remunerative enterprise. Technology is identified as one the most important sources of growth, and there are sufficient evidences to show that investment in agricultural research yields good dividends. There exist huge gaps between realized and potential yields of most crops that can be bridged to a large extent by enhancing farmers' access to key inputs, irrigation, markets, credit and extension services. Diversification of production portfolio towards high-value crops has considerable potential to accelerate growth in agriculture and farmers' income. However, extreme volatility in prices acts as disincentive to adopt productivity-enhancing technologies and diversification. Post-harvest management and small-scale processing would help farmers capture benefits of value addition. Effective coordination between centre and states is important in mainstreaming and channelizing policies and investment to achieve the target of doubling farmers' income.

**Keywords:** Farmers' Income, Total Factor Productivity, Yield Gap, Irrigation, Diversification, Prices

## **Impact of Cluster Front Line Demonstrations on Productivity and Profitability of Redgram in Karimnagar District of Telangana**

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The cluster frontline demonstrations on Redgram were conducted by Krishi Vigyan Kendra, Jammikunta during 2017-18 to 2019-20 on *Kharif* season covering 90 ha area with 225 demonstrations in total 6 villages with 6 clusters in Karimnagar district of Telangana. Improved technologies consisted use of the high-yielding variety, Seed treatment with bio-fertilizers, Integrated nutrient and weed management, and Pest and disease management. The results revealed that the highest grain yield was obtained in the demonstrated plot with an average of 1350 kg/ha compared to 1115 kg/ha in farmer's practice. Higher average net return (Rs.49,731/ha) were obtained in the demonstration plots compared to farmers' practice plots (Rs.34,815/ha).

The average increase in the demonstration yield over farmers' practice was 23.79 percent and the net returns increase over farmers' practice was 42.81 percent. The average technology gap of 216 kg/ha whereas the average extension gap of 235 kg/ha and the average technology index of 13.54 percent was recorded.

## **Population fluctuation of jassids infesting okra with different sowing dates**

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The field experiment was carried out on population fluctuation of jassids infesting okra with different sowing dates during *rabi-summer* season of 2016-17 at Agronomy Farm, College of Agriculture, Dapoli. The results revealed that there were marked differences in infestation of jassid population. The initiation of jassids infestation was started from 4<sup>th</sup> week after sowing at each sowing dates. During cropping season at different sowing dates, the mean infestation varied from 0.71 to 4.04 per three leaves per plant. Minimum jassids infestation ( $0.71 \pm 0.94$ ) was recorded in S<sub>1</sub> (12<sup>th</sup> -18<sup>th</sup> Nov.,) sowing date in 5<sup>th</sup> SMW (29<sup>th</sup> Jan., - 4<sup>th</sup> Feb., *i.e.* 11 weeks after sowing), while maximum ( $4.04 \pm 1.40$ ) infestation was recorded during 18<sup>th</sup> SMW (30<sup>th</sup> April - 6<sup>th</sup> May *i.e.* 6<sup>th</sup> weeks after sowing) in S<sub>6</sub> (26<sup>th</sup> Feb., - 4<sup>th</sup> March) sowing date. In S<sub>1</sub> (12<sup>th</sup> -18<sup>th</sup> Nov.,) BSS ( $r = -0.719^*$ ), S<sub>2</sub> (3<sup>rd</sup> - 9<sup>th</sup> Dec.) morning relative humidity had ( $r = 0.765^*$ ), S<sub>4</sub> (15<sup>th</sup> - 21<sup>st</sup> Jan.) minimum temperature and BSS ( $r = -0.892^*$  and  $r = 0.889^*$ ) and S<sub>6</sub> (26<sup>th</sup> Feb., - 4<sup>th</sup> March) minimum temperature and evening relative humidity had ( $r = -0.713^*$  and  $r = -0.746^*$ ) significant correlation between various weather parameters with mean infestation of jassids and sowing date and showed that the remaining various meteorological parameters were found to be non-significant. Whereas in S<sub>3</sub> (24<sup>th</sup> - 31<sup>st</sup> Dec.) and S<sub>5</sub> (5<sup>th</sup> - 11<sup>th</sup> Feb.) sowing date all weather parameters were found to be non significant.

**Keywords:** Seasonal incidence, jassids, weather parameters, correlation, sowing dates etc.

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## Exploring the Potential of Climate-Smart Fruit Crops

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As the global climate continues to change at an unprecedented rate, agriculture faces numerous challenges, including shifting weather patterns, increased pests and diseases and altered growing conditions. In this context,

the cultivation of climate-smart fruit crops emerges as a promising solution to ensure food security and sustainable agricultural practices. Climate-smart fruit crops are a diverse group of plant species that exhibit remarkable adaptability to changing climatic conditions. They offer multiple advantages in the context of a warming world. The cultivation of fruit crops like dragon fruit, phalsa, pomelo, bael, wood apple, aonla, karonda, barbados cherry, pomegranate and fig offers a promising pathway to address the challenges posed by climate change in agriculture. Their adaptability, nutritional value and economic potential make them valuable assets in ensuring food security and sustainability in an evolving climate landscape. These crops exhibit traits such as drought tolerance, disease resistance and the ability to thrive in variable temperature conditions. Furthermore, they often require fewer inputs, such as water and synthetic fertilizers, making them environmentally friendly. One of the key aspects of climate-smart fruit crops is their role in mitigating climate change. Through carbon sequestration in their biomass and soil, these crops act as carbon sinks, helping to offset greenhouse gas emissions. Additionally, their ability to grow in diverse agro-ecological zones encourages sustainable land use practices, reducing deforestation and habitat destruction. In the context of global food security, climate-smart fruit crops offer a diverse and nutritious source of sustenance. They are rich in essential vitamins, minerals and antioxidants, contributing to improved diets and better health outcomes. Moreover, their adaptability to varying climate conditions ensures a stable food supply in the face of climate-related disruptions. However, realizing the full potential of climate-smart fruit crops requires multi-faceted efforts. These include investment in research and development to bred new varieties with enhanced resilience, the dissemination of knowledge and best practices to farmers and the development of supportive policies and incentives to encourage their adoption.

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## **Resistant Gene Analogue Marker(S) Screening against Yellow Mosaic Disease in Mungbean [*Vigna Radiata* (L.) Wilczek]**

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Using the disease grading system, 100 genotypes of mungbeans were tested in the field for yellow mosaic disease resistance during Rabi 2021-2022. The yellow mosaic disease was resistant to 49 of the 100 mugbean genotypes, Moderately resistant to 22, Moderately susceptible to 11, susceptible 3, and **Highly susceptible** to 15 of the genotypes. According to BLAST tool results, the sequenced virus has a 98.94% similarity to the entire coding sequence of the MYMIV-Mb02 coat protein (AV1) gene from the mungbean yellow mosaic India virus strain, accession number GQ387502.1. Consequently, the variant was given the accession number ON622515.1 and named mungbean yellow mosaic India virus isolates NAU-RJ coat protein gene segment. Six resistant (40 C, NMS-21-01, NMS-21-06, NMS-21-22, NMS-21-49, NMS-21-95) and six highly susceptible (GM 4, NMS-21-23, NMS-21-24, NMS-21-40, NMS-21-68, NMS-21-69), were studied in the current study. Nine pairs of RGA primers were used to screen six resistant and six susceptible genotypes of mungbean. This resulted in effective amplification of five pairs of RGA primers in all resistant genotypes, but not in all highly susceptible genotypes. According to the findings of this investigation, five pairs of RGA markers may successfully discriminate between the severely sensitive and resistant mugbean genotypes. These RGA markers can be used for mapping resistance gene and marker validation study because of their long-lasting YMV resistance.

**Keywords:** mugbean, MIYMV, RGAs, YMD, begomovirus and BLAST

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## Aspirations and Retention of Rural Youth in Agriculture

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The salient findings of the study with regard to the aspirations and retention of rural youth in agriculture were studied as dependent variables.

Correlation coefficient was worked out to ascertain the relationship between the independent variables such as age ( $r=0.185$ ), education ( $r=0.653$ ), farming experience ( $r=0.323$ ), land holding ( $r=0.449$ ), family occupation ( $r=0.420$ ), annual income ( $r=0.631$ ), social participation ( $r=0.378$ ), sources of information ( $0.509$ ), achievement motivation ( $r=0.444$ ), economic motivation ( $r=0.433$ ), self-confidence ( $r=0.391$ ), benefits accrued ( $r=0.641$ ) and training received ( $r=0.611$ ) had positive and significant relationship with aspiration at one per cent level. Similarly, family size ( $r=0.129$ ), had a positive and significant relationship with aspiration at a five percent level. The remaining variables viz., marital status ( $r=-0.065$ ) had a non-significant relationship with aspiration. The independent variables such as age ( $r=0.195$ ), education ( $r=0.661$ ), farming experience ( $r=0.294$ ), land holding ( $r=0.343$ ), family occupation ( $r=0.420$ ), annual income ( $r=0.503$ ), social participation ( $r=0.457$ ), sources of information ( $0.446$ ), achievement motivation ( $r=0.464$ ), economic motivation ( $r=0.304$ ), self-confidence ( $r=0.384$ ), benefits accrued ( $r=0.506$ ) and training received ( $r=0.546$ ) had positive and significant relationship with retention at one per cent level. The remaining variables viz., marital status ( $r=-0.054$ ) and family size ( $r=0.103$ ) had non-significant relationship with retention of rural youth in agriculture. Multiple regression analysis revealed that the coefficient of determination ( $R^2$ ) 66.73 per cent of the variation in aspiration of rural youth towards agriculture and 56.59 per cent of the variation in retention of rural youth in agriculture. It is worthy to mention here that out of the selected variables under the study education, farming experience and annual income had significant contributions in deciding rural youth aspiration and retention in agriculture. The sources of information and social participation also showed significant contributions in deciding rural youth aspiration towards agriculture. Family occupation, economic motivation and training received had significant contributions in deciding their retention in agriculture.

**Keywords:** Agriculture, Aspiration, Retention, Rural Youth, Maharashtra.

## **Influence of different nutrient management approaches on soil available nutrients under maize based cropping system in Vertisol**

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An experiment was carried out for 3 consecutive years during 2019-20, 2020-21 and 2021-22 at Zonal Agricultural and Horticultural Research Station, Babbur farm, Hiriyur, situated in Central Dry Zone (Agro-Climatic Region IV) of Karnataka. Studies conducted to investigate the influence of different nutrient management approaches on soil available nutrients under maize-maize cropping system in a Vertisol. The experiment consist of 4 treatments, viz., T<sub>1</sub> - Natural farming - Seed treatment with beejamrutha + ghana jeevamrutha @ 1000 kg ha<sup>-1</sup> before sowing + jeevamrutha @ 200 L ha<sup>-1</sup> @ 15 days interval + mulching at 30 DAS; T<sub>2</sub> - Organic farming - Seed treatment with *Rhizobium* + PSB + N equivalent basis of vermicompost; T<sub>3</sub> - Package of Practice - Seed treatment with *Rhizobium* + recommended dose of nutrients and FYM; T<sub>4</sub> - Farmers practice - FYM @ 7 t ha<sup>-1</sup> and 45: 115 kg ha<sup>-1</sup> N, P<sub>2</sub>O<sub>5</sub>, respectively in a randomized complete block design (RCBD) with 5 replications. The results revealed that application of organic manures such as vermicompost and FYM and concoctions like jeevamrutha and ghana jeevamrutha improved soil physical properties and soil organic carbon. Different nutrient management approaches did not have significant effect on soil pH, EC and free calcium carbonate content. The available N, P<sub>2</sub>O<sub>5</sub>, K<sub>2</sub>O and S status of soil increased significantly due to the incorporation of organic manures and bio fertilizers

with chemical fertilizers, whereas exchangeable calcium, magnesium and DTPA-extractable micronutrients did not vary significantly among different nutrient management approaches.

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## **Miyawaki forest- Restoration of urban and peri-urban environment**

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The climate change has adverse effects on plant, animal habitats and their food chains. The unpredictable natural disasters such as flood, drought, rise in sea level and melting of icebergs could affect both the community and the ecology of the region. The deforestation and degradation of natural resources carried out in the past leads to deterioration of wild plant species and animal kingdom. If we are addressing climate variations, that would be restoring forest ecosystems and recreating forests are the better solution. Since the creation of forests could take many years, Miyawaki method is a one such potential technique of restoring the forest and ecology as well. This technique of creating green cover in shorter span of time also gains importance across the continents. In the 1980s, Professor Akira Miyawaki introduced a new and innovative reforestation approach in Japan with the challenge to restore indigenous ecosystems, and maintaining global environments, including disaster prevention and carbon dioxide (CO<sub>2</sub>) mitigation by a theme “native forests by native trees”. Here, natural vegetation successional stages (from bare soil to mature forest) are practically forced and reproduced, accelerating natural successional times. For the first two or three years, the forest has to be watered and weeded, after which it becomes self-sustaining. After then, it's ideal to leave the forest as undisturbed as possible so that its ecology, including animals, can settle in. keeps the forest weed, plastic, and paper-free, Watering has to be done in once a week need to maintain a proper drainage system. In Miyawaki we are using only organic fertilizers with proper mulching.

**Keywords:** Akira Miyawaki, Miyawaki forest, deforestation, ecosystem and native trees.

## **IFS - A Success Story Of Innovative Young Farmer**

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This paper discusses about the success story of farmer practicing Integrated Farming System (IFS) for sustainable livelihood. Present study was conducted during 2018-19 in Bayyaram village of Bayyaram mandal in Khammam district of Telangana State. A case study approach was followed to document the success of IFS farmer. Mr. Vidyasagar hails from Bayyaram village of Bayyaram mandal in Khammam district of Telangana State. He adopted different IFS components such as Horticulture, Dairy, Poultry, Piggery and Fishery units. He is hardworking nature, an innovator and motivated young farmers. He closely supervised multiple enterprise units and followed new technologies in IFS to get sustainable livelihood. He used new methods of cultivation in IFS and believed that diversification with various components of farming systems results in desired profitability for IFS farmers. Hence, integration of different components with higher input recycling increased farm productivity of different components and also he was able to provide employment opportunities to other farmers through IFS.

**Keywords:** Integrated Farming System, input recycling, higher income, success

# Microgreens : A Homestead Vegetable, Production Option for Food and Nutritional Security

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According to current data and research nearly about 50-60% Indians say access to nutrition is a challenge. Due to rush schedule, globalization and pollution people face many problems, in which nutritional insecurity is one of the serious concern. A balanced diet is key to good overall health, increased productivity and protection from illness. The major steps are taken to mitigate nutritional insecurity is through biofortification and genetically engineering crops are used.

Now a days microgreens gained popularity in upscale market and restaurants. Microgreens are a tiny form of edible greens produced from the seeds of vegetables, herbs or other plants. The first documented use of the word 'microgreens' in USA. They are not the same as sprouts.

Microgreens are grown in soil, cocopeat or on a micromat growing pad to a stage of development in between a sprout and a baby green. Microgreens have much stronger, more developed flavors than sprouts. They contain their dense nutritional value but are topped off with an extra boost of life sustaining chlorophyll. Brassicaceae and amaranthaceae majority of species used in current microgreen production. Studies have proven that microgreens contain from 4 to 40 times more vitamins, enzymes, minerals, antioxidants and beneficial properties than its equivalent product grown to maturity. Microgreens deliver nutrients that are important for eyes, skin, bones, healthy digestion, reducing inflammation, preventing cardiovascular diseases, fighting cancer and strengthening the immune system.

**Keyword:** Microgreens, super food and nutritional security



# **Assessment of Half-sib progenies with Seed Parameters and Morphological Variation in *Sapindus emarginatus* Vahl. in Northern Dry Agroclimatic zone of Karnataka**

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Indian forests exhibit rich biodiversity across all states, despite variations in species diversity. The evolution of forest trees for breeding purposes presents a challenging aspect of forestry due to time constraints and the adaptability of genetic resources to diverse climatic conditions. The unscientific collection of non-timber forest products (NTFPs) leads to the erosion of valuable genetic resources within their original habitats. In light of these concerns, efforts have been made to collect seed sources from different parts of Indian states for the analysis of seed source variation in Soapnut (*Sapindus emarginatus*) and the evaluation of half-sib progeny. A survey was conducted to gather genotypes of Soapnut to aid in the adoption of high-yielding sources in the agroforestry systems of Karnataka. Soapnut (*Sapindus emarginatus*) is one of the most sparsely distributed non-timber forest products with wide adaptability in various agroclimatic zones of India. Its pericarp contains a significant amount of saponin, which finds wide applications in the pharmaceutical and detergent industries, meeting the demand for plant-based products derived from Soapnut. To capitalize on the advantages of high fruit yield and higher saponin content, there is a need for the assembly, screening, evaluation, and mass production of superior genotypes. This approach encourages sustainable consumption practices by minimizing wild Soapnut harvesting and compensating for it through agroforestry and industrial plantations outside of natural forests, thereby reducing anthropogenic impacts on these ecosystems. For the identification of suitable seed sources, 22 different locations were selected, and seeds were assembled for the screening of high-quality seeds to establish a Half-Sib Progeny, with the idea of

converting it into a Seedling Seed Orchard (SSO) at AICRP, College of Agriculture, UAS, Dharwad. A reconnaissance survey was carried out, and seed sources were collected from various regions, including Andhra Pradesh (1), Assam (1), Karnataka (13), Maharashtra (2), Gujarat (1), Uttarakhand (1), Himachal Pradesh (2), and West Bengal (1). Selected Soapnut Candidate Plus Trees (CPTs) were observed for morphological traits of the trees and fruiting intensity during the fruiting season. The recorded morphological attributes for mother trees included total height (meters), girth at breast height (meters), clear bole height (meters), crown width (meters), and the number of branches. Matured fruits were collected from three different heights and four directions on the trees. Significant variations in morphological traits were observed among the different seed sources, including fruit length, fruit width, 100-fruit weight, fruit colour, fruit shape, 100-seed weight, and the fruit-to-seed ratio.

**Keywords:** Tree improvement, Half-sib, Genotype, Saponins, Morphology, Traits

**GIRDAHA/AB/2023/199**

## **Role of Floriculture in Textile Industry**

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In India huge amount of flowers are cultivated and used for various purposes such as for decoration and offering to god. Apart from this a survey report revealed that almost 40 % of flowers are unsold and wasted and thrown in river which causes pollution but these flowers can be used to extract dye which can be used as floral dye for colouring textile. Textile processing industry is one of the major environmental polluters as the effluent from these industry contain a heavy chemicals including synthetic dyes used during textile processing. To reduce the environmental pollution due to these synthetic dye processing industry, one should use

natural dyes obtained from flowers which is eco - friendly and renewable. Now a days people make use of fabrics which are dyed with synthetic dyes and this fabric dyed with synthetic dye causes skin allergies and disease like cancer , so as to avoid such problems like skin allegeris and cancer we should make use of fabrics which are dyed with natural floral dye.

**Keyword:** floral dye, Textile, industry etc.

GIRDAHA/AB/2023/200

**Effect of Seed Sources Variation on  
Morphological, Germination parameters and  
Physical Properties and GC-MS analyses of  
Essential oil in *Sapindus emarginatus* Vahl.  
Candidate Plus Trees (CPT's) of Karnataka**

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Tree domestication and tree breeding for process of introducing quality sources of species from its natural habitat to new environment for its economic value and to increase the income for farming activities. In this view effort was made to collect seed sources from Different parts of Indian states to analyse variation in seed source Soapnut (*Sapindus emarginatus*) and adoptability for evaluation of half-sib progeny. Survey conducted to collection of genotypes of Soapnut to help adopting high yield source in agroforestry systems of Karnataka. Soapnut (*Sapindus emarginatus*) one of the most sparsely distributed non timber forest products wide adoptability in agroclimatic zones of India. The pericarp contains significant amount of saponin, which was wide application in pharmaceutical and detergent industry, to meet this demand Soapnut plant-based product. Advantage of high fruit yield and higher saponin yielding genotypes required for assemblage, screening and evaluation and mass production. This encourages to a measure of sustainable consumption, soapnut harvesting in

the wild should be minimized and compensated by agroforestry and industrial plantations grown outside of the forests, this will reduce anthropogenic effects on natural forest. For identification of seed source 25 different locations selected and the seeds sources was assembled in view of screening superior quality seeds for mass production. A reconnaissance survey was carried out and collected seed sources from 25 different locations of Karnataka. Selected Soapnut CPTs observed and recorded with morphological traits of the tree and fruiting intensity output during fruiting season. The morphological attributes recorded for mother trees *viz.*, Total height(m), GBH(m), Clear Bole Height(m), Crown width (m), Number of Branches. The matured fruits collected from three different heights and four directions of the trees. The significant variation in morphological traits were observed between the sources in terms of fruit length, fruit width, 100 fruit weight, fruit colour, fruit shape, 100 seeds wight, and fruit to seed ratio. Then different seed sources, treated with cold water soak for 24 hours and sown in nursery bed in randomization to test germination percentage, peak value of germination, mean daily germination, and germination value. Extraction of Essential oil by stem distillation method, varied across 21-24.5% in all 25 different seed sources. . The gas chromatography-mass spectrometry (GC-MS) analysis shows that essential oil of soapnuts collected from three different district of Karnataka contain following two compounds, e.g. 2,6-Octadiene-1-ol, 3,7- dimethylacetate (24.4) and 1,2-Benzenedicarboxylic acid, diisooctyl ester (46.5%) with equal composition and their retention time was 914 and 928, respectively. The comparative studies on physical properties of essential oil show almost similar properties. The result obtained in the present study could be use as reference for further studies. The all 25 different seed sources shown statistically significant values, which are helpful in selection of superior genetic resources for mass production of quality planting stock to produce high yield with good quality fruits.

**Keywords:** Half-sib, Genotype, Saponins, Morphology, Traits

## The role of soil biota in enhancing ecosystem services

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Soil microorganisms play a vital role in nutrient cycling, waste decomposition, and pollution detoxification. Biological degradation of soil, resulting from factors like intensive agriculture, deforestation, and pollution, disrupts these essential functions, threatening ecosystem stability. Studies have shown that land use practices, such as agroforestry and organic farming, can enhance microbial activity and restore soil health. Balanced fertilizer management and residue retention also contribute to healthier soil microbial communities. These sustainable practices mitigate biological degradation, safeguarding soil quality, environmental integrity, and human well-being. Understanding the intricate relationship between soil microorganisms and land management is crucial for ensuring the long-term sustainability of our ecosystems and agriculture.

**Keywords:** Soil microorganisms, Biological degradation, Deforestation and pollution

## **Nutritional Significance of Fish: Exploring the essential nutrients in fish for combating malnutrition**

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The nutritional importance of fish in the context of combating malnutrition holds significant potential as a strategic avenue for addressing global health issues. Malnutrition, characterized by deficiencies in vital nutrients, remains a critical concern affecting diverse populations. Fish is a nutrient-dense food source, and investigates its potential contributions to alleviating malnutrition. Wild-caught and aquaculture-derived fish are rich sources of essential nutrients crucial for human health. Abundant in high-quality proteins, fish provides ample amino acids necessary for growth, immune function, and cellular repair. Moreover, fish is renowned for its content of omega-3 fatty acids, including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), which confer cardiovascular advantages, neurological development, and anti-inflammatory properties. The importance of fish's micronutrients, such as vitamins D and B<sub>12</sub>, iodine, selenium, and zinc. These micronutrients play integral roles in maintaining bone health, supporting cognitive functions, regulating thyroid activity, and enhancing immune responses. Notably, the bioavailability of these nutrients from fish exceeds that of many plant-based sources, highlighting its potential to address nutrient deficiencies effectively. The versatility of fish consumption across cultural diets and its potential to bridge nutritional gaps for vulnerable populations, particularly in regions with limited access to diverse nutrient sources. As malnutrition is influenced by various socio-economic, cultural, and environmental factors, adopting a holistic approach incorporating fish's nutritional attributes could significantly address this challenge.

**Keywords** - Nutritional significance; Fish; Essential nutrients; Combating malnutrition; Omega-3 fatty acids.

## **Nitrogen dynamics and energetics in rice affected by crop establishment and precision nitrogen management**

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Although India has made considerable advances in agricultural research, the blanket recommendation of cultivation practices for adoption over larger areas is still in vogue. Such broad based 'blanket' recommendations of fertilizer nitrogen restrict efficient use to enhance productivity or reduce the yield gap for different regions. Innovative fertilizer management practices aimed at managing nitrogen efficiency must integrate both preventive and corrective strategies to sustain the soil resource base and increase the profitability, use efficiency and energy productivity across regions. It is therefore suggested that fertilizer application should be based on local variations of field sites. Thus, there is a need to investigate nitrogen management with a site-specific nitrogen approach in comparison to recommended practices in rice. These approaches need thorough testing or investigating in different rice establishment systems. In rice, site-specific nutrient management-based N management can be an important approach that can answer the questions of when, where and how much to apply nitrogenous fertilizers and their combination with other nutrients, synchronizing it with crop demand so as to acquire the maximum threshold level of yield, reducing environmental harms. In this context, a two-year field experiment was conducted in spilt-plot design with three rice establishment systems as main plots [aerobic, system of rice intensification (SRI) and conventional] and four nitrogen management approaches as subplots (soil test crop response-STCR, soil test fertilizer recommendation-STL, leaf colour chart-LCC and recommended dose of fertilizer-RDF) at College of Agriculture, Navile, Shivamogga, Karnataka in sandy loam soil of low N status. The results indicated that the nitrogen content and plant uptake, however, increased with the growth of the crop. Application of nitrogen through the STCR approach recorded the highest uptake at all growth stages, as the increase

in dry matter supports it. Again, the highest nitrogen uptake (98.23 kg/ha) for total biomass was found at 90 DAS/T compared to other nitrogen management approaches. This helps translocate photosynthate and is thus associated with maximum yield. Further, systems of establishment differed significantly in nitrogen content and uptake. The higher agronomic use and recovery efficiency were recorded by the STCR approach (5.64 and 0.24 kg/kg) as compared to STL (1.74 and 0.10 kg/kg) and LCC approaches (3.75 and 0.16 kg/kg). Energetics significantly influenced by different systems of establishment. The energy productivity measures energy utilization in an agricultural system. The highest energy productivity per unit of energy was obtained by the SRI system (581.14 g/MJ) compared to the conventional system (499.75 g/MJ) and aerobic (404.25 g/MJ). Similarly, the SRI system recorded significantly higher output energy (225626 MJ/ha) compared to conventional (207055 MJ/ha) and aerobic (147969 MJ/ha) systems. The STCR approach recorded higher output energy (209197 MJ/ha) and specific energy (2.30 kg/MJ). In comparison, the energy ratio (7.36) and energy productivity (544.63 g/MJ) were higher in the case of the RDF approach of nitrogen management.

**Keywords:** Site-specific nitrogen management, SRI, STCR, aerobic, energy productivity.



## **Aggregate stability in soils of Nandurbar district and their interaction with available nitrogen and soil organic carbon**

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The survey under titled "Studies on aggregate stability in soils of Nandurbar District and their interaction with available nitrogen and soil organic carbon" was conducted during 2019 to 2022. Total about 21 soil samples were collected from 0-15 cm depth and exact locations of samples site was recorded by GPS device. The results indicated that about 17 samples (80.95 %) reported low aggregate stability (MWD) and only 4 samples (19.05 %) reported good aggregate stability. While the bulk density of soil ranged from 1.27-1.50 Mg m<sup>-3</sup>. The organic carbon content, available nitrogen, phosphorus and potassium, ranged between (2.5 to 9.4 g kg<sup>-1</sup> soil), (145.5 to 215.9 kg ha<sup>-1</sup>), (8.2 to 22.4 kg ha<sup>-1</sup>) and (302.4 to 672.0 kg ha<sup>-1</sup>), respectively. Whereas, the Water Soluble Carbon (WSC), Soil Microbial Biomass Carbon (SMBC), Permanganate Oxidisable Soil Carbon (POSC), Particulate Organic Matter Carbon (POMC), Humic Acid Carbon, Fulvic Acid Carbon and Total Organic Carbon (TOC) were ranged from 2.24 - 6.28 mg kg<sup>-1</sup>, 138.52 - 440.87 mg kg<sup>-1</sup>, 432.00 - 614.25 mg kg<sup>-1</sup>, 1.42 - 2.93 g kg<sup>-1</sup>, 80.5 - 163.9 g kg<sup>-1</sup>, 61.5 - 133.2 g kg<sup>-1</sup> and 4.45 - 23.35 g kg<sup>-1</sup>, respectively.

**Kea Words:** - aggregate stability, Mean Weight Diameter (MWD)

## Nanoemulsion: Foundation of Nanonutraceuticals

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Nanoemulsion technology has emerged as a prominent part of interest due to its potential in facilitating the solubility, stability and bioavailability of nutrients, bioactive compounds and nutraceuticals. The small size and large surface area of nanoemulsion droplets contribute to their superior stability and potential for enhanced delivery of bioactive compounds. Nanoemulsions, a unique class of emulsified systems, have emerged as a promising technology in the field of nutraceutical enhancement. Nutraceuticals, bioactive compounds with health-promoting properties, have gained significant attention for their potential role in preventing and managing chronic diseases. However, their poor solubility, low bioavailability and instability limit their practical application. In this context, nanoemulsions, composed of nanoscale droplets of one immiscible liquid dispersed in another, have emerged as a promising solution to these challenges. This review presents a bird view of nanoemulsion technology and its applications in enhancing the delivery and effectiveness of nutraceutical compounds. Importantly, the state of nanoemulsion can able to improve the bioavailability of poorly soluble compounds. Meanwhile, nanoemulsions can act as controlled release systems, delivering nutraceuticals in a sustained and targeted manner. Also, this discussion will explore the factors influencing release kinetics, including droplet size, surfactant properties, and environmental conditions. At the end, the potential of nanoemulsions to release nutraceuticals at specific sites within the body, enhancing therapeutic effects are important targets of this technology.

**Keywords:** Nanoemulsion, Emulsified Systems, Bioavailability, Nutraceuticals

## **Agriculture Accelerator Fund: Fostering Innovation for Sustainable Farming**

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The Agriculture Accelerator Fund (AAF) is a dynamic financial initiative designed to catalyze innovation and drive sustainable development within the agricultural sector. Agriculture stands at a critical crossroads, facing the challenge of feeding a growing global population while mitigating the environmental and resource constraints of the 21<sup>st</sup> century. The AAF emerges as a timely solution to address these pressing issues by fostering entrepreneurship, technological advancements and sustainability within the agricultural domain. The AAF is to provide strategic financial support to startups, research projects and initiatives that aim to revolutionize various aspects of agriculture. These encompass precision farming, crop management, agri-tech innovations, sustainable practices and supply chain optimization. By offering funding, mentorship, and access to a vast network of experts, the AAF empowers visionaries and entrepreneurs to bring their agricultural solutions to fruition. The AAF operates on multi-faceted approaches as capital injection that is a core pillar of the AAF is the provision of capital to early-stage startups and research ventures. This funding enables these entities to develop and scale their innovations, ultimately contributing to increased agricultural productivity and efficiency. Mentorship and Expertise approach offers mentorship programs that connect entrepreneurs with industry veterans and experts. This knowledge exchange nurtures creativity, guides decision-making and accelerates the development of groundbreaking solutions. The AAF actively cultivates an ecosystem where collaboration and innovation thrive. By fostering partnerships between startups, research institutions and established agricultural players, the fund facilitates the integration of new technologies and sustainable practices into mainstream agriculture. The fund prioritizes projects and initiatives that emphasize environmentally friendly practices, resource conservation and resilience to climate change. The AAF impact on the agricultural sector is profound. By supporting the development and adoption of innovative technologies and

sustainable practices, the AAF contributes to increased agricultural productivity, reduced environmental footprint and enhanced global food security. It fosters job creation, economic growth and rural development in agricultural communities. AAF strategic investments, mentorship programs, and sustainability focus converge to empower visionaries and entrepreneurs to revolutionize the industry. As the world grapples with the challenges of feeding a growing population while safeguarding the planet, the AAF stands as a beacon of hope, driving innovation and sustainability in agriculture for a brighter future.

**Key words:** Agriculture Accelerator Fund, Sustainable Farming, Entrepreneurship

**GIRDAHA/AB/2023/207**

## **Role of Natural and organic farming in sustainable agriculture and environment security**

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Natural and organic agricultural methods are essential for fostering sustainable agriculture and guaranteeing the safety of the environment. These techniques provide a comprehensive strategy to deal with the world's urgent problems, including climate change, the depletion of natural resources, and growing worries about food safety. In natural and organic farming, soil health is prioritized. Instead of using artificial pesticides and fertilizers, they rely on organic substitutes like compost and crop rotation. In addition to increasing crop output, this sustainable soil management also stops soil erosion and degradation, assuring the long-term viability of agricultural fields. By using these methods, chemical contamination is decreased. Heavy reliance on synthetic chemicals, which can contaminate water sources, harm beneficial insects, and disturb ecosystems, characterizes conventional agriculture. By focusing on non-toxic pest control strategies, minimizing chemical runoff, and protecting biodiversity, natural and organic farming, in contrast, lowers these dangers. Organic farming encourages the preservation of biodiversity. Avoiding monoculture and supporting a variety of crops and habitats encourages a

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healthy ecosystem where natural predators manage pests, decreasing the need for chemical pest control measures. By preventing the extinction of species and maintaining genetic diversity, this strategy protects the fragile balance of nature.

In terms of climate change mitigation, organic farming shines as well. It promotes carbon sequestration through healthier soils, as organic matter locks in carbon dioxide. Moreover, it reduces energy consumption and greenhouse gas emissions associated with the production and application of synthetic inputs. Organic farming practices often favour local, seasonal production, reducing the carbon footprint of agriculture by diminishing the need for long-distance transportation and cold storage. This not only curtails emissions but also supports local economies and strengthens food security. Natural and organic farming practices are essential components of sustainable agriculture and environmental security. By prioritizing soil health, minimizing chemical pollution, conserving biodiversity, mitigating climate change, and supporting local communities, these methods offer a comprehensive solution to the challenges of modern agriculture. Promoting and expanding these practices is imperative to ensure a sustainable and secure future for both our food systems and the planet.

GIRDAHA/AB/2023/208

# **Response of heavy metals on biochemical studies and detoxification mechanism in chickpea genotypes under saline irrigation**

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Chickpea (*Cicer arietinum* L.) is the third most important food legume grown in the world and a favourite food crop in semi-arid parts of India with limited fresh water resources. In order to meet the food demand, increasing attention is being given to the use of non-conventional water resources such as saline/brackish water with heavy metals and treated waste water for irrigation. With this in mind, the effects of heavy metals on proline, SOD, CAT, POX and yield attributes in two chickpea

(*Cicer arietinum* L.) 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 (40-45 DAS) plants were exposed to single saline irrigation (Cl-dominated) of levels 2.0, 4.0 and 6.0 dS m<sup>-1</sup>. The control plants were irrigated with distilled water. Sampling was done at the flowering stage (80-85 DAS). SOD, CAT and POX increase significantly in both the genotypes with increasing levels of heavy metals in saline irrigation. The genotype HC-3 showed more amount of relative stress injury and lipid peroxidation of leaves and roots as compared to CSG-8962 with increasing the saline irrigation from control to 6.0 dS m<sup>-1</sup>. There was also abrupt rise in the proline cont with increasing saline irrigation level in both genotypes, the increase being more in HC-3 than CSG 8962. The yield and yield attributes like number of pods plant<sup>-1</sup>, number of seeds plant<sup>-1</sup>, 100 seed weight, biological and seed yield plant<sup>-1</sup> also decreased with increasing saline irrigation from control to 6.0 dS m<sup>-1</sup>. The reduction is more in CSG-8962 as compared to HC-3. Hence, the mechanism of heavy metals tolerance is relatively better in HC-3 than in CSG-8962 as found from biochemical and yield attributes studied. The genotype HC-3 can further be used in crop improvement programmes of chickpea for toxic ions/ heavy metals/ salt tolerance.

**Keywords:** Salinity tolerance; Chickpea; Plant water status

**GIRDAHA/AB/2023/209**

## **Effect of shading on drought and heat stress in lentil (*Lens culinaris* Medikus)**

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In the wake of global climate change, one of the utmost remarkable drivers of climate change affecting agriculture is the rising global temperature and water stress. Given the pace and volume by which greenhouse gases are getting into the atmosphere, global warming is likely to challenge global hunger index, including decreasing yields in lentil

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production. In the northern part of India, the long -term data analysis showed that the practice of long duration rice variety, which deplete soil moisture, delayed harvesting of crop and altered precipitation pattern is a concerning trend of lentil production. The reproductive stage is most sensitive stage of the cool season crop lentil which negatively impact their growth and development during this critical phase of their life cycle and overall production. There are several biochemical mitigation approaches has been used to reduce the biochemical and physiological impairment of crop at sensitive stage. Artificial mild Shading is one of the recommended strategies to mitigate the high temperature and water stress. However, very few studies are documented regarding shading in pulses, due to heat and water stress. Under shading condition, reduction of ambient heat of existing air, as the most of the energy are utilized by evaporation process, instead of going to sensible heat, therefore cool air temperature, known as evaporative cooling. Additionally, soil temperature is also lower the shaded area of about 4 °C less than air temperature from depth of 0.5 to 2 meters, by which soil residual moisture is comparatively conserved. Under shading, as a result of altered spectra, red light is decreasing but blue light is increasing, which boosts the electron transport of photosynthesis, gaseous exchange and rubisco activity. Shade condition, increasing the chl b quickly compare to chl a, resulting that higher concentration of chl b would enhance the fraction of antenna molecules in light harvesting complex II by which help in efficiently capture of blue light. It improved the redistribution of storage dry matter from vegetative organs into grains. In addition, under shading condition, physiological maturity has been delayed, which increases the time span of grain filling and proper relocation of storage dry biomass into grains from leaves and other part after flowering. As a consequence of this, average grain weight, grain yield per unit area were higher in pulses including lentil.

## **Influence of Tillage and Weed Management on Soil Properties and Yield of Wheat in Inceptisols**

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The present investigation was conducted during the year 2020-21 to study the “Influence of tillage and weed management practices on soil properties and yield of Wheat in Inceptisols” at Research Farm of All India Coordinated Research Project (AICRP) on Weed Management, Department of Agronomy, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The five weed control practices were superimposed in four different strips of tillage and randomized in strip plot design with three replications. The tillage operations consist of conventional tillage, reduced tillage, minimum tillage and zero tillage, while weed management practices includes application of post emergence weedicides, WM<sub>1</sub> (Sulfosulfuron + Metsulfuron), WM<sub>2</sub> (mesosulfuron + Iodosulfuron), WM<sub>3</sub> (Clodinafop + Metsulfuron), hand weeding and weedy check. The soils of the experimental plot were alkaline having low to medium organic carbon. The biological properties was estimated after eight and thirty days of spraying of weedicide (8 & 30 DAS). During this study, the individual and interaction effect of tillage and weedicide was evaluated.

Based on the results generated, the tillage and weed management has significant effect on various biological properties. DHA (25.05 & 34.05  $\mu$  g TPF  $g^{-1}$  24  $hr^{-1}$ ), urease (43.14 & 58.98 mg  $NH_4$   $kg^{-1}$  24  $hr^{-1}$ ) and alkaline phosphatase (81.27 & 125.52  $\mu$  p-nitrophenol  $g^{-1}$  24  $hr^{-1}$ ) was registered with minimum tillage that is treatment T<sub>3</sub>. In concern to weed management, the highest DHA (27.67 & 38.26  $\mu$  g TPF  $g^{-1}$  24  $hr^{-1}$ ), urease (45.94 & 59.57 mg  $NH_4$   $kg^{-1}$  24  $hr^{-1}$ ) and alkaline phosphatase (82.51 & 128.50  $\mu$  p-nitrophenol  $g^{-1}$  24  $hr^{-1}$ ) were noted in weedy check treatment where weeds were allowed to grow. The application weedicide may have temporary adverse impact on soil biology. It was observed that, the bulk density of soil was influenced and the lower bulk density (1.42  $Mg\ m^{-3}$ ) was noticed with minimum tillage, however the highest bulk density was registered with zero tillage (1.46  $Mg\ m^{-3}$ ). While in respect of weed



management the highest bulk density (1.45 Mg m<sup>-3</sup>) was noted where weeds were allowed to grow (weedy check).

The maximum grain yield (36.22 q ha<sup>-1</sup>) of wheat was recorded with conventional tillage while at the same time under weed management practices it was registered (38.74 q ha<sup>-1</sup>) with adoption of hand weeding. The minimum disturbance to soil through various tillage practices and adoption of hand weeding as against application of weedicide has evolved promising findings towards long term sustainability of soil. Therefore, the adoption of minimum tillage and hand weeding is the most convenient way to maintain soil biodiversity and productivity of wheat under rainfed agricultural system.

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## **Dehydration-induced alterations in chloroplast proteome of developing chickpea delineate interrelated adaptive responses**

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Chloroplast, the energy organelle unique to photosynthetic eukaryotes, executes several crucial functions including photosynthesis. While chloroplast development and function are controlled by the nucleus, environmental stress modulated alterations perceived by the chloroplasts are communicated to the nucleus via retrograde signalling. Notably, coordination of chloroplast and nuclear gene expression is synchronized by anterograde and retrograde signalling. The chloroplast proteome holds significance for stress responses and adaptation. We unravelled dehydration-induced alterations in the chloroplast proteome of a grain legume, chickpea and identified an array of dehydration-responsive proteins (DRPs) primarily involved in photosynthesis, carbohydrate metabolism and stress response. Notably, 12 DRPs were encoded by chloroplast genome, while the rest were nuclear-encoded. We observed a coordinated expression of different multi-subunit protein complexes viz., RuBisCo, photosystem II and cytochrome *b6f*, encoded by both chloroplast and nuclear genome. Comparison with previously reported stress-

responsive chloroplast proteomes showed unique and overlapping components. Transcript abundance of several previously reported markers of retrograde signalling revealed relay of dehydration-elicited signalling events between chloroplasts and nucleus. Additionally, dehydration-triggered metabolic adjustments demonstrated alterations in carbohydrate and amino acid metabolism. This study offers a panoramic catalogue of dehydration-responsive signatures of chloroplast proteome and associated retrograde signalling events, and cellular metabolic reprogramming

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## **Carbon Dynamics Under Organically Managed Cropping Systems in Semi Arid Agro Ecosystems**

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An investigation was undertaken to study the “Carbon dynamics under organically managed cropping systems in semi-arid agro ecosystems”. The experiment was initiated from the year 2018-19 and the present investigation was carried out during 2021-22 at Research Farm, Centre for Organic Agriculture Research and Training, Department of Agronomy, Akola, Maharashtra with objective to assess the carbon pools under major cropping systems and correlation of carbon pools with soil properties and yield of various crops. The experiment was laid out in Randomized Block Design (RBD) with seven treatments consisting of cropping systems *viz.* cotton (sole), cotton + sunhemp (2:1), cotton + blackgram (2:1), soybean + pigeonpea (3:1), blackgram - chickpea (rabi), greengram + sorghum (2:1) and sunhemp (sole), replicated thrice. Nutritional requirements were supplied through FYM and vermicompost based on nitrogen - 50% N through FYM + 50% N through vermicompost. The compensation of phosphorus was made available through PROM (Phosphate rich organic manure). Similarly, the sunhemp was buried in soil after 35 to 40 days of sowing, while other intercrops were harvested and the residues of the same were incorporated in the soil after harvest. Soil and plant samples were analysed after harvest of crops.

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Based on the results generated, Carbon pools viz., very labile C (4.04 g kg<sup>-1</sup>), labile C (1.29 g kg<sup>-1</sup>) and less labile C (0.93 g kg<sup>-1</sup>) were recorded higher in surface soil (0-20 cm) with treatment of Cotton + Sunhemp, while non-labile C (5.13 g kg<sup>-1</sup>) was recorded higher in sole Cotton. The active pool contributed 44.96 per cent in surface soil (0-20 cm) to total organic carbon of soil and 45.54 percent in subsurface soil (20-40 cm). The passive pool contributed relatively higher 55.04 percent in surface soil (0-20 cm) to total organic carbon of soil and 54.46 per cent in subsurface soil (20-40 cm). Higher carbon pool as influenced by organically grown intercropping system was in the surface soil (0-20 cm) as compared to subsurface soil (20-40 cm). The passive pool of carbon dominated the active pool of carbon in the soil. The abundance of soil organic carbon fractions followed the order  $C_{NL} > C_{VL} > C_L > C_{LL}$ . Significantly higher seed yield (1213 kg ha<sup>-1</sup>) was reported with Soybean + Pigeon pea intercropping system. However, in respect of cotton, the highest seed yield (1027 kg ha<sup>-1</sup>) and stalk yield (2465 kg ha<sup>-1</sup>) was recorded with the Cotton + Sunhemp treatment. The highest system equivalent yield was recorded with Soybean + Pigeon pea intercropping system (1718 kg ha<sup>-1</sup>).

However, Cotton + Sunhemp and an application of sole Sunhemp recorded significant results in respect of yield of cotton, carbon pools and other properties of soil. Hence, Cotton + Sunhemp and Soybean + Pigeonpea were found to be suitable under organically grown cropping systems to obtain higher productivity, improved soil properties and enhanced carbon pools under semi-arid agro ecosystems.

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## **Prosperity and Wealth through Non-Wood Forest Products in Bundelkhand Region of Central India**

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Non-timber forest products (NTFPs) harvesting, collection and processing are creating several employment opportunities in the drought-

prone Bundelkhand region of India. The livelihood dependency on trees of farmers, tribals and landless labourers for income generation. Surveys and interviews in Bundelkhand region provided an overview of the dependency of different rural communities on NTFPs such as gum, dona pattal, lac from Butea; brooms, jaggery and baskets from Phoenix; flowers and seeds from mahua; bidi leaves from tendu and sticks from bamboo for sustaining their livelihood. To promote NTFPs-based livelihood enterprises, more emphasis should be given for sustainable harvest, value-addition and marketing. Approximately 60% of the population consists of workers and labourers. Among the workers, almost 60-70% are engaged in agriculture, collection of NTFPs and value-addition such as bidi industry, mahua flower collection and processing. Majority of the forest area of Bundelkhand falls under tropical dry deciduous and thorn forest. The total forest area of Bundelkhand is 1.24 m ha, which comprises about 17.62% of the total geographical area. The forest area in Bundelkhand region of UP is 6.72% and that of MP is 25.41% of the total geographic area. These ecological resources are considered as the 'treasure house' of livelihood for rural-tribal populations. More than 450 non-timber forest species of medicinal value have been reported, among which traditionally 100 species are abundantly utilized for collection and harvesting for income generation. Other than medicinal shrubs, herbs and trees, mahua, chironji, tendu and gum-producing species are abundant in natural forest areas of Bundelkhand. A single tribal family can collect up to 100 kg of palash gum and earn a maximum amount of Rs 2950 per month. Tendu leaf is harvested. In this context, tree based livelihood has a huge potential in creating sustainable income in drought-prone areas of Bundelkhand. In spite of recurrent drought conditions, trees are still producing NTFPs, thereby showcasing the climate resilience capacity of this region. A preliminary survey was conducted to assess the major NTFPs and their role in livelihood generation in Bundelkhand region.

**Keywords:-** Non- Timber, Forest Products, Mahua, Tendu, Harvesting, Bundelkhand

# Nutritional Analysis and Microbial Analysis of Inulin-Fortified Pearl Millet Based Fermented Traditional Beverage

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**Background-** Beverages specifically intended as healthier alternatives are supposed to serve energy and specific nutrients are changing the market priority. A busy professional life leaves little for exercise, a drink which is low in calorific value such as a health drink, can serve as a healthy alternative. *Rab* is a cereal and dairy-based non-alcoholic beverage that has been used throughout Rajasthan since early times.

**Objective-** An attempt was made to analyse the nutrient contents of inulin-fortified pearl-millet-based functional *Rab*.

**Methodology:** One per-cent inulin was added to the developed pearl millet *Rab* and it was set to ferment for 7 h at 35<sup>o</sup> C. The sensory-optimized beverage was studied for proximate principles, mineral, vitamin B content, and microbial analysis.

**Results:** The optimized product contained 5.8 g, 2.35 g, 1.18 g, 44.71 Kcal, 0.72 g, and 6.06 g of carbohydrates, protein, fat, energy, ash, and fiber; per 100 mL. The final product contained Ca 33.18 mg, P 40.69 mg, Na 312 mg, K 147.14 mg, Mg 26 mg per 100 mL. Microbial analysis showed all the values under the safe limit.

**Conclusion:** Inulin-fortified *Rab* is high in fiber content and thus can be used as a functional beverage. It may be served as a healthy alternative beverage.

**Keywords:** functional food, inulin, traditional drink, *Rab*, *Raabadi*

## **Establishment of relation between the crop coefficients and vegetation indices for wheat using remote sensing and GIS**

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Precise estimation of irrigation water needs is of utmost important for conserving water. Generally, these water needs are calculated by adopting the FAO-56 procedures. This method relies on literature-based crop coefficients ( $K_c$ ), which can often lead to excessive irrigation. This research paper focuses on addressing this point by utilizing multispectral vegetation indices (VIs) obtained through remote sensing to develop a more precise model for  $K_c$  estimation. As VIs exhibit patterns similar to  $K_c$ , these offer a means to account for real-world field conditions and spatial variations effectively. Considering frequent need of water to wheat crop, this study was conducted in Akola district of Maharashtra using multi-date Sentinel 2A satellite images. Vegetation indices such as EVI, NDVI, NDWI and SAVI were extracted and analysed in relation to wheat crop coefficients. The research found strong correlations between weekly VI values and week-wise crop coefficients of wheat recommended by MPKV, Rahuri, using simple linear regression analysis. Among the various regression models, the NDWI-  $K_c$  model demonstrated superior performance with  $R^2$  value of 0.9346 and D value of 0.986, along with low SE, RMSE and PD values (0.095, 0.9345 and 3.34 respectively). Thus NDWI emerged as the most effective remote sensing indicator for estimating wheat crop coefficients. This information supports precise irrigation water management for wheat crop.

**Keywords:** wheat, vegetation indices, precision agriculture crop coefficients, spatial, Sentinel, remote sensing, GIS

## Crop modelling with regression in Agriculture

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Crop modelling with regression is a crucial tool in modern agriculture for predicting and optimizing crop yields. This abstract provides a concise overview of the significance and applications of regression-based crop modelling in agriculture. Crop modelling involves the use of mathematical and statistical techniques to simulate and predict crop growth, development, and yield in response to various environmental factors. Regression analysis, a fundamental statistical method, plays a pivotal role in crop modelling by establishing relationships between input variables (such as weather, soil conditions, and crop management practices) and crop output (yield). Regression-based crop models enable farmers and agronomists to make data-driven decisions, enhancing agricultural sustainability and productivity. By analyzing historical data and environmental parameters, these models can predict future crop yields, allowing for informed choices in crop selection, planting schedules, irrigation, and fertilization. Furthermore, regression models facilitate the identification of key variables that significantly influence crop performance, aiding in the development of targeted strategies to mitigate risks associated with climate change and optimize resource allocation. The integration of remote sensing data and machine learning techniques with regression modelling has further enhanced the precision and accuracy of crop yield predictions.

**Keywords:-** Variables, Regression modelling, Input variables, Significantly, Optimize resource

## **Survey on predatory mites inhabiting vegetable crops from various localities in Thrissur district of Kerala, India**

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The predatory mites of the family Phytoseiidae are outstanding biological control agents and productive elements of agricultural systems. Studies on the biology and ecology of phytoseiids have shown how well they manage a number of pests that are crucial to agriculture. Studies into the biology and ecology of phytoseiids have revealed how adeptly they control a variety of pests families like Tetranychidae, Tenuipalpidae, Eriophyidae etc. Predatory mites have gained widespread awareness due to their potential as biocontrol agents for phytophagous mites and more recently, insect pests like thrips, aphids, scale insects, mealy bugs, etc. Several mite families, including the Phytoseiidae, Ascidae, Blattisociidae, Bdellidae, Cunaxidae, Cheyletidae, Stigmaeidae, Erythraeidae, Tydeidae, Anystidae, and others, have been given the predatory function. The family Phytoseiidae of predatory mites have the potential to be significant biotic agents in the management of phytophagous mites (McMurtry and Croft, 1997). A survey conducted on predatory mites inhabiting vegetable plants of Central Kerala, Thrissur district during August 2022 - December 2022 reported a total of 20 species of predatory mites belonging to 11 genera and 5 families from 14 species of vegetable plants. They were examined and studied for their taxonomic characters of which one species of family Cheyletidae was reported new to science. We may employ these predators as possible biological control agents for managing insect pests of a range of crops on a commercial basis by mass-multiplication method.



## Evaluation of Different *Bt* and Non-*Bt* Cotton Genotypes against Aphids under Field Condition

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An investigation was undertaken with an objective to evaluate the different *Bt* and non-*Bt* cotton genotypes against aphids (*Aphis gossypii* Glover) 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 aphids. The aphid (*A. gossypii*) population ranged from 18.93 to 31.64 aphids per 3 leaves on *Bt* cultivars and 17.37 to 26.77 aphids per 3 leaves on non-*Bt* cultivars. The *Bt* cultivars, Ajeet 155 and President gold recorded aphid infestation level of 18.93 and 19.73 aphids per 3 leaves, respectively, and categorized as moderately resistant to aphid. Marvel recorded the aphid infestation intensity level of 31.64 aphids per 3 leaves and were found highly susceptible to the aphid infestation. None of the *Bt* cotton cultivars were screened under in resistant category. Out of screened six non-*Bt* cultivars, GISV-272, AKH-13-51 and Phule Yamuna recorded aphid infestation level of 17.37, 18.38 and 19.64 aphids per 3 leaves, respectively, were moderately resistant to aphid. The non-*Bt* cultivars, Phule 688, Phule 492 and Phule 388 recorded the aphid intensity level of 22.97, 24.21 and 26.77 aphids per 3 leaves, respectively, and were found susceptible to the attack of aphids. None of the non-*Bt* cotton cultivars were screened under in resistant category.

**Keywords:** Aphids, *A. gossypii*, field screening.

## **Population Dynamics of Leafhopper, *Amrasca Biguttula Biguttula* (ISHIDA) in Cotton and its Relationship with Weather Parameters**

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The field experiments were conducted during *kharif* 2015 and 2016 at Cotton Improvement Project, Mahatma Phule Agricultural University, Rahuri to determine the effect of ecological factors on the incidence of leafhopper, *Amrasca biguttula biguttula* on *Bt* cotton. The pest population was started from first week of July on third weeks old crop, acquired its first peak in third week of August on twelve weeks old crop (7.28/3 leaves) and second peak in first week of November on twenty-three weeks old crop. Maximum pest population (7.28 & 9.92/3 leaves) was built up at temperature ranged from 23 to 33°C, relative humidity ranges from 50 and 71 percent, zero rainfall and 5 mm evaporation during first peak and 17 to 33°C temperature, 38 to 57% relative humidity, zero rainfall and 5 mm evaporation during second peak. Leafhopper population build up showed positive correlation with maximum and minimum temperatures whereas; it had negative association with morning, evening relative humidity, evaporation, rainfall and rainy days. The determination of effects of different weather factors on population of leafhoppers in cotton was essential for effective pest management. This study will be very helpful not only for forecasting the out breaks of leafhopper population but also in formulating effective pest management strategies.

**Keywords:** Ecological factors, Jassids, *Amrasca biguttula biguttula*, Correlation.

## Evaluation of Different *Bt* and Non-*Bt* Cotton Genotypes against Thrips under Field Condition

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The field experiment was carried out with an objective to evaluate the different *Bt* and non-*Bt* cotton genotypes against thrips (*Thrips tabaci*, Lindeman) 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 thrips. During crop growth, the average mean population of thrips (*T. tabaci*) ranged from 19.08 to 50.73 thrips per 3 leaves on *Bt* cultivars and 22.52 to 46.88 thrips per 3 leaves on non-*Bt* cultivars. On the *Bt* cultivars, Champion 504, Marvel and MRC 7377 thrips infestation level observed was 19.08, 23.92 and 28.90 thrips per 3 leaves, respectively and categorized as moderately resistant to thrips. The *Bt* cultivars *viz.*, Trinetra and President gold recorded the thrips infestation intensity level of 47.92 and 50.73 thrips per 3 leaves, respectively and were found highly susceptible to thrips infestation. Out of six non-*Bt* cultivars screened, Phule 492 and Phule Yamuna recorded thrips infestation level of 22.52 and 27.75 thrips per 3 leaves, respectively and were emerged as moderately resistant to thrips. The non-*Bt* genotype *viz.*, Phule 688 recorded thrips infestation intensity level of 46.88 thrips per 3 leaves and found highly susceptible to thrips infestation. None of the *Bt* and non-*Bt* cotton cultivars were screened under in resistant category.

**Keywords:** Genotypes, Thrips, *Thrips tabaci*.

## **Promoting Technology Adoption for Sustainable Farming Systems: A Review Study**

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The current study promotes technology adoption for sustainable farming system: A review study. A sustainable farming system produces food and other goods and services in a manner that is good for the environment, the community, and the bottom line. Whether this idea is addressed at the farm level, the farming and food sectors level, and in the context of the larger local or global economy, various issues may arise regarding appropriate technology. Increases in farming production and development in the farming industry have been driven mostly by technological progress in every nation. Historically, increased output and profitability have motivated the acceptance and adoption of new technology in farming. Over several decades, farming practices have had a major impact on the technology adoption rate, farming product, and farming systems. It is complex to be a modern-day farmer, advisor, and policymaker. Many decades of farming have left their mark on the ecosystem. Growing demand necessitated the use of more farmland, nutrients, and pesticides. Some effects include deforestation, soil degradation, biodiversity loss, irrigation issues, and pollution. The long-term success of farms is at risk due to multiple factors, and the impact of new technology along the food supply chain needs to be clarified. The rising cost of conducting studies and providing advice to farmers is another area of worry. The encouragement of technological use might one day promote sustainable farming methods. However, the term technology adoption is extremely broad. Development, propagation, and use of current and novel biological, chemical, and mechanical techniques on the farm all play a role, as do farm capital and other inputs, including education, training, guidance, and information. Aspects of the broader agricultural food operations that impact farms are also included. Finally, remember that most of these advancements are developed by something other than the farming sector.

As revealed by experts, several factors influence whether farmers adopt environmentally beneficial practices. In the first paragraph, a simple definition of sustainable farming is presented. The researchers then draw attention to the gap in the literature by looking at all the factors involved in spreading these practices. More research is required to learn how to coordinate better farmers' efforts to promote technology adoption for a sustainable farming system.

**Keywords:** Promotion, Technology, Adoption, Sustainable, Farming Systems, and Review Study

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## **Evaluation of Different *Bt* and Non-*Bt* Cotton Genotypes against Whitefly under Field Condition**

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An investigation was undertaken with an objective to evaluate the different *Bt* and non-*Bt* cotton genotypes against whitefly (*Bemisia tabaci*, Gennadius) 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 *khariif* 2015 and 2016 to study their reaction to whitefly. The average mean population of whitefly (*B. tabaci*) during crop growth ranged from 6.99 to 17.86 whitefly per 3 leaves on *Bt* cultivars and 7.55 to 14.61 whitefly per 3 leaves on non-*Bt* cultivars. The whitefly infestation level of 6.99 and 8.50 whitefly per 3 leaves, was observed on the *Bt* cultivars, Marvel and MRC 7377, respectively and found moderately resistant to whitefly. The *Bt* cultivars viz., Bhakti (NCS-245) and President gold recorded whitefly infestation intensity level of 17.86 and 16.19 whitefly per 3 leaves, respectively and were found highly susceptible to the whitefly infestation. Among the non-*Bt* cultivars, Phule 388 and Phule 492

were recorded whitefly infestation level of 7.55 and 9.43 whitefly per 3 leaves, respectively and categorized as moderately resistant to whitefly. The non-*Bt* cultivars, Phule Yamuna, Phule 688, GISV 272 and AKH-13-51 recorded the whitefly intensity level of 13.15, 10.88, 14.61 and 12.56 whitefly per 3 leaves, respectively and were found susceptible to the attack of whitefly. None of the *Bt* and non-*Bt* cotton cultivars were screened under in resistant category.

**Keywords:** Genotypes, Whitefly, *Bemisia tabaci*.

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## **Pusa Hydrogel- the critical necessity of the future to convert desert into farmland**

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At present, water scarcity is a major problem for the mankind, particularly for the farming community. This issue has become more problematic because of climate change. Despite having 16.67% of the world's population, India only has 4% of the world's freshwater. Therefore, it is evident that the availability of water in the agricultural sector, mostly for irrigation, is steadily decreasing. Hydrogel is a biodegradable super absorbent polymer that can hold 400-1500 g of water per gram of dry hydrogel. With proper amendment and different dosages of soil to hydrogel ratio, the incorporation of hydrogel polymer can boost soil water retention capacity by 50-70%. Hydrogel polymer has been utilized as water-holding material in the arid and semiarid region under the restriction of supplementary irrigation sources and saline conditions. Hydrogel is used to expand the capacity of various soils as well as the water reservoir close to the root system. Hydrogels initially do not garner a lot of interest due to their poisonous nature, high cost and limited lifespan caused by their starch-based structure, which was hazardous to soil bacteria. Maintaining

this limitations, Pusa Hydrogel, a cellulosic hydrogel, was developed at the Indian Agriculture Research Institute (IARI), New Delhi. This gel has the advantage of functioning even at temperatures above 30°C and in the presence of salts and fertilizers, conditions in which most hydrogels are known to malfunction, typically as a result of structural deterioration. Early hydrogels were starch-based, and because of their vulnerability to soil microorganisms, they performed poorly in agricultural settings. Pusa Hydrogel could swell more without harming the polymer matrix when temperature raised to 50 degrees. IARI scientists developed this while taking the soil and climate of the Indian subcontinent into consideration. So, several comparable products were explored in India but failed in real-world conditions before Pusa Hydrogel appeared as a novel option.

**Keywords:** Cellulosic, novel option, polymer, Pusa Hydrogel, water scarcity.

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## **Analysing growth and instability of the Indian yogurt market : A Global comparative approach**

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Humans have been enjoying fermented foods for a long time because they last longer, are safe to eat and taste good. Yogurt is a popular fermented food that's packed with healthy cobalamin. In India, yogurt is becoming more popular, growing at a rate of 10.20%, second only to China.

In this study, we compare how India's yogurt market is doing compared to the rest of the world. We look at three things: how much money people spend on yogurt (Revenue per capita), the price of yogurt, and how much yogurt is sold (Volume of sale).

Surprisingly, India is outperforming the world in yogurt. The amount of money people spend on yogurt (Revenue per capita) in India is growing at a rate of 9.1%. The price of yogurt is going up by 6.6%, and the

amount of yogurt sold (Volume of sale) is increasing by 3.4%.

What's more, the Indian yogurt market is more stable compared to the global market. This stability is attracting the attention of big international companies who want to get in on the growing Indian yogurt market.

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## Evaluation of Biocontrol agents against Soybean Root Rot Complex Causing Fungi

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The antagonistic activity of *Trichoderma* sp., *Aspergillus niger*, *Glocladium virens* and *Pseudomonas fluorescens* isolated from native soil as well as *G. virens* and *T. viride* from Amravati and Parbhani studied under *in vitro* condition against *Sclerotium rolfsii* Sacc., *Rhizoctonia bataticola* (Taub.) Butler and *Fusarium solani* by dual culture technique. Of the ten antagonists tested under *in vitro* condition. maximum growth inhibition of *S. rolfsii* was observed with *P. fluorescens* (71.85%) followed by *T. harzianum* (65.56%), *T. viride* (A) (65.19%) and *G. virens* (A) (61.48%), it was minimum with *G. virens* (P) (31.11%) followed by *T. koningii* (34.81%), *T. viride*(P) (43.33%) and *T. lignorum* (44.81%). Maximum inhibition of sclerotia production was observed with *T. harzianum* (99.46%) followed by *T. viride* (A) (95.80%), *G. virens* (A) (94.54%), *P. fluorescens* (93.65%) and *A. niger* (89.62%). 54.81 to 90.74 per cent inhibition of mycelial growth and 73.68 to 100 per cent inhibition of sclerotial production of *R. solani* were observed with all antagonists tested. Maximum growth inhibition was observed with *G. virens* (P) (90.74%) followed by *P. fluorescens* (85.93%), *G. virens* (A) (64.44%), *T. viride* (A) (61.48%) and *T. hamatum* (59.63%), whereas 100 per cent inhibition of sclerotia production was observed with *P. fluorescens*, *G. virens* (A), *T. harzianum*, *T. hamatum* and *A. niger*. all the antagonists were found to be significantly effective over control in inhibiting the mycelial growth of *F. solani*. These antagonists inhibited 62.22 to 87.03 per cent mycelial growth of the fungus. Maximum growth inhibition was observed with *T. viride* (A) (87.03%), *T. hamatum* (85.92%),



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*T. viride* (P) (84.81%), *A. niger* (82.95%), *T. harzianum* (81.11%), *T. koningii* (72.92%), *P. fluorescens* (70.36%), *G. virens* (P) (67.77%), *G. virens* (A) (62.22%) and *T. lignorum* (62.22%).

**Keywords** : Biocontrol, soybean, root rot

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# Integrated nutrient management on nutritional profile of amaranth

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A field experiment was conducted at the experimental farm, Department of Horticulture, Assam Agricultural University, Jorhat in the year 2023 to study the effect of integrated nutrient management on growth, yield and quality of amaranth. The experiment was laid out in a randomized block design (RBD) with three replications. The treatment combinations were T<sub>0</sub>: Control, T<sub>1</sub>: 100% RDF (60:30:20 kg NPK/ha) + FYM 5t/ha, (T<sub>2</sub>): 100% RDF + Vermicompost 4t/ha, T<sub>3</sub>:100% RDF+ Vermicompost 2t/ha + PSB + *Azotobacter*, T<sub>4</sub>: 75 % RDF +FYM 5t/ha, T<sub>5</sub>: 75 % RDF + Vermicompost 4t/ha, T<sub>6</sub>:75 % RDF + Vermicompost 2t /ha +PSB + *Azotobacter*, T<sub>7</sub>: 75 % RDF instant mixture with incubated vermicompost 1t/ha and T<sub>8</sub>: 100% RDF instant mixture with incubated vermicompost 1t/ha. Among the treatments, the treatments T<sub>8</sub> recorded maximum proteins, carbohydrates, calcium, iron, zinc, phosphorous levels and higher crude fiber content observed in treatment T<sub>4</sub>. Moreover, Ascorbic acid content mostly observed in treatment T<sub>7</sub>.

## Evaluation of Eco-Friendly Management of Small Cardamom Root Grub Hilly Tracts of Idukki, Kerala

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The present study was carried out to test the infectivity of three native EPNs namely, *Heterorhabditisindica* (strain ICAR-NBAIR), *Heterorhabditisbacteriophora*, *Steinernemacarpocapsae* powder formulation against cardamom root grub. The attachment to and rate of penetration of these EPNs into tested insect was also undertaken. Penetration of the IJs of *Heterorhabditisindica* showed highest penetration and was superior to *Heterorhabditisbacteriophora*. and *Steinernemacarpocapsae* never the less the rate of penetration is also depending on the IJs infection strategies. EPN application involves implanting novel powder formulation at plant base that can be done with ease and fast and saves a lot of labour. The WP formulation was found very effective in root grub management that reduced the cost of production and mitigated the use of pesticides (fipronil, chlorpyrifos, phorate) in small cardamom. Therefore, it is concluded that cardamom root grub was susceptible to tested EPNs, there were differences among these EPNs in their ability to kill the insect. Among test EPNs, *Heterorhabditisindica* (strain ICAR-NBAIR) and *Heterorhabditisbacteriophora* (strain ICAR-NBAIR) appears to be the most promising EPN against root grub. EPN is ecologically safe, effective, sustainable and on-farm recyclable green technologies for small cardamom. EPNs constitute a cost-effective, value-added approach to promote sustainable agriculture in small cardamom plantation.

**Key words:** Pest Management, Entomopathogenic nematodes, cardamom, root grub

## **Effect of Enriched Compost and Humic Acid on Quality and Nutrient Status of Soil after Harvest of Safed Musli under Inceptisols**

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The present investigation entitled, “Effect of enriched compost and humic acid on quality and nutrient status of soil after harvest of Safed Musli under inceptisols” was conducted during kharif, 2021-22 at Research Farm, Nagarjun Medicinal Plants Garden, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra. The soil of the experimental site was Inceptisols which was moderately alkaline in reaction, low in available nitrogen, medium in available phosphorus and high in available potassium. The objectives were to study the effect of enrich NPS compost and foliar application of humic acid on the yield, growth and quality of Safed Musli and to assess the effect of enrich NPS compost and foliar application of humic acid on the fertility status of soils. The experiment was laid out in Randomized Block Design with nine treatments replicated in three replications. The treatments comprised of absolute control, Vermicompost @ 5 t ha<sup>-1</sup>, NPS compost @ 3 t ha<sup>-1</sup>, Vermicompost @ 2.5 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid, Vermicompost @ 5.0 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid, Vermicompost @ 7.5 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid, NPS compost @ 1.5 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid, NPS compost @ 3.0 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid, NPS compost @ 4.5 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid. The humic acid sprayed at 45 and 75 days after planting of safed musli. The results showed that, the quality parameters such as saponin content and saponin yield, protein, fiber and carbohydrate content in roots of Safed Musli were recorded significantly highest in the treatment NPS compost @ 4.5 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid. Whereas, the significant improvement in chemical properties of soil were recorded with the application of NPS compost @ 4.5 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid which was found at par with the application NPS compost @ 3.0 t ha<sup>-1</sup> + 2 sprays of 0.5 % humic acid.

## **Characterization of Soils among the tributaries of Kanhan River of Pench Irrigational Project in Nagpur District, Maharashtra, India**

**Sagar N. Ingle \*<sup>1</sup>, Priya S. Gadge and Amol Nagmote**

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The current study was started, and a survey was conducted for it in May 2022, in order to characterise the soils of the right bank canal command area of the Pench irrigation project in Nagpur district, namely in Parsheoni Tahasil. This region's soils range from clay loam to clayey with more than 35% clay.. Bulk density of these soils varied from 1.28 to 1.53 Mg m<sup>-3</sup>. The saturated hydraulic conductivity (HC) of these soils ranged from 0.81 to 2.71 cm hr<sup>-1</sup>. Soil reaction was low to moderately alkaline (pH 7.43 to 8.53). These soils are non saline as indicated by the electrical conductivity which ranged from 0.119 to 0.552 dS m<sup>-1</sup> at 25° C, but more accumulation of salts was observed in surface layer of these soils. Organic carbon content (2.7 to 6.2 g kg<sup>-1</sup>) was low to moderate. The calcium carbonate content of these soils was low to moderate ranged from 1.5 to 6.13 per cent.

**Key words:**. Characterization, Kanhan River, Pench Irrigational Project

## **Biochar serves as a bioremediation tool for tackling both organic and inorganic pollutants originating from food waste in agricultural soils**

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This comprehensive review delves into the escalating challenge of food waste resulting from population growth and rapid industrialization, emphasizing the multifaceted origins of food waste across the entire food

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supply chain. The scale of food waste is staggering, with over one-third of produced food, estimated at more than 1.3 billion metric tons annually, being squandered globally. The mismanagement of this substantial waste stream poses significant environmental and health risks, from microbiological illnesses to exacerbating climate change due to its substantial greenhouse gas footprint. Various food waste management methods are currently employed, including burning, landfilling, composting, anaerobic digestion, and thermochemical conversion processes like pyrolysis. Among these, pyrolysis stands out as a promising method due to its ability to convert organic waste into valuable byproducts like biochar, bio-oil, and synthetic gas. Pyrolysis involves the thermal breakdown of organic materials under anaerobic conditions, producing these carbon-rich byproducts at moderate temperatures and low pressure. Biochar, a stable and porous material, is a vital byproduct of pyrolysis and is formed by subjecting organic materials to anaerobic heating conditions. The characteristics of biochar, including its carbon content, porosity, and surface functional groups, can be tailored by adjusting pyrolysis parameters and employing activation treatments. Biochar demonstrates significant potential in enhancing soil properties, promoting plant growth, sequestering carbon, improving nutrient availability, and mitigating global warming. Combining biochar with compost yields additional benefits, making it a valuable input for sustainable agriculture. The review highlights the need to explore the production, properties, and applications of biochar derived specifically from kitchen waste, emphasizing the importance of further research in this area to advance environmentally friendly kitchen waste management technologies.

**Keywords:** Biochar, Agriculture waste, Pyrolysis, Soil

## Utilization of Floral Wastage to Produce Valuable Product

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Floral wastage is a significant environmental concern associated with the floral industry. After flowers are used for decorative purposes or for special occasions, they are typically discarded, leading to waste generation. It is estimated that 800 million tonnes of flowers are offered across the temples, mosques and gurudwaras .etc in the country ,more than 8 million tonnes of flowers are dumped in the river every year, in India many places of worship generate 20 tonnes of flower waste daily.This explores the potential of utilizing floral wastage to produce valuable products through innovative approaches. The objective of this is to identify and evaluate sustainable strategies for re-purposing floral wastage, to protect the environment and maximize the economic value of waste. Various methods such as composting, extraction of bioactive compounds, production of natural dyes, natural gulal, bio-ethanol production, biocide production, production of incense sticks (Agarbattis), handmade paper, florafoam are investigated as potential products to transform floral waste into valuable resources.

There are various groups regards with production of ecofriendly products from utilizing floral wastage, among which **Help Us Green** (now named as **PHOOL.co**), a company in Uttar Pradesh, India, started an initiative to recycles FW into useful products. Similarly **Green Wave in Telengana**, is working on simple clean technologies which can address the challenge of providing safe and easy work . They collect FW from temple, mosques and use them to manufacture incense sticks. Whole setup is present in the temple premises itself .Among all this one of the crucial step

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of converting floral wastage ,garlands to valuable products that is making **Dhup Kandi** is implemented in Ganesh Tekdi temple in Nagpur.

The feasibility and viability of these approaches depend on several factors, including the availability and quality of floral waste, technological advancements in extraction methods, market demand for the derived products, and awareness among stakeholders about the importance of recycling floral waste. By re purposing floral wastage, we can reduce the environmental impact of the floral industry, minimize landfill waste, and create valuable products. The utilization of floral waste not only presents economic opportunities but also contributes to a more sustainable and circular economy.

**Keyword:** Floral wastage, value addition, dyes etc.

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# **Effect of Genotypes and Planting dates of Broccoli (*Brassica oleracea* var. *Italica* Plenck) on growth, yield and yield contributing characters**

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This investigation was conducted on four diverse broccoli (*Brassica oleracea* var. *Italica* Plenck) accessions (Palam Haritika, Palam Samridhi, KTS-1, and Aishwarya) collected from different growing parts of India were evaluated on planting dates and genotypes of broccoli during the *Rabi* season of 2017-18 at the Potato & Temperate Fruit Research Station, Mainpat, Surguja (C.G.). Observed remarkable heterogeneity in yield and yield characteristics. The findings of a pooled analysis demonstrated that sowing dates had a substantial effect on various broccoli growth and yield quality criteria. The study discovered that the date of transplantation influences the length of broccoli leaves. Varieties differed significantly in

head diameter, head weight, number of secondary heads, weight of secondary heads, days to harvest, per plant head production, and total yield. The interaction between transplanting dates and yield revealed that the maximum head yield was 19.65 tonnes per hectare on October 16th in Palam Samridhi and the minimum was 10.54 tonnes per hectare by Aishwarya. The best combination was Palam Samridhi, which was sowed on October 16th, demonstrated consistency in performance among accessions, and can be recommended for commercial cultivation. The interaction effect of date of transplanting and genotype was determined to be non-significant, but numerically the interaction effect of D2V2 (16th of October and genotype Palam Samridhi) was the greatest among all-treatment combinations.

**Keywords:** Broccoli, Genotype, Date of transplanting, Stalk length, Head yield.

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## **Drone Mounted Sprayer for Effective Herbicide Application**

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The world population currently at 7.7 billion, is projected to reach 9.5 billion by 2050 and necessitating a substantial increase in food production. However, numerous biotic and abiotic factors present challenges to crop protection and production. Among these factors, weeds emerge as a significant biotic threat to crops worldwide. Weeds compete vigorously with crops for essential resources such as water, nutrients, carbon dioxide and also act as hosts for pests and diseases. However, relying solely on chemical weed control methods has proven insufficient due to factors like labor shortages and low efficiency. Traditional methods involving manual sprayers and tractor-operated equipment expose



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operators to harmful chemicals, leading to serious health issues and fatalities among farmers. To address these concerns, the introduction of drones in agriculture offers a promising solution. Drones equipped with sprayers play a pivotal role in weed control, providing benefits like reduced chemical and water wastage, lower labor costs, precise spraying, consistent discharge and significant time savings. To comprehensively explore the impact of these factors, laboratory trials were conducted, involving a range of combinations of spray heights (ranging from 1 to 3 m) and discharge rates (varied from 0.1 to 0.8 l min<sup>-1</sup>). The results of these trials unveiled valuable insights. The minimum and maximum swath widths were determined to be 1.8 and 5.3 m, respectively, corresponding to operating heights of 1 m and 3 m. Furthermore, it was observed that the maximum droplet size (with a VMD of 630 µm) occurred at a combination of 1.5 meters in height and a discharge rate of 0.2 l min<sup>-1</sup>, while the minimum droplet size (with a VMD of 491 µm) was recorded at a combination of 2 m in height and a discharge rate of 0.8 l min<sup>-1</sup>. The highest level of spray distribution uniformity, reaching an impressive 96%, was achieved at a combination of 3 m height of operation and discharge rate of 0.45 l min<sup>-1</sup>. Their field capacity surpasses other technologies, covering approximately 1.16 to 2.94 ha h<sup>-1</sup>, resulting in significant water savings of 75 to 90%. Ultimately the drone-based weedicide application proves to be an efficient and optimized method, benefiting farmers economically and contributing to income growth.

**Keywords:** Drone Technology, Weedicide, Uniformity and Time efficient.

## **Impact of Naphthalene Acetic Acid on the morpho- physiological traits and yield attributes of Dahlia (*Dahlia variabilis* L.)**

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A field experiment was formulated to determine the effect of Naphthalene Acetic Acid (NAA) on the morphology, yield, and yield-contributing attributes of two Dahlia (*Dahlia variabilis* L.) cultivars, Topstar and Figaro. The study was carried out at the Research Farm, College of Agriculture, Raipur, during the Rabi season of the year 2021–22 and laid out following the complete randomized block design (CRBD) in three replications. At 30 and 60 days after transplanting, the growth hormone NAA (0, 60, 90, and 120 ppm) was applied foliarly, and various morphological, yield, and yield-attributing traits were recorded following foliar application. The results from the present study revealed that morphological traits such as plant height, stem girth, leaf area, and the number of leaves plant<sup>-1</sup> were maximized with the application of NAA at 120 ppm concentration. Furthermore, when plants were treated with NAA at 90 ppm, yield and yield-attributing traits such as fresh flower weight, bud weight, and total biological yield were found superior.

**Keywords:** Dahlia, NAA, Foliar application, morphology, yield and yield contributing traits

# Impact of Flowers and Landscape on Mental Health

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The relationship between nature and mental health has long been recognized, with numerous studies highlighting the positive effects of natural environments on psychological well-being. The present-day suburban life is full of anxiety and the rush to make every day count. This pressure is taking a massive toll on our lives. Nature always has the answer to our everyday woes in various ways. One such medium is through beautiful Flowers and Landscape of Nature.

According to World Health Organisation, India's suicide rate in 2019, at 12.9/1,00,000, was higher than the regional average of 10.2 and the global average of 9.0.

The exposure to flowers and natural landscapes can significantly improve mental health outcomes. Flowers, with their vibrant colors, intricate shapes, and pleasant fragrances, have been found to evoke positive emotional responses, reduce stress, and enhance mood.

A study results that jasmine oil has stimulatory effects on the function of nervous system which could be concluded that inhalation of jasmine oil affected to brain wave activities and mood states. Natural landscapes, such as gardens, parks, and green spaces, also play a crucial role in promoting mental health. The visual richness, tranquillity, and biodiversity of natural environments have been linked to reduced symptoms of anxiety, depression, and stress. Garden walking and reflective journaling decreased depression scores in older adults.<sup>[3]</sup>

**Keyword:** Landscape, garden, flowers and health etc.

# **Balancing Livelihoods and Ecology: A Comprehensive Study of Dal Lake's Fisheries, Vulnerability, and Management Dynamics**

**Shakir Ahmad Mir, S.N. Ojha, Shahid Gull**

The current study comprehensively examines the livelihood conditions, vulnerability, and resilience of the fisher communities inhabiting Dal Lake. Additionally, it delves into an analysis of species diversity, trophic status, and trends in fish caught within the lake, along with evaluating its management. The livelihood and vulnerability of fisheries-based livelihoods were assessed using a composite index development approach, and the species diversity was evaluated using the Shannon-Wiener index. The fishers of Dal Lake are moderately vulnerable to climate variability and changes. The status of the livelihood capitals of the fishers reveals that most of the capitals are of moderate type; however, the financial capital is poor horizontally among all the fishing villages. It was also found that the people's socio-economic conditions and resilience are deplorable. The fishers are entirely dependent on the lake for their livelihood, and there was a lack of alternate livelihood among them, which increased their dependency on it and also made them more susceptible to different fluctuating conditions and less catch from the lake fisheries-related activities and policies are being side-lined because of giving more importance to tourism. The management of the lake is shared between the Fisheries and Tourism Departments and the Jammu and Kashmir Lakes Conservation and Management Authority (power). The lake is dominated by omnivorous fishes, followed by herbivores and carnivores. The compound annual growth rate results from 1989 to 2019 for capture fisheries showed a positive growth rate of 0.23. The lake is not only a source of fish but is also a famous destination for lakhs of tourists from different parts of India and other countries, besides being a significant source of vegetables through its floating vegetable gardens. While tourism plays a pivotal role in generating revenue from the lake, it has, at times, overshadowed fisheries-related activities. Policies have been skewed in favor of tourism, resulting in the marginalization of the fisheries sector. The management of the lake is a shared responsibility among the Fisheries and

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Tourism departments and the Jammu and Kashmir Lakes Conservation and Management Authority. Unfortunately, inadequate coordination between these entities has adversely impacted the overall health of Dal Lake and brought it closer to the brim of death. We recommend implementing measures to control sewage influx and manage weed growth as essential steps toward restoring the lake's ecological health. Modifying the existing governance and management structures is imperative to ensure effective coordination and comprehensive lake management. We also propose the adoption of a network governance approach involving key stakeholders, fisher communities, and governing bodies to address coordination challenges and enhance the overall management of Dal Lake. In conclusion, this study underscores the necessity of adopting a holistic approach to lake management, one that considers both the local communities' well-being and the ecosystem's sustainability. Coordinated efforts and policy adjustments are essential to strike a balance between tourism and fisheries, ensuring the long-term prosperity of Dal Lake and its inhabitants.

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# **Effect of different nitrogen sources on growth and yield of Kasuri methi (*Trigonella corniculata* L.)**

**Shiv Kumar and Suresh Kumar Tehlan**

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The present investigation was carried out at Vegetable Research Farm and in the laboratories of the Department of Seed Science and Technology, CCS Haryana Agricultural University, Hisar during *Rabi* season of 2022-23 to assess the effect of different nitrogen sources on growth and yield of kasuri methi. The material comprised of newly developed kasuri methi variety "Hisar Kasuri Methi - 7" which was grown with eighteen treatment combinations of organic manures (FYM, Vermicompost) inorganic fertilizers and biofertilizer (*Rhizobium*). All the treatment combinations were evaluated for different growth and seed yield parameters. Experimental results revealed that significantly highest growth and yield attributes *viz.*, plant height at 30, 60, 90 DAS and at maturity

(5.53, 14.00, 76.67 and 95.14 cm), number branches/plant (6.99), number of cluster/plant (122.00), number of pods/cluster (19.62), length of pod (2.01 cm), number of pods/plant (2457.97), number of seed/pod (6.95), biological yield (3085.85 kg/ha), seed yield (730.57 kg/ha) and harvest index (23.67%) were observed under treatment T<sub>1</sub> {100 % RDN (Inorganic) + *Rhizobium*}, whereas, minimum was recorded under treatment T<sub>18</sub> (Control).

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## **Application of Machine Learning Tools in Agriculture**

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The most recent technology, machine learning is utilized to tackle complicated problems in agriculture and help farmers in minimizing losses. Utilizing machine learning in agriculture enables more accurate and effective farming with high-quality output using less human labor. Machine learning tools have found numerous applications in agriculture, revolutionizing the industry by improving efficiency, crop yield and sustainability. Lack of information at each level of agriculture creates new issues, which raises the cost of farming. Through every step of the agricultural process, from crop selection to product sale, there are significant net losses.

According to the proverb "Information is Power," farmers may be able to make better judgments and solve agricultural problems by keeping track of information on the crops, environment, and market. Information may be collected and processed using technologies like blockchain, IoT, machine learning, deep learning, cloud computing, and edge computing. The use of computer vision, machine learning, and IoT applications will assist in boosting productivity, enhance quality, and eventually increase the profitability of farmers and related industries. Modern agriculture is using more and more machine learning capabilities, giving farmers useful information and resources to increase productivity, sustainability and

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profitability while minimizing environmental effects. The successful implementation of machine learning in agriculture requires access to data, infrastructure, and education for farmers. Machine learning tools are pivotal in shaping the future of agriculture, making it more productive, resilient, and environmentally conscious.

**Keywords:** -Machine learning, Technology, Sustainability, Profitability.

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# Effect of graded levels of nitrogen application on yield and yield attributes of maize

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Maize is an important cereal crop after rice and wheat grown all over the world. Maize being an exhaustive crop, balanced application of 150:65:65 kg of N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O ha<sup>-1</sup> is recommended for irrigated maize in northern Karnataka. However, it responds positively to higher nutrient application rates. Among major nutrients, nitrogen management in maize production system is one of the main concerns. Considering the above facts, the experiment was undertaken with the objective to study the effect of graded levels of nitrogen application on yield of maize at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad, during *kharif* 2020. The experiment was laid out in RCBD design, comprising nine treatments at varied levels of nitrogen ranging from 0 to 200 % RDN at an interval of 25 %. The experimental results revealed that yield parameters were significantly higher with the application of 200 % RDN than rest of the treatments. Significantly higher grain yield, straw yield and harvest index were recorded with the application of 200 % RDN as compared to other treatments. However, it remained on par with 175 and 150 % RDN applied treatments.

**Key words:** *Nitrogen, Maize, RDF, Yield, Yield attributes*

## Fall Armyworm: Identification and Management

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The Fall Armyworm, *Spodoptera frugiperda* is a devastating pest of maize that is native to tropical and subtropical regions of the western hemisphere from the United States of America to Argentina. The scientific name is derived from the feeding habits of the larval life stage, *frugiperda* meaning “lost fruit” in Latin, as the pest can cause damage to crops resulting in severe yield loss. Fall Armyworm (FAW) was reported for the first time on the African continent in early 2016. Although FAW shows a definite preference for the Poaceae it displays a wide host range attacking over 80 different plant species including major crops such as cotton, groundnuts, sorghum, wheat, potatoes, soybean and sugarcane. Its polyphagous nature presents challenges in management due to the presence of numerous alternative hosts outside the production season of main crop. Around the world, maize is grown in about 193.07 million hectares (mha), with production and productivity of 1147.07 million metric tonnes (mmt) and 5.75 million tonnes per hectare (mt/ha), respectively (<https://www.fao.org/faostat/en>) [1]. In India, during 2019-20, maize was grown in about 9.72 mha, with yield and productivity of 29 mt and 2945 kg/ha, respectively. The fall armyworm (FAW), *Spodoptera frugiperda* (Smith) (Noctuidae: Lepidoptera) is one of the serious insect pest on variety of crops around the world. It is a polyphagous pest that causes significant losses to many agricultural crops and is reported to damage more than 353 plant species belonging to 76 families (Montezano et al., 2018) [6]. FAW was first reported from the African continent in January 2016 (Goergen et al., 2016) [2]. In India, *S. frugiperda* was reported for the first time in the maize fields of University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka during May, 2018. Eggs are creamish white or grey in color covered by a whitish wool-like material and Newly hatched caterpillars are green in colour during the 1st – 2nd instars and turn brown to black from 3rd – 6th instar. Mature Caterpillars have a dark head with a pale, upside down Y-shaped mark on the front • Big caterpillars have four raised dark spots that form a squared pattern on the 2nd to last segment when seen from above. Management of FAW with IPM tools like, Cultural, Mechanical and Biological methods

**Keywords:** FAW, Maize, India.



## **Evaluation of various biocontrol agents and chemicals against *Meloidogyne-Fusarium* wilt complex infecting Turmeric (*Curcuma longa*) under field condition**

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The field experiment was carried out at farmer's sick plot in Chamarajanagar, Karnataka during *Kharif* 2022 to evaluate different bioagents and chemicals for their efficacy against wilt complex caused by *Meloidogyne* sp. and *Fusarium* sp. on Turmeric by testing the nematode population levels in soil and roots, wilt incidence as well as considering the growth and yield parameters. Six bio control agents *Viz.*, *Trichoderma harzianum*, *Trichoderma viride*, *Purpureomyces lilacinum*, *Bacillus subtilis*, *Pseudomonas fluorescens* and Arka microbial consortia and five chemicals *Viz.*, Fluopyrum 34.48 SC, Carbosulfan 6G, Carbofuran 3G, Thiophanate methyl 70 WP and Cartap hydrochloride 4G in single and sequential application were compared with untreated control for the management of wilt complex. Among all biocontrol agents *Purpureomyces lilacinum* (5kg/ha) recorded the highest reduction in nematode population, galls per plant and per cent wilt incidence (20.96 %) with maximum plant height, root length, number of fingers, fresh and dry rhizome weight followed by *Trichoderma harzianum* (5kg/ha) in field condition. In chemical management sequential use of Fluopyrum 34.48 SC (3ml/L) and Thiophanate methyl 70 WP (3ml/L) recorded the highest reduction in nematode population, galls per plant and lowest per cent wilt incidence (15.96%) with maximum plant height, root length, number of fingers, fresh and dry rhizome weight followed by sequential application of Fluopyrum 34.48 SC (3ml/L) and Cartap hydrochloride 4G (5kg/ha).

**Keywords:** *Meloidogyne* sp., *Fusarium* sp., Turmeric wilt complex, Biocontrol agents, chemicals.

## Smart Technology, Precise Agriculture for Future Needs

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All the farm lands of our country are not in a homogenous conditions and fluctuation of yields are not only due to application of improper quantity of inputs like nutrients, water, pesticides and weedicides and but also because of applications of higher amount of inputs to the soils that reduces the productive yields. Moreover, for the ever-increasing population there is a need to meet the food grain requirement which cannot be accomplished by decreasing the productivity. For this we need a technology to apply the variable amounts of inputs at right time, right place and right quantity and conserve the resources for future generations. Heterogeneous condition can be observed, measured and analysed the variations by smart technology and future agriculture may completely depends on different farm equipments due to lack of labour so we have to think in advance in learning the new advanced technology and link this machinery with smart technology for sustainable agriculture. Besides in our country, the main problem is majority of the farmers are small land holding farmers, where as a solution precision agriculture holds a good positive and successful ray and a key to increasing the agricultural productivity in a sustainable way.

**Keywords:** Advanced technology, Precision Agriculture, Small land holding, Sustainable agriculture.

# Combinatorial effect on antioxidant activity of *Camellia sinensis* (Green tea) with *Trachyspermum ammi* seed extract: *In vitro* assay

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Green tea (*Camellia sinensis*) is the second most popular drinks consumed globally for its significant phytoconstituents that contribute to healthy lifestyle. Many therapeutic principles are associated with green tea such as antioxidant, anti-inflammatory, anti-ageing, antidiabetic, antihypertensive and many more have been documented, making it a valuable source for the development of new drugs. *Trachyspermum ammi* commonly called as Ajwain is known for its aromatic smell and pungency taste, used as spice in Indian food. Ajwain seeds in smaller quantities are used to flavor drinks and dishes and also proved for numerous pharmaceutical applications. The current investigation is aimed to explore the effect of Green tea blend with *Trachyspermum ammi* seed extract (TASE) in the ratio of 1:1 on phytochemicals and antioxidant capability. The total phenol contents of Green tea, TASE and its blend were found to be 13.2, 3.5 and 14.5 mg Catechol equivalent/g and total flavonoids were about 5.8, 1.5 and 4.2 mg Quercetin equivalent/g, respectively. Further, Green tea blend with TASE showed significant synergetic enhancement of 5% in antioxidant capacity as evident by DPPH assay at EC<sub>50</sub> concentration 40.05 mg/mL of blended extract. The phenol and flavonoid components of TASE showed positive contribution for enhanced free radical scavenging potentiality in blended Green tea. Additionally, these combinations may be utilized to prepare novel tea blends that offer advantages to human health with increasing consumer acceptance and economic value.

**Keywords:** Flavonoids, phenols, antioxidant, *Camellia sinensis*, *Trachyspermum ammi* (Ajwain) seeds.

## Step wise regression analysis for restorer and maintainer lines of sunflower (*Helianthus annuus. L*)

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Stepwise regression is statistical tool used to build the best model, with important number of independent variables, that accounts for the most variance in the dependent or outcome variable. In this study, twelve traits including morphometric and yield attributing traits of 60 genotypes of Sunflower (55 restorer lines and 5 maintainer lines ) were used to create a regression model. Seed yield per plant was taken as the dependent variable and the variables that contributed significantly remained in the model while the rest of the variables were not included. Among twelve traits, two got included in the model. Number of seeds per head and head diameter were the variables which showed positive effect on Seed yield per plant. The tolerance values assess multicollinearity among the independent predictor variables, which ranged from 0.88-0.94 for the three variables indicating the accuracy of the estimated model. The p-values of the coefficients of included variables were less than 0.05, proving their significant association with yield. The R<sup>2</sup> value of the model estimated was equal to 0.346, which shows that 34.6 % of the total variance is contributed by these two predictor variables. Therefore, the number of seeds per head and head diameter influence yield in a directly proportional manner. Positive or negative selection for these characters can lead to yield improvement. This basic statistical study can be explored further with the inclusion of a larger set of traits.

**Keywords :** Sunflower, stepwise regression, models, crop improvement.

# Stepped pyrolysis of biomass: an advanced technique of thermal decomposition of intrinsic bioconstituents

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Crop residues are attracting the attention of policymakers worldwide, as they can lead to economic and environmental benefits. In this regard, crop residues can be converted into clean, valuable products. Tanmay et al. 2023 estimate that India generates 869.11 MT (million tonnes) of biomass each year with a surplus of 288.14 (33.15%) MT. Through thermochemical, biological, and physical processes, biomass can be converted into different value-added products. The pyrolysis process is well known as one method for enhancing the carbon content and adsorbency levels of solid-state carbonized products. Pyrolysis is currently carried out by increasing the biomass temperature using a straight-line temperature increment protocol, and in some cases, the biomass is maintained at an elevated temperature for a defined period. This paper hypothesizes that for lignocellulosic biomass, one can obtain better products through the stepped pyrolysis of biomass. An organic compound is broken down into simpler compounds using stepped pyrolysis (SP). In this process, the material is heated sequentially at increasing temperatures, with each step being carried out at a higher temperature. The process of stepped pyrolysis is typically carried out in a furnace or reactor that is designed to control the temperature, rate of heating and residence time. The material to be pyrolyzed is placed into the furnace or reactor and then heated to a specific temperature for a set duration, residence time, before being transferred to the next step. The advantage of stepped pyrolysis is that it allows better control over the decomposition process, which optimizes the yield of products with desired properties. Additionally, the sequential heating steps can be tailored to optimize the generation of specific types of products or to minimize the formation of unwanted by-products. Under the study, pigeon pea stalk was used as a raw material. Initially, the raw material was subjected to thermogravimetric analysis to explore the thermal behaviour at different heating rates. The differential

thermogram (DTG) was resolved into their intrinsic bioconstituents by using the deconvolution analysis. The deconvoluted data were used for deciding on various steps during the stepped pyrolysis. A comprehensive comparative analysis of desirable properties in the generated product through stepped pyrolysis (SP-char) and traditional pyrolysis (TP-char) was done. The SP-char showed a reduction in volatile matter and an increment in fixed carbon content by 5%, over the TP-char. Also, remarkable changes in adsorption indices (increment in iodine number by 17% and reduction in methylene blue values by 31%) were recorded which reflected the higher adsorbency level of SP-char as compared to TP-char. The pyrolytic kinetic was also estimated by using three isoconversional methods; FWO, KAS and Starink. Stepped pyrolysis reduces the activation energy by 18-26%, over traditional pyrolysis. Hence, an enhanced valued product can be generated through the stepped pyrolysis method rather than the traditional method.

**Keywords:** Stepped pyrolysis; Thermogravimetric; Deconvolution; Methylene blue; Iodine number; Pyrolytic Kinetics.

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## **Study the Constraints in the Operation for Potato in Drip Irrigation System**

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The purpose of this study is to identify the main challenges that farmers in Rajasthan's zone 1B confront. Two districts make up Zone 1B: Sri Ganganagar and Hanumangarh, also known as the granary of Rajasthan. The land area in the Sri Ganganagar and Hanumangarh districts in 2019–20 is 221.53 hectares and 103.96 hectares, respectively. The purpose of the study was to identify the challenges that farmers faced after drip irrigation in potato crops. The study included both primary and secondary data and was based on a descriptive and exploratory research approach. The study used multistage stratified random sampling. There were eight main issues with drip irrigation systems that farmers had to deal with. The farmers were given a pre-

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structured schedule with both open-ended and closed-ended questions so they may rank the constraints in accordance with their preferences. The major obstacle was determined to be "high initial cost for drip irrigation" (Garrett score: 70.50), followed by "requirement of timely maintenance" (Garrett score: 62.03), "lack of technical know-how" (Garrett score: 56.33), "lack of adequate training" (Garrett score: 53.93)", "non-availability of technical guidance in time" (Garrett score: 46.20), "n Farmers must be encouraged to use drip irrigation because water is a limited resource.

**KEYWORDS:** Drip Irrigation, Potato, Rajasthan, Challenges

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# Effect of organic manures and natural farming on quality and economics of carrot

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The experiment was carried out at Research farm of Deen Dayal Upadhyaya Centre of Excellence for Organic Farming of CCS Haryana Agricultural University, Hisar during the *rabi* season 2022-23 under organic system cultivation without using any chemicals to study the effect of organic manures and natural farming on growth, yield and quality of carrot. The experiment was laid out in RBD with eight treatments and three replications. Three different organic manures such as FYM, vermicompost, poultry manure alone and along with biofertilizers (*Azotobacter* and PSB) was applied. Treatment of cow based bio-formulations (as a component of natural farming *i.e.*, Ghanajeevamrit and Jeevamrit) and control was also included as treatment where no fertilizer and manure were used. The study revealed significant improvements in almost all quality attributes by combined application of organic manures along with biofertilizers. Among different combinations, vermicompost+ biofertilizer surpassed all other treatments by giving maximum total sugar, reducing sugar, non-reducing sugar, TSS. Also, the gross return (Rs. 425100 ha<sup>-1</sup>), net return (Rs. 232873 ha<sup>-1</sup>), and BC ratio (2.21) during the experiment. It was also observed during the study that control treatment showed lowest findings among all the treatments.

**Keywords:** Carrot, organic manures, cow based bio-formulations, growth indices

## **Survey for the disease incidence of dry root rot of mungbean incited by *Macrophomina phaseolina* (Tassi.) Goid, in major mungbean growing areas of Telangana State**

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Dry root rot of mungbean caused by *Macrophomina phaseolina* (Tassi.) Goid is the prime importance in reducing the crop yield. Dry root rot become a major obstacle to the growers of mungbean, which can lead to significant losses in production by reducing plant populations at both seedling and adult stages. By considering the importance of pathogen a roving survey was conducted during *Rabi* 2022-23 in major mungbean growing areas of Telangana State to record the occurrence and distribution of root rot of mungbean in eighteen major mungbean growing districts of Telangana. In each district randomly 2-3 fields were selected and a total of 50 fields were covered during the survey. The highest disease incidence of 31.7% was recorded in Ichoda village of Adilabad district and least disease incidence of 5.3 % was recorded in Pallipadu village of Khammam district. Disease was more prevalent in sandy loam soils followed by clay loam and minimum in black soil. Disease incidence was also higher in areas where farmers used local and private varieties and also in fields were mungbean is grown as immediate crop after paddy, maize crops.

**Keywords:** Mungbean, root rot, *Macrophomina phaseolina*, Survey, soil borne disease.



# Total factor productivity and returns to investment in *rabi* sorghum research in Western Maharashtra

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MPKV, Rahuri and MPKV, Rahuri.

Ensuring sustainability and improving TFP of sorghum crop, the major source of carbohydrates, is important to achieve food and nutritional security. The present investigation was aimed to study, "Total factor productivity and returns to investment in *rabi* sorghum research in Western Maharashtra". To assess the returns to investment, Estimated Value of Marginal Return (EVMP) and Internal Rate of Return (IRR) of cereal research and development investment were analyzed. The primary data on per hectare use of inputs, outputs and their prices of the main and competing strains of sorghum crop under study have been obtained from the cost of cultivation reports of state cost of cultivation scheme. The average input index of *rabi* sorghum for twenty one year's clearly indicates that, TFP mean of *rabi* sorghum increased over first decade signals productivity increased. While, it may take longer gestation period to reflect in compound growth rates of input, output and TFP of *rabi* sorghum. An additional investment of one rupee in *rabi* sorghum research generated additional income of Rs 7.38. The estimated value research flexibility was 5.26 which mean that to achieve one per cent increase in TFP, the investments in *rabi* sorghum research needs to be increased by 5.26 per cent. The Internal Rate of Return (IRR) to investment in *rabi* sorghum research estimated to be 34.61 per cent.

**Keywords:** Total Factor Productivity, *Rabi* sorghum, Tornqvist-Theil index Estimated Value of Marginal Product, Internal Rate of Return.

## **The gap between Farm harvest price and Minimum Support Price of rapeseed & mustard and chickpea in Haryana**

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Rapeseed & mustard and chickpea are important oilseed and pulse crops in Haryana which has consistent supply of human nutrition, as well as an important component of climate-resilient agricultural systems. The study period i.e. 1995-96 to 2020-21, gap was found between FHP and MSP of rapeseed and mustard in Haryana resulted which ranged from (-198.75 to 989.43 ₹/qtl). The maximum gap was noted in the year 2011-12 i.e. 989.43 ₹/qtl while minimum gap was recorded in the 2016-17 (-198.45 ₹/qtl). Rapeseed and mustard revealed positive deviations 17 times and negative deviation 6 times in 26 years during 1995-95 to 2020-21. The gap was detected between farm harvest prices and minimum support of chickpea in Haryana noted which ranged from (-93.00 to 1115.50 ₹/qtl). The maximum gap was recorded in the year 2011-12 (1115.50 ₹/qtl) while minimum gap was recorded in the 2017-18 i.e.-93.00 ₹/qtl. Chickpea shown positive deviations 23 times and negative deviation 1 time in 26 year during 1995-95 to 2020-21.

**Keywords:** Chickpea, Rapeseed and Mustard, Minimum Support Price (MSP) and Farmer Harvest Price (FHP).

## **Biodiversity of insects in rice ecosystem (local cultivars) of Arunachal Pradesh, Namsai district during vegetative stage**

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The rice crop is of tremendous economic importance as it is a staple food for more than half of the world's population, especially in Asia. Pest infestations in rice bring about heavy losses depending upon species and the season in different parts of the world. Correct identification of insect pest is a prerequisite step before undertaking any control measures. Limited information is available on insect biodiversity (insect pest & Natural enemies) in rice crop. Therefore, efforts were made to study the biodiversity of insect pest and natural enemies present in rice crops in Namsai district of Arunachal Pradesh. A total of 8 insect species belonging to six insect orders viz., Homoptera, Hymenoptera, Lepidoptera, Orthoptera, Odonata and Araneae were collected and identified. There were a total of 4 insect pest and 4 natural enemies recorded. The insect species viz., rice leaf folder, rice skipper, green leaf hopper and grasshopper were found to be major pests of rice in this region during vegetative stage while the common natural enemies were spider, dragonfly, damselfly and parasitic wasp.

**Keywords:** Biodiversity, pests, natural enemies

## **The Role of Novel Technology in the Agriculture and Food Industry**

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The modern food industry is undergoing a profound transformation driven by the integration of novel technologies. The food industry has

evolved significantly over the years, and today it stands on the brink of a technological revolution. Novel technologies have become integral to the entire food supply chain, from farm to fork. Advanced technologies, such as precision agriculture, biotechnology, and automation, have revolutionized food production. Precision agriculture utilizes data-driven approaches to optimize crop yields and reduce resource waste. Biotechnology plays a pivotal role in developing genetically modified organisms (GMOs) that enhance crop resistance and nutritional content. Automation, using robots and drones, streamlines harvesting and reduces labor costs. Ensuring food quality and safety is paramount in the food industry. Novel technologies like blockchain, artificial intelligence (AI), and sensor technology are being employed to monitor and trace food products throughout the supply chain. Blockchain provides transparent and tamper-proof records, while AI can detect contaminants and pathogens in real-time, minimizing foodborne illness outbreaks. Innovations like vertical farming, hydroponics, and lab-grown meat are reducing the environmental footprint of food production. These technologies require less land, water, and energy while producing fewer greenhouse gas emissions compared to traditional agriculture. Novel technologies enable personalized nutrition using apps and wearable devices. Moreover, 3D food printing allows for the customization of food products to meet individual dietary requirements and tastes. Efficiency in the food supply chain is critical for minimizing food waste and ensuring timely delivery. The Internet of Things (IoT) facilitates real-time monitoring of temperature, humidity, and other environmental factors, preventing spoilage during transportation and storage. Additionally, autonomous vehicles and drones enhance delivery speed and accuracy. The intersection of technology and culinary arts has led to the creation of novel food experiences. Molecular gastronomy and food tech startups explore innovative ways to prepare and present food. Virtual reality (VR) and augmented reality (AR) applications offer immersive dining experiences and aid in food education. From optimizing production to ensuring safety, enhancing sustainability, and meeting diverse consumer preferences, technology is a driving force behind the industry's evolution. While challenges and ethical considerations persist, the continued integration of these innovations promises a more efficient, sustainable, and personalized food future.

## **Atal Innovation Mission: Fostering Innovation and Entrepreneurship in India**

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The Atal Innovation Mission (AIM) is a flagship initiative of the Government of India aimed at cultivating a culture of innovation and entrepreneurship across the nation. In an era where innovation is the cornerstone of economic growth and competitiveness, AIM seeks to empower India's youth and entrepreneurs to harness their creative potential. Its primary objective is to foster innovation, promote entrepreneurship, and drive economic development through a range of programs and initiatives. Atal Tinkering Labs (ATLs) are established in schools across India to provide students with hands-on experience in STEM (Science, Technology, Engineering and Mathematics) fields. These labs are equipped with state-of-the-art equipment and resources to inspire young minds to innovate and experiment. AIM supports the creation of world-class Atal incubation centers that nurture startups and entrepreneurs. These centers provide access to mentorship, funding, and a conducive ecosystem for turning innovative ideas into successful businesses. Atal New India Challenges (ANIC) invites innovators and startups to address pressing national problems through technology-driven solutions. This initiative encourages problem solving and innovation while fostering collaboration between the government and the private sector. Atal Community Innovation Centers (ACICs) were established in rural and underserved areas to promote grassroots innovation. They provide access to technology, training and resources to empower local communities and drive socio-economic development. Atal Research and Innovation for Small Enterprises (ARISE) focuses on supporting small and medium-sized enterprises (SMEs) by providing access to research facilities and expertise, enabling them to enhance their product offerings and competitiveness. The impact of the AIM on India's innovation ecosystem is significant. It has not only ignited a spirit of innovation among students and entrepreneurs but has also led to the emergence of numerous successful startups across various sectors, including technology, healthcare, agriculture and renewable energy. AIM

has played a pivotal role in positioning India as a global innovation hub, attracting investment and fostering collaborations with international partners. AIM is driving India's transformation into a knowledge-driven economy. Its multifaceted initiatives empower individuals, schools, startups and communities to harness the power of innovation for national development. As India strives to become a global innovation leader, AIM stands as a beacon of hope, fostering a culture of innovation that will shape the country's future for years to come.

**Key words:** Atal Innovation Mission, Atal Tinkering Labs, Atal New India Challenges, Atal Community Innovation Centers, Entrepreneurship,

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## **A comprehensive review: Current Research on the Health Supporting properties of Indian ginseng (*Withania somnifera*)**

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There has been a notable increase in publications on the health-promoting properties of winter *Withania somnifera*, commonly known as Ashwagandha and winter cherry. Current research on Ashwagandha mainly conducted to examine the different human health aspects, involving adptogenic effect, effect on sleep, neuroprotective and sedative effect. Several clinical test also reports antimicrobial, anti-diabetic, cardioprotective and anti-inflammatory properties of winter cherry. Additionally, there are some reports of tarcicidal hormone act and reproductive effects. This mounting amount of investigation on Ashwagandha demonstrates its promise as a beneficial natural therapy for a wide range of health issues. It is crucial to note, however, that research on Ashwagandha is ongoing, and more studies are required to establish its potential therapeutic uses and define the ideal doses and durations of administration. Furthermore, the safety of Ashwagandha should be considered, especially when combined with other drugs or supplements. As a result, continued research, particularly clinical trials, is required to gain a

better understanding of the possible advantages and hazards of employing Ashwagandha as a therapeutic drug. This inclusive review goes into the most recent discoveries and provides a detailed summary of the current understanding of the possible uses of ashwagandha, as well as any known safety problems and contraindications.

**Keywords:** Indian ginseng; *Withania somnifera*; Herbal medicine; Antimicrobial activity; Anti-inflammatory activity; Plant extract

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## **In-vitro mass multiplication of *Bambusa balcooa***

**Radhika Motghare<sup>1</sup>, Dr. Shubhankar Tarafdar<sup>1</sup>, Dr. Kevin Gawali<sup>1</sup> and Khubchand Verma<sup>2</sup>**

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As the world's most prolific fastest expanding plant, bamboo occupies 1% of the world's forests. Bamboo offers a number of benefits in terms of environmental sustainability as well as its capability to fix carbon. In the present study a different concentration of HgCl<sub>2</sub> i.e. (0.1, 0.2 and 0.3) were used, subsequently followed by initiation in solid MS media by using different concentration of BAP. Out of which 0.1 % of HgCl<sub>2</sub> for 15 mins was observed to best in terms of survival percentage. Shoot has been multiplied using MS media with different concentrations and combinations of BAP & NAA mg/L. Here it was detected that when we gradually increases BAP concentration 2 mg/L + 0.7 (NAA) + 0.10 (ADS) the no. of shoot was increases as well as the maximum shoot length (in cm) was observed. After enough multiplication folds, the shoot was shifted to ½ MS media with different concentration & combinations of NAA & IBA. Out of which ½ MS +NAA 3 mg/L + 0.5(IBA) concentration showed maximum root induction response. After root growth, hardening has been carried out utilising a cocopeat mixed with vermi-compost mixture in a high-tech greenhouse's-controlled atmosphere.

## **In-vitro Regeneration of Bamboo (*Bambus balcooa*): A Review**

**Radhika Motghare<sup>1</sup>, Dr. Kevin Gawali<sup>1</sup>, Dr. Shubhankar Tarafdar<sup>1</sup> and Amol Nagmote<sup>1</sup>**

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Bamboos are adaptable, fragrant, perennial, and non-wood forest plants that are extremely significant from an ecological, sociological, and economic standpoint. Bamboo may be propagated using a variety of methods, including rhizome and culm cuttings, clump division, and seed propagation, however these traditional methods have significant limitations when it comes to large- or mass-scale multiplication. These are typically inadequate and ineffective for mass scale dissemination, leaving micropropagation as the sole practical approach. The requirement for bamboo material for cultivation is so high that large-scale multiplying will inevitably necessitate micropropagation. High hopes have been placed in the ability of micropropagation for the mass propagation of bamboo, and a great deal of study has gone into the creation of procedures for large-scale, quick propagation. These include clonal fidelity, somatic embryogenesis, invitro blooming, macro-proliferation, field efficiency as well as the optimisation and development of *in vitro* culture procedures. For large-scale micropropagation, which is urgently needed, this paper rapidly presents the most current knowledge on tissue culture mediated biotechnological interventions done in bamboo.

## **Impact of Crop Geometry of Maize (*Zea Mays* L.) On Growth and yield attributes**

**Mayank Bhange, Kevin Gawali, A. Thaokar and Chetan Bondre**

School of Agricultural Sciences, G. H. Raison University, Saikheda, Chhindwara (M.P.)



## 5<sup>th</sup> International Conference

To investigate the impact of crop geometry on the growth and yield of the maize crop (*Zea mays* L.), a field experiment was carried out in rabi 2022 on clayey soil at the Agronomy Farm, G.H. Rasoni University, Saikheda, Chhindwara (M.P.), Department of Agronomy, School of Agricultural Sciences. The experiment consisted of six treatments which were replicated thrice in RBD Design. Result indicated that application of Highly plant density (45 x 20) (T5) significantly increased growth attributes Plant height (156.93 cm), No. of leaves Plant-1 (11.90), Dry matter (111.0 g) and yield attributes No.ofcobsplant-1 (2.23), Grain yield (56.81 ha<sup>-1</sup> /q), Straw yield (90.57 ha<sup>-1</sup> /q) of maize crop.

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# Effect of Different Source of Fertilizers on yield and Economics of Wheat

**Girish Bambal<sup>1</sup>, Dr. Kevin Gawali<sup>1</sup>, Shubhashish Rakshit<sup>1</sup> and Prof. Ambarish Thaokar<sup>1</sup>**

School of Agricultural Sciences, G. H. Rasoni University, Saikheda, Chhindwara (M.P.)

The experiment was conducted at Crop Research Cafeteria, School of Agricultural sciences, G.H. Rasoni University, Chhindwara (M.P.). The experiment was lay out in Randomized Block Design (RBD) with eight treatments and three replications. The treatment detail is T<sub>1</sub>Control, T<sub>2</sub>100% RDF, T<sub>3</sub>100% RDF + farm yard manure @1t/ha, T<sub>4</sub>75% RDF + farm yard manure@1t/ha, T<sub>5</sub>50%RDF + farm yard manure@1t/ha T<sub>6</sub>100%RDF+ farm yard manure @1t/ha +PSB, T<sub>7</sub> 75%RDF + farm yard manure@1t/ha+PSB and T<sub>8</sub>50%RDF+ farm yard manure @1t/ha +PSB. Integrated use of chemical compost manure showed a significant impact on the yield and economics of wheat. The results revealed that the application of 100%RDF+ farm yard manure @ 1t/ha +PSB showed a significant positive impact on grain produce (Kg ha<sup>-1</sup>), straw produce (Kg ha<sup>-1</sup>) and gross monetary profit, net profit and Benefit cost ratio.

**Keywords:** Wheat, Urea, Yield and economics

## **Effect of nano-urea & Mono ammonium phosphate on Growth, Yield and yield Attributes of wheat (*Triticumaestivuml.*)**

**Jaya Chakole., Ambarish Thaokar and Dr. Kevin Gawali**

School of Agricultural Sciences, G. H. Raison University, Saikheda, Chhindwara (M.P.)

The experiment was carried out at Crop Research Cafeteria, School of Agricultural sciences, G. H. Raison University, Chhindwara (M.P.). The experiment was laid out in Randomized Block Design (RBD) with six treatments and three replications. The treatment detail is T<sub>1</sub> 100%RDN+1 spray of nano urea at tillering stage, T<sub>2</sub> 100% RDN + 1 spray of mono ammonium phosphate at tillering stage, T<sub>3</sub>75%RDN+1spray of nano urea at tillering & jointing stage + 1 spray of mono ammonium phosphate at tillering & jointing stage, T<sub>4</sub> 100% RDN + plain water spray a ttillering & jointing stage, T<sub>5</sub> 75% RDN + 1 spray of nano urea + 1 spray of mono ammonium phosphate+plainwaterattilleringstage and T<sub>6</sub> Control+50%RDN + plain water spray at tillering & jointing stage. Integrated use of nano urea & mono ammonium phosphate showed a significant impact on the growth, yield and yield attributes of wheat. The results revealed that the application of 75% RDN + 1 spray of nano urea + 1 spray of mono ammonium phosphate + plain water showed a significant positive impact on growth characters *viz.*, plant height(87.12cm), Number oftillersplant<sup>-1</sup>(7.39), Dry matter production plant<sup>-1</sup>(6.12 g), maximum grain yield (4782 kg ha<sup>-1</sup>) and straw yield (7116 kg ha<sup>-1</sup>) and higher yield attributes *viz.*, number of effective tillers (7.39 plant<sup>-1</sup>), spike length (9.63 cm), no. of grains spike<sup>-1</sup> (38.30) and test weight (41.05 g) over the other treatments.

**Keywords:** Wheat, nano urea, growth, yield and yield attributes

## **Effect of Nano Urea & Mono Ammonium Phosphate on Yield and Economics of Wheat (*Triticum aestivum L.*)**

**Jaya Chakole., Ambarish Thaokar and Dr. Kevin Gawali**

School of Agricultural Sciences, G. H. Rasoni University, Saikheda, Chhindwara (M.P.)

The experiment was conducted at Crop Research Cafeteria, School of Agricultural sciences, G.H. Rasoni University, Chhindwara (M.P.). The experiment was laid out in Randomized Block Design (RBD) with six treatments and three replications. The treatment detail is T<sub>1</sub> 100%RDN+1 spray of nano urea at tillering stage, T<sub>2</sub> 100%RDN + 1 spray of mono ammonium phosphate at tillering stage, T<sub>3</sub> 75% RDN + 1 spray of nano urea at tillering & jointing stage+1 spray of mono ammonium phosphate at tillering & jointing stage, T<sub>4</sub> 100%RDN+plain water spray at tillering & jointing stage, T<sub>5</sub> 75%RDN +1spray of nano urea+1spray of mono ammonium phosphate + plain water at tillering stage and T<sub>6</sub> Control + 50% RDN + plain water spray at tillering & jointing stage. Integrated use of nano urea & mono ammonium phosphate showed a significant impact on the yield and economics of wheat. The results revealed that the application of 75% RDN + 1 spray of nano urea + 1 spray of mono ammonium phosphate + plain water showed a significant positive impact on grain yield (Kg ha<sup>-1</sup>), straw (Kg ha<sup>-1</sup>) and gross monetary return, net return and B:C ratio.

**Keywords:** Wheat, nano urea, yield and economics

## **Integrated weed management in chickpea (*Cicer arietinum L.*)**

**Hrshikesh G Kokate, Dr. Kevin Gawali, Dr. Ruhidas Ghatak, Dr. Ashish Sarda and Dr. Chetan Bondre**

School of Agricultural Sciences, G. H. Rasoni University, Saikheda, Chhindwara (M.P.)

## G H Raisoni University, Saikheda and Just Agriculture Education Group

A field experiment was conducted during Rabi season 2022-2023 at research field, department of Agronomy, School of Agricultural sciences, G. H. Raisoni University, Saunsar, Dist- Chhindwara (M.P.) using four herbicides combined with Hand weeding for effectively controlling of both groups of weeds, their effect on production economics on chickpea. The experiment was carried out in Randomized Block Design with three replications. The treatments consist of eight weed management practices. We observed treatment Oxyfluorfen 0.120 kg/ha (PE) + Imazethapyr (POE) 50 g/ha @ 35 DAS + 1 hoeing @ 60 DAS minimum and significantly lowest total weed counts compared to rest of treatment then Imazethapyr 10% SL @ 63 g/ha (POE) at 25 DAS + 1 hoeing at 50 DAS, Pendimethalin 30 % EC @ 1.0 kg/ha (PE) + Quizalfop-p-ethyl 5% EC @ 0.060 kg/ha (POE) at 45 DAS then Pendimethalin 30% EC @ 1 kg/ha (PE) + 1 hoeing at 30 DAS. The important growth attribute, viz. plant height, number branches/plant, crop dry matter accumulation and important yield contributing characters, viz. number pods/plant, number of seeds/pods, text weight, growth values, viz. grain and straw yield significantly in the treatment Oxyfluorfen 0.120 kg/ha (PE) + Imazethapyr (POE) 50 g/ha @ 35 DAS + 1 hoeing @ 60 DAS and it as at par with Imazethapyr 10% SL @ 63 g/ha (POE) at 25 DAS + 1 hoeing at 50 DAS , Pendimethalin 30 % EC @ 1.0 kg/ha (PE) + Quizalfop-p-ethyl 5% EC @ 0.060 kg/ha (POE) at 45 DAS *fb* then Pendimethalin 30% EC @ 1 kg/ha (PE) + 1 hoeing at 30 DAS. Economic study revealed that, the maximum net monetary returns were obtained with the treatment Oxyfluorfen 0.120 kg/ha (PE) + Imazethapyr (POE) 50 g/ha @ 35 DAS + 1 hoeing @ 60 DAS (Rs 70946/ha) but it was at par with treatment Imazethapyr 10% SL @ 63 g/ha (POE) at 25 DAS + 1 hoeing at 50 DAS , (Rs 63401/ha), Pendimethalin 30 % EC @ 1 kg/ha (PE) + Quizalfop-p-ethyl 5% EC @ 0.050 kg/ha (POE) @ 45 DAS, (60608/ha), *fb* Pendimethalin 30% EC @ 1 kg/ha (PE) + 1 hoeing at 30 DAS, (Rs 55683/ha).Where, B:C ratio (1.65) is highest in also with the treatment Oxyfluorfen 0.120 kg/ha (PE) + Imazethapyr (POE) 50 g/ha @ 35 DAS + 1 hoeing @ 60 DAS.

## **Influence of Cropping Geometry on Yield and Economics of Maize Crop (*Zea mays* L.)**

**Mayank Bhange, Kevin Gawali, A. Thaokar, Chetan Bondre**

School of Agricultural Sciences, G. H. Rasoni University, Saikheda, Chhindwara (M.P.)

To investigate the impact of crop geometry on the growth and yield of the maize crop (*Zea mays* L.), a field experiment was carried out in rabi 2022 on clayey soil at the Agronomy Farm, G.H. Rasoni University, Saikheda, Chhindwara (M.P.), Department of Agronomy, School of Agricultural Sciences. The experiment consisted of six treatments which were replicated thrice in RBD Design. Result indicated that application of Highly plant density (45 x 20) (T5) significantly increased yield attributes No. of cobs plant<sup>-1</sup> (2.23), Grain yield (56.81 ha<sup>-1</sup> /q), Straw yield (90.57 ha<sup>-1</sup> /q) of maize and economics parameter Gross returns(192971 Rs/ha), Netreturns (131629 Rs/ha), B:CRatio (2.15)of maize crop.

## **Effect of integrated weed-management practices on the chickpea (*Cicer arietinum* L.) and related weed dynamics, productivity, and profitability.**

**Hrishikesh G Kokate, Dr. Kevin Gawali Dr. Ruhidas Ghatak, Dr. Ashish Sarda and Dr. Chetan Bondre**

School of Agricultural Sciences, G. H. Rasoni University, Saikheda, Chhindwara (M.P.)

The field experiment was conducted during *Rabi* season of the year 2022-23 at Agronomy Research Farm School of Agricultural sciences, G. H. Rasoni University, Saunsar, Dist- Chhindwara (M.P.) to find out most suitable weed management practice in chickpea. The experiment was laid out in randomized block design with three replications and eight weed control treatments, viz T<sub>1</sub>: Weedy check; T<sub>2</sub>: Pendimethalin 30% EC @ 1.0 kg/ha(PE) + 1 hoeing at 30 DAS; T<sub>3</sub>: Alachlor 1.0 kg/ha (PE) + 1 hoeing at 45 DAS; T<sub>4</sub>: Imazethapyr 10% SL @ 63 g/ha (POE) at 25 DAS + 1 hoeing at

## **G H Raisonni University, Saikheda and Just Agriculture Education Group**

50 DAS; T<sub>5</sub>: Oxyfluorfen 23.5% EC @ 0.120 kg/ha (PE); T<sub>6</sub>: Pendimethalin 30 % EC @ 1.0 kg/ha (PE) + Quizalfop-p-ethyl 5% EC @ 0.060 kg/ha (POE) at 45 DAS; T<sub>7</sub>: Quizalfop-ethyl 5% EC @ 0.060 kg/ha (POE) at 30 DAS + 1 hand weeding at 50 DAS; and T<sub>8</sub>: Oxyfluorfen 23.5% EC @ 0.120 kg/ha (PE) + Imazethapyr 10% SL @ 50 g/ha at 35 DAS + 1 hoeing at 60 DAS.

Results indicated that weed control treatments give significantly positive impact on nutrient (N, P, K) uptake, yields and economics of chickpea over weedy check at each growth stage. Maximum yield (18.78 q ha<sup>-1</sup>) and nutrient uptake (N- 100.80, P- 28.58 and K- 74.39 kg/ha) by chickpea were recorded in Oxyfluorfen 23.5% EC @ 0.120 kg/ha (PE) + Imazethapyr 10% SL @ 50 g/ha at 35 DAS + 1 hoeing at 60 DAS treatment and maximum nitrogen, phosphorous and potassium (18.22, 5.48 and 9.91kg/ha) uptake by weed were obtained in weedy check treatment and lowest in Oxyfluorfen 23.5% EC @ 0.120 kg/ha (PE) + Imazethapyr 10% SL @ 50 g/ha at 35 DAS + 1 hoeing at 60 DAS . So, adoption of suitable weed management measures can enhance the performance of crop and provide more income to farmers far achieving the goal of doubling farmer income by 2025

**GIRDAHA/AB/2023/264**

## **Performance of Different Cultivar of Maize (*Zea Mays* L.) For Optimum Growth, Yield attributes and Yield under Field Condition**

**Ankit E Bhakne, A.Thaoakar and Kevin Gawali,**

School of Agricultural Sciences, G. H. Raisonni University, Saikheda, Chhindwara (M.P.)

The goal of the field experiment was to evaluate the performance of various maize cultivars for the best growth, yield qualities, and yield under field conditions. It was carried out at the Agriculture Farm, School of Agricultural Sciences, G H Raisonni University, Saikheda, Chhindwara (M.P.) during the rabi season of 2022. Three replications were used in the randomized block design of the trial. Five maize

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cultivars (T<sub>1</sub>- JM218, T<sub>2</sub>- JM215, T<sub>3</sub>- PRMH - 306, T<sub>4</sub>- JM - 8, T<sub>5</sub>- JM - 13) and T<sub>6</sub>- control. Among the maize cultivar the V<sub>3</sub>-PRMH-306 performed significance superior over rest of varies at all cultivars. Results revealed that sowing of PRMH-306 variety recorded significantly higher growth parameters (viz., plant height, dry matter accumulation/plant, number of leaves/plant), yield attributes (viz., cobs/plant, seeds/cob, 100grain weight, cob length, girth of cob, rows/cob, grains/row) and grain yield as well as stover yield compared to control. In terms of grain yield, NMR, and B:C ratio, maize variety PRMH-306 significantly outperformed the other variations under all five maize cultivars. The PRMH-306 variety of maize was found to have the highest net financial returns and B:C ratio (Rs. 54909/ha and 2.81, respectively).

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## Effect of different varieties on yield and economics of maize (*Zea Mays* L.)

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The experiment was conducted in the School of Agricultural Sciences, Crop Research Cafeteria, G. H. Rasoni University, Chhindwara (M.P.). With six treatments and three replications, the experiment was set up using the Randomised Block Design (RBD) method. The treatment detail is T<sub>1</sub>JM218, T<sub>2</sub>JM215, T<sub>3</sub>PRMH - 306, T<sub>4</sub>JM - 8, T<sub>5</sub>JM - 13 and T<sub>6</sub>Control. Varietal effect revealed a substantial impact on the yield and economics of maize. The application of the PRMH-306 maize variety had a substantial favourable impact on growth characteristics, including grain yield (1693 kg ha<sup>-1</sup>), stover (2607 kg ha<sup>-1</sup>), gross monetary return (55869 rupees per hectare), net monetary return (34886 rupees per hectare), and B:C ratio (2.66).

**Keywords:** - Maize, Varieties, yield and economics

## **Effect of Bio-Fertilizers on Growth, Yield and Yield Attributes of chickpea (*Cicerarietinum*)**

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(M.P.)

The experiment was conducted at Crop Research Cafeteria, School of Agricultural sciences, G.H. Raisoni University, Chhindwara (M.P.). The experiment was laid out in Randomized Block Design (RBD) with six treatments and three replications. The treatment detail is T<sub>1</sub>Control + RDF 100%, T<sub>2</sub>RDF 100% + Rhizobium, T<sub>3</sub>RDF 100% + Trichoderma, T<sub>4</sub>RDF 100% + Rhizobium + PSB, T<sub>5</sub>RDF 100% + Trichoderma + Rhizobium and T<sub>6</sub>RDF 100% + Rhizobium + Trichoderma +PSB. Integrated use of chemical&bio-fertilizers showed a significant impact on the growth, yield and yield attributes of gram. The results revealed that the application of T<sub>6</sub> RDF 100% + Rhizobium + Trichoderma +PSB showed a significant positive impact on growth characteristics viz., plant height (45.18cm), branches plant<sup>-1</sup>( ), leavesplant<sup>-1</sup>(294.67), dry biomass plant<sup>-1</sup>(40.83g), nodules plant<sup>-1</sup>(50.67),grain yield (Kg1693 ha<sup>-1</sup>), Stover (2607Kg ha<sup>-1</sup>) and yield attributes viz.,pods plant<sup>-1</sup>(69.00), seed pod<sup>-1</sup> (2.33)and test weight (171.67 g).

**Keywords:** Chickpea, RDF + Bio-fertilizers, growth, yield and yield attributes

## **Perfomance of Bio-Fertilizers on Yield and Economics of chickpea (*Cicer arietinum*)**

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The experiment was conducted at Crop Research Cafeteria, School of Agricultural sciences, G. H. Raisoni University, Chhindwara (M.P.). The



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experiment was laid out in Randomized Block Design (RBD) with six treatments and three replications. The treatment detail is T<sub>1</sub>Control + RDF 100%, T<sub>2</sub>RDF 100% + Rhizobium, T<sub>3</sub>RDF 100% + Trichoderma, T<sub>4</sub>RDF 100% + Rhizobium + PSB, T<sub>5</sub>RDF 100% + Trichoderma + Rhizobium and T<sub>6</sub>RDF 100% + Rhizobium + Trichoderma +PSB. Integrated use of chemical&bio-fertilizers recorded a significant impact on the seed yield and economics of chickpea. The results revealed that the application of T<sub>6</sub> RDF 100% + Rhizobium + Trichoderma +PSBnoted a significant positive impact on seed yield (1693 Kg ha<sup>-1</sup>), stover (2607Kg ha<sup>-1</sup>) and gross monetary return (55869 Rs. Ha<sup>-1</sup>), net return (34886 Rs. Ha<sup>-1</sup>) and B:C ratio (2.66).

**Keywords:** - Chickpea, RDF + Bio-fertilizers, yield and economics

GIRDAHA/AB/2023/268

# Consequence of FYM and Major Nutrient on Growth and Yield of Linseed (*Linum usitatissimum L.*)

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(M.P.)

A field experiment was conducted during rabi, 2022-23 on clayey soil at the Agronomy Farm, Department of Agronomy, School of Agricultural sciences, G.H. Rasoni University, Saikheda, Chhindwara (M. P.), to study the consequence of FYM and major nutrient on growth and yield of linseed (*Linum usitatissimum L.*). The experiment consisted of nine treatments which were replicated thrice in RBD Design. Result indicated that 5 TONS FYM +125 %RDF (T<sub>9</sub>) significantly increased growth attributes and yield of linseed.

**Keywords:** Linseed, Nutrients, RDF, Growth, Yield, FYM.

## **Management of *Sclerotium rolfsii* by the use of botanical**

**Dhiraj Nimbalkar, Pushpanjali Dhok, Kevin Gawali and Ashutosh Rajoriya**

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Tomato (*Solanum lycopersicon* L.) is a globally significant vegetable crop facing substantial challenges due to collar rot disease caused by *Sclerotium rolfsii*. The study aimed to assess the antifungal potential of thirteen botanical extracts against *S. rolfsii* mycelial growth in vitro. *Allium sativum* (garlic) displayed the highest fungicidal efficacy, completely inhibiting mycelial growth at all tested concentrations (25%, 50%, 75%, and 100%). *Jasminum angustifolium* also exhibited notable inhibition, 57.14% to 70.95% across concentrations. Other botanical extracts showed varying degrees of inhibition. The study provides an eco-friendly alternative to chemical fungicides for controlling *S. rolfsii*, mitigating environmental risks and reducing the emergence of resistant pathogens. This research contributes to the growing emphasis on organic agriculture and sustainable disease management strategies. Further research should explore field applications and investigate the broader implications of these botanical extracts in integrated disease management programs.

## **Bio control efficacy of *Trichoderma* and *Pseudomonas* isolates against soil borne pathogens causing diseases in Chickpea.**

**Rahul Gathe, Pushpanjali Dhok, Kevin Gawali, Ashutosh Rajoriya,  
Rajbabbar Jatav and Dhiraj Nimbalkar**

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This study focused on isolating and identifying *Trichoderma* isolates and *Pseudomonas* isolates from rhizospheric soil and to study bioefficacy of *Trichoderma* and *Pseudomonas* isolates against soil borne pathogen of chickpea crop. Pathogen such as *Rhizoctonia bataticola* causing dry root rot and *Sclerotium rolfsii* causing collar rot to chickpea crop plant. In this research work Bacterial and fungal colonies were isolated using serial dilutions and hyphal tip technique, and identified using morphological features.

Four biocontrol agents were examined: *Trichoderma harzianum*, *Trichoderma viride*, *Pseudomonas fluorescence*, and *Pseudomonas spp.* In the case of *Sclerotium rolfsii*, *Trichoderma harzianum* exhibited the highest efficacy (64.28%), followed by *Trichoderma viride* (58.57%), *Pseudomonas fluorescence* (45.71%), and *Pseudomonas spp.* (41.42%). For *Rhizoctonia bataticola*, *Trichoderma harzianum* was again the most effective (91.42%), followed by *Trichoderma viride*, *Pseudomonas fluorescence*, and *Pseudomonas spp.* found lesser effective as compared to other biocontrol agents. The study highlights the mechanisms of competition for nutrients, antibiosis, and myco-parasitism as key factors in pathogen control. The results indicate significant growth inhibition of the pathogens by the BCAs, leading to potential strategies for managing plant diseases

## **In vitro evaluation of *Trichoderma harzianum* and *Trichoderma viride* for its efficacy against *Rhizoctonia bataticola* causing dry root rot of chickpea**

**Rahul Gathe, Pushpanjali Dhok, Kevin Gawali, Ashutosh Rajoriya, Rajbabbar Jatav and Dhiraj Nimbalkar.**

School of Agricultural Sciences, G. H. Raisoni University, Saikheda, Chhindwara (M.P.)

Efficacy of *Trichoderma harzianum* and *Trichoderma viride* isolates was evaluated under *in vitro* conditions against *Rhizoctonia bataticola* causal agent of dry root rot in chickpea. Through the dual culture technique it was determined that *Trichoderma viride* exhibited a growth inhibition of 70% against *Rhizoctonia bataticola*, while *Trichoderma harzianum* demonstrated a remarkable growth inhibition of 91.42%. These findings underscore the potential of *Trichoderma harzianum* and *Trichoderma viride* as potent antagonists, capable of effectively controlling dry root rot in chickpea.

**Keywords:** Phytopathogen, *Trichoderma harzianum*, *In vitro* technique, Isolation, Bio control agent, *Trichoderma viride*.

## **Genetic Variability Studies of Growth, Yield and Quality Parameter in Tomato (*Lycopersicon esculentum* M.)**

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School of Agricultural Sciences, G. H. Raisoni University, Saikheda, Chhindwara  
(M.P.)

The present study entitled “Genetic variability studies of growth yield & quality parameters in tomato (*Lycopersicon esculentum* M.)” for estimating the extent of genetic variability yield and quality parameters of parents respectively and to identify superior parents. To achieve these objective parents (Abhilasha, Brahma, Aarya, Indam AMERICAN, Ananta, Vishawanath, Shatabadi) were crossed in diallel fashion during the rabi 2021-22. Seven parents were obtained and grown at Department of Agril. Botany, College of Agriculture, GHRU Saikheda, Dist, Chhindwara, Madhya Pradesh in randomized block design with two replications. Spacing of 60 X 60 cm<sup>2</sup> was kept between row to row and plant to plant and 15 plants were raised in each row. The observations were recorded on days to 50% flowering, days to 1st flowering, plant height (cm) 60&90 DAT, Numbers of primary branches per plant 60&90 DAT, Stem girth 60&90 DAT, fruit length (cm), fruit diameter, Average fruit weight, Days to 1st maturity, Total yield per plant, Fruit yield per plot, Phenol content. The results obtained were subjected to statistical analysis. The mean squares due to genotypes were highly significant for all the characters studied i.e. days to 50% flowering, days to 1st flowering, plant height (cm) 60&90 DAT, Numbers of primary branches per plant 60&90 DAT, Stem girth 60&90 DAT, fruit length (cm), fruit diameter, Average fruit weight, Days to 1st maturity, Total yield per plant, Fruit yield per plot, Phenol content. this indicates the high genetic variation among the genotypes for these characters.

**Keywords:** GCV, PCV, Heritability, GAM, Tomato.

## **Effect of Indole Butyric Acid (IBA) on shoot and root characters of pomegranate (*Punica granatum*) hardwood cuttings**

**Anjali Wankhede, Ajay Haldar, Kevin Gawali and Ashish Sarda**

Department of Horticulture, SOAS, GH Raison University, Saikheda, Chhindwara (M.P.)

The present experiment conducted during October' 2022 to February' 2023 at the Department of Horticulture, School of Agricultural Sciences, GH Raison University, Saikheda (M.P.) during *Rainy* Season. The experiment was laid down in Randomized Block Design with three replication and seven treatment including control. The seven treatment of plant growth regulators and control (T1- Control , T2- 500 PPM IBA T3- 1000 PPM IBA, T4- 1500 PPM IBA, T5- 2000 PPM IBA, T6- 2500 PPM IBA and T7- 3000 PPM IBA). Observations of growth characters such as days taken to start sprouting, percentage of cutting takes, length of shoot after 80 days of planting (cm), length of shoot after 100 days of planting (cm), number of shoot per cutting, number of leaves per shoot, total number of leaves per shoot, length of leaves (cm), width of leaves (cm), leaf area index (LAI), fresh weight of leaves (g) and dry matter percentage of leaves, root characters such as length of roots (cm), diameter of roots (mm), fresh weight of roots (g) and dry matter percentage of roots to be recorded. The results revealed that the maximum days taken to start sprouting ( ), percentage of cutting takes ( ), length of shoot after 80 days of planting ( cm), length of shoot after 100 days of planting ( cm), number of shoot per cutting ( ), number of leaves per shoot ( ), total number of leaves per shoot ( ), length of leaves ( cm), width of leaves ( cm), leaf area index ( LAI), fresh weight of leaves ( g) and dry matter percentage of leaves ( ), root characters such as length of roots ( cm), diameter of roots ( mm), fresh weight of roots ( g) and dry matter percentage of roots ( ).

## **Combining ability for fruit yield and its components in brinjal (*Solanum melongena* L.)**

**A. R. Khanzode, Kevin Gawali and Amol Nagmote**

School of Agricultural Sciences, G. H. Raisoni University, Saikheda, Chhindwara  
(M.P.)

The means squares due to general combining ability and specific combining ability were significant for all the characters and means squares due to reciprocal combining ability significant for all the characters except days to 50% flowering and fruit girth. Kirti, Daftri and Simran are the parents were identified as good general combiner for yield and other yield contributing characters. These genotypes were may be recommended for their use in the crossing programme or for developing gene pool. High mean performance, significant useful heterosis, in desirable direction and positive significance sca/rca effect were considered as the criteria for selection of potential crosses. Based on above criteria the crosses Harsh X Daftri, Daftri X Kirti, Daftri X Harsh and Harsh X Kelwangi were identified to exhibit high mean, significant positive heterosis over both the checks and significant positive combining ability for grain yield plant<sup>-1</sup> and other yield contributing characters.

## Genetic Variability, Heritability and Genetics Advance in Tomato

**R. M. Mahurtale, Kevin Gawali and Amol Nagmote**

School of Agricultural Sciences, G. H. Raison University, Saikheda, Chhindwara  
(M.P.)

The present study entitled “Genetic variability, heritability and genetic advance in tomato (*Lycopersicon esculentum* M.)” for estimating the extent of genetic variability yield and quality parameters of parents respectively and to identify superior parents. To achieve these objective parents (Abhilasha, Brahma, Aarya, Indam 14301, Ananta, Vishawanath super) were crossed in diallel fashion during the rabi 2021-22. Seven parents were obtained and grown at Department of Agril. Botany, College of Agriculture, GHRU Saikheda, Dist, Chhindwara, Madhya Pradesh in randomized block design with two replications. Spacing of 60 X 60 cm<sup>2</sup> was kept between row to row and plant to plant and 15 plants were raised in each row. The observations were recorded on days to 50% flowering, days to 1st flowering, plant height (cm) 60&90 DAT, Numbers of primary branches per plant 60&90 DAT, Stem girth 60&90 DAT, fruit length (cm), fruit diameter, Average fruit weight, Days to 1st maturity, Total yield per plant, Fruit yield per plot, TSS The results obtained were subjected to statistical analysis. The mean squares due to genotypes were highly significant for all the characters studied i.e. days to 50% flowering, days to 1st flowering, plant height (cm) 60&90 DAT, Numbers of primary branches per plant 60&90 DAT, Stem girth 60&90 DAT, fruit length (cm), fruit diameter, Average fruit weight, Days to 1st maturity, Total yield per plant, Fruit yield per plot, TSS. This indicates the high genetic variation among the genotypes for these characters.

**Keywords:** GCV, PCV, Heritability, GAM, Tomato.



## **Genetic Variability, Heritability and Genetics Advance in Tomato**

**Rahul Mahurtale, Kevin Gawali, Amol Nagmote, Chetan Bondre and  
Ashish Sarda**

School of Agricultural Sciences, G. H. Rasoni University, Saikheda, Chhindwara  
(M.P.)

Six genotypes of tomato were evaluated for yield and various yield attributing characters at the Main Experiment Station, Department of Genetics and Plant Breeding, School of Agricultural Sciences, G. H. Rasoni University, Saikheda Tah. Sausar Dist. Chhidwada (M. P.), India; during 2022-2023. The experiment in Randomized Complete Block Design with three replications. Observations were recorded on twelve quantitative characters *viz.*, days to 50% flowering, days to first flowering, plant height at 60 and 90 days after transplanting (DAT), count of primary branches per plant at 60 and 90 DAT, stem girth at 60 and 90 DAT, fruit length(cm), fruit diameter(cm), average fruit weight(g), days to first maturity, total yield per plant, fruit yield per plot, and total soluble solids (TSS). High amount of GCV and PCV were observed for all the traits except days to 50 per cent flowering, which showed very low variability. High heritability along with high genetic advance in percent of mean were estimated for all the traits except days to 50 per cent flowering. Fruit yield per plant followed by average fruit weight, number of fruits per plant and plant height were the top five traits which showed high level of genetic advance indicating opportunity for better selection response.

**Keywords** GCV, PCV, Genetics advance , Tomato.

## **Effect of Indole Butyric Acid (IBA) on shoot and root characters of pomegranate (*Punica granatum*) hardwood cuttings**

**Anjali Wankhede, Ajay Haldar, Kevin Gawali and Ashish Sarda**

Department of Horticulture, SOAS, GH Raison University, Saikheda, Chhindwara (M.P.)

The present experiment conducted during October' 2022 to February' 2023 at the Department of Horticulture, School of Agricultural Sciences, GH Raison University, Saikheda (M.P.) during *Rainy* Season. The experiment was laid down in Randomized Block Design with three replication and seven treatment including control. The seven treatment of plant growth regulators and control (T1- Control , T2- 500 PPM IBA T3- 1000 PPM IBA, T4- 1500 PPM IBA, T5- 2000 PPM IBA, T6- 2500 PPM IBA and T7- 3000 PPM IBA). Observations of growth characters such as days taken to start sprouting, days taken to 50% sprouting, percentage of success of cutting, length of shoot after 60 days of planting (cm), length of shoot after 80 days of planting (cm) (b) Root characters such as number of roots per cutting, length of roots (cm) to be recorded. The results revealed that the maximum days taken to start sprouting ( ), days taken to 50% sprouting ( ), percentage of success of cutting ( ), length of shoot after 60 days of planting ( cm), length of shoot after 80 days of planting ( cm), Root characters such as number of roots per cutting ( ), length of roots ( cm).

## **Population Fluctuations of *Helicoverpa armigera* (Hubner) on Chickpea in Relation with Weather Parameters**

**Rushikesh P. Basugade<sup>1</sup>, Chetan M. Bondre<sup>1</sup>, Kevin A. Gawali<sup>1</sup>, and Kalpana Patil<sup>2</sup>**

<sup>1</sup>Department of Entomology, School of Agricultural Sciences, G. H. Raisoni University, Saikheda, Chhindwara (M.P.)

<sup>2</sup>Head Department of Entomology, Shri. Shivaji College of Horticulture, Amravati

The Population Fluctuation of *H.armigera* on chickpea conducted on experimental field of G. H. Raisoni School of Agriculture Sciences, Saikheda (M.P.) during Rabi 2022-23 on variety JG-36. The actual results reveals that the population fluctuation of gram pod borer is starts from vegetative stage and last to maturity of crop. The first occurrence of *H.armigera* was observed in 49<sup>th</sup> MW with 0.60 larva /meter row length Afterword larvae first time attained its greatest level 1.86 larvae/mrl in 2<sup>nd</sup> SMW and then slightly declined and As per investigation the maximum population of *Helicoverpa amigera* recorded in 6<sup>th</sup> MW having 2.20 larvae/mrl respectively. Confirms as peak incidence and identified stage is podding stage (grain development stage). The incidence of *H armigera* gradually declined after 2<sup>nd</sup> peak incidence. The varietal characteristics also help in controlling the population of *H.armigera*. The correlation studies reveal that the signifi negative correlation in between gram pod borer and max temperature and correlation calculated -0.648. Likewise the significant positive correlation found in between larval population and RH morning i.e. 0.531 and RH evening i.e. 0.692 as well as rainfall.

## **Impact of Certain Chemical Insecticides Along with Biopesticide on *Helicoverpa armigera* (Hubner) in Chickpea.**

**Rushikesh P. Basugade<sup>1</sup>, Chetan M. Bondre<sup>1</sup>, Kevin A. Gawali<sup>1</sup> and Nikhil Waghmare**

<sup>1</sup>Department of Entomology, School of Agricultural Sciences, G. H. Raisoni University, Saikheda, Chhindwara (M.P.)

To investigate the impact of chemical insecticide along with biopesticides on gram pod borer *Helicoverpa armigera* in chickpea conducted infield condition of G.H.R.U.School of Agriculture Sciences, Saikheda (M.P.) with various treatments. The trials laid out as per experimental design RBD with seven treatment modules including control i.e. Flubendiamide 480SC, Indoxacarb 14.5SC, Spinosad 45SC, HaNPV 250LE + Btk 8L, Novaluron 10EC, HaNPV 250LE. Respectively three spray schedules taken on gram pod borer and after application of all sprays Flubendiamide 480SC expressed as high potential chemical to control population of gram pod borer i.e. only 0.63 larvae/ml amongst all modules. As result Flubendiamide takes lead role or being superior over other treatments. Rest of treatments also had significant control on gram pod borer followed by Indoxacarb 14.5SC (0.87 larvae/ml), Spinosad 45SC (1.03 larvae/ml), HaNPV + Btk (1.18 Larvae/ml), Novaluron 10EC (1.21 Larvae per meter row) at last the least effective or low potential was HaNPV 250LE (1.10 larvae/ml). Regarding with grain yield also Flubendiamide 480SC proved its effectiveness by recording highest yield amongst all modules (i.e. 20-22 qt/ha).

**Keywords:** Efficacy, *Helicoverpa armigera*, Impact, Insecticides

## **Investigating Seasonal Fluctuation of *Helicoverpa armigera* on Chickpea and Weather Parameters Affecting on it.**

**Rushikesh P. Basugade<sup>1</sup>, Chetan M. Bondre<sup>1</sup>, Kevin A. Gawali<sup>1</sup> and  
Aniket Dorle**

<sup>1</sup>Department of Entomology, School of Agricultural Sciences, G. H. Raisoni  
University, Saikheda, Chhindwara (M.P.)

The pod borer is unquestionably responsible for 80-90% of the damage in chickpea fields. Because of the transition of the larval population from vegetative growth to pod formation. The study explores the critical role of weather parameters in influencing the population dynamics and infestation patterns of the gram pod borer (*Helicoverpa armigera*), a devastating pest affecting leguminous crops, particularly chickpeas. The research underscores the significance of understanding the relationship between weather parameters and the behavior of this insect for effective agricultural management strategies. The gram pod borer's life cycle and behavior are intricately linked to various weather factors. Temperature, a key factor, governs its developmental rate, influencing egg hatching, larval growth, pupation, and adult emergence. Warmer temperatures accelerate growth and turnover of generations, while cold temperatures can slow down these processes. Additionally, rainfall and humidity impact larval survival and movement. Adequate rainfall provides favorable conditions for host plant development, affecting larval food availability.

The study reveals the exact infesting pattern of gram pod borer *H.armigera* on chickpea. It can be helpful for many more studies going to be implemented on this topic. It also helps to implement effective management strategies over *Helicoverpa armigera* gram pod borer. The findings emphasize the practical implications for agriculture. Farmers can predict and manage pest outbreaks by monitoring local weather conditions and their effects on the pest's life cycle. This knowledge facilitates the development of targeted pest management strategies. By leveraging the information on weather parameters, farmers can optimize pesticide applications, reduce pesticide use, and minimize environmental

contamination. Implementing control measures during specific weather conditions can lead to cost savings and preserve crop quality.

Ultimately, this research highlights the intricate relationship between weather parameters and the incidence of the gram pod borer. Understanding these connections empowers farmers to make informed decisions, adopt sustainable practices, and enhance resilience against changing conditions. The study contributes to the broader goal of sustainable agricultural practices, economic benefits, and food security by optimizing pest management strategies based on weather patterns.

**Keywords:** *Helicoverpa armigera*, Chickpea, pod borer, Incidence, Weather factor

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## **Impact of Television on Radio Listening Habits of Farmers**

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The advent and spread of Television brought a wave of entertainment putting the Radio broadcast in the background. However, the agricultural broadcast enjoyed lot of credibility and patronage among the rural community and are assumed to hold their importance even after the spread of Television. Hence, to probe into, how for the Television has affected Radio listening habits of farmers, particularly the farm broadcast, the present study was undertaken. The study was conducted in Sausar tehsil of Chhindwara district (M.P.). The sample of the study consisted of 135 respondents from 15 villages. The respondents were interviewed personally with the help of pretested interview schedule and the data was collected. The data collected was analyzed and inferences were drawn.

The News on Radio as well as on Television was most popular among the formers. Agricultural programmes on Radio occupied second

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place, whereas the same on Television occupied fourth place after News. Amongst the other programmes, Cine Songs on Radio channels were popular, whereas Serials and Cinema were popular programmes on Television. The time spent on listening to Radio was maximum during morning hours, while the time spent on Television viewing was more during evening and night hours, which may be termed as impact of Television on Radio Listening habits of farmers. Similarly, the younger farmers exhibited low level of preference to listening to farm broadcast as compared to senior Category of farmers. The young farmers were obviously attracted towards Television. Cosmo politeness and higher degree of Extension contacts found to be significantly associated with high level of preference to listening to farm broadcast which indicated that progressive farmers gave preference to farm broadcast on Radio. Formal education, size of land holding, socio-economic status and accessibility to Radio and Television did not have any significant association with the level of preference to listening to farm broadcast.

Getting information about recent advances in agriculture and receiving daily hints were most prominent reasons for listening to farm broadcast on Radio. Entertainment was most prominent reason for viewing the Television. Efforts may be made to provide more advanced farm information and practical hints to the formers. It is necessary to keep in touch with the changing information need and sources of information of the clientele and guide the field extension workers to be more effective while utilising the mass media.

## **Simulation of Indian Refrigerators Using ERA Program**

**Dr. Saurabh Gupta**

G H Raison Institute of Engineering and Business Management, Jalgaon

Due to replacement of CFCs in refrigerators, rapid product redesign is required to meet higher energy efficiency standards. ERA (EPA Refrigerator Analysis) program developed by Arthur D. Little, is capable of simulating the performance of a refrigerator in case of refrigerant replacement. ERA is a tool that can be used as a part of the design and optimization process to determine the energy benefit concepts. This paper deals with various features of ERA for domestic refrigerator.

## **Assessment of Crop Weather Relations in Wheat (*Triticum aestivum*) in Western Maharashtra Plain Zone**

**Misal Suraj Satish <sup>1\*</sup>, Kharbade Sattappa Bhambhar<sup>2</sup> and R. Balasubramanian <sup>3</sup>**

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<sup>2</sup>Associate Dean, College of Agriculture, Kolhapur, 415 110, Mahatma Phule Krishi Vidyapeeth, Rahuri, 413722, Maharashtra, India.

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Wheat (*Triticum aestivum* L.) is a thermo-sensitive long-day crop. Temperature is a major determinant of its growth and productivity. Late sown wheat exposes preanthesis phenological events to high temperature that influence grain development and ultimately the yield [6]. Comprehensive assessments of the influence of climate variability on crop yields at local and regional scales can be highly beneficial. With an aim to assess the weather influences on wheat at local scale this study was taken up. An experiment was conducted at Department of Agricultural Meteorology Farm, College of Agriculture, Pune, Maharashtra State (India) in a split-plot design with three



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replications and sixteen treatment combinations of four different varieties and four sowing windows. Four varieties used were NIAW-301 (*Trymbak*), NIAW-917 (*Tapovan*), NIAW-1415 (*Netravati*) and NIAW-1994 (*Phule Samadhan*). Four sowings were taken up on 43<sup>rd</sup> MW (22-28 October), 45<sup>th</sup> MW (5-11 November), 47<sup>th</sup> MW (19-25 November) and 49<sup>th</sup> MW (3-9 December). The grain yield of wheat was influenced significantly by wheat varieties. The grain yields were significantly higher in NIAW-1994 (51.07 and 48.52 qha-1) and significantly superior to the rest of the wheat varieties. This was followed by NIAW-917 (45.72 and 43.43 q ha-1), NIAW-301 (43.57 and 41.27 q ha-1). The variety NIAW-1415 recorded significantly lower grain yield (40.89 and 38.84 qha-1) during 2016 and 2017, respectively. Correlation analysis with weather parameters e.g. Temperature (Maximum and Minimum), Relative humidity (Morning and Evening), Rainfall and *bright sunshine hours* and yield showed that from tillering to 50% flowering stage, maximum temperature (-0.962\*) was significantly negatively correlated with grain yield ( $r = -0.980^{**}$ ), ( $r = -0.950^{**}$ ) during 2016 and 2017, respectively in NIAW-301 (*Trymbak*). The same trend was observed in the remaining varieties also. Regression equations were developed to predict the yield.

**Keywords:** Correlation, Regression, Wheat varieties, Sowing dates, Growth stages and Yield

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# Simulation of Indian Refrigerators Using ERA Program

**Dr. Saurabh Gupta**

G H Rasoni Institute of Engineering and Business Management, Jalgaon

Due to replacement of CFCs in refrigerators, rapid product redesign is required to meet higher energy efficiency standards. ERA (EPA Refrigerator Analysis) program developed by Arthur D. Little, is capable of simulating the performance of a refrigerator in case of refrigerant replacement. ERA is a tool that can be used as a part of the design and optimization process to determine the energy benefit concepts. This paper deals with various features of ERA for domestic refrigerator.

## Effects of Temperature and Substrate on Germination of Tulsi (*Ocimum tenuiflorum L*) seeds

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CCS Haryana Agricultural University, Hisar-125004

Tulsi (*Ocimum tenuiflorum L.*) holds a crucial place as a medicinal herb and is actively grown for commercial purposes in regions of the country with hot and humid climates. The germination process in Tulsi seeds is an important stage that can be influenced by various environmental factors, including temperature and germination substrates. Understanding the germination responses to temperature and substrate variations is crucial for optimizing Tulsi seedling production and achieving successful crop establishment. Keeping in view the present study was conducted during 2022 in the laboratories of the Department of Seed Science and Technology, Chaudhary Charan Singh Haryana Agricultural University, Hisar. This study examines the impact of different temperatures and substrates on the germination of Tulsi seeds. The experiment involved germination of Tulsi seeds at 15°C, 20°C, 25°C, 30°C, and 20-30°C alternate temperature grown in three substrates *i.e.* Between paper, Top of the paper and Sand substrate to assess their effect on germination. The maximum germination was observed at 25°C in top of the paper substrate, followed by highest germination was observed at 25°C in between paper, while the lowest germination percentage was recorded in sand at 30°C. There was no germination observed at 15°C and 20°C in any of the substrates. The results reveal that temperature and substrate significantly affect Tulsi seed germination. Findings indicate optimal conditions for Tulsi seed germination is top of the paper substrate as well as between paper at 25°C.

**Keywords:** Germination, Substrates, Temperature, Tulsi

## **Developemnt & Performance Evaluation of Groundnut Harvester**

**M. D. Nikam, S. K. Thakare, Mrudulata M. Deshmukhand and E. R.  
Vaidya**

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Technology, Dr. P.D.K.V., Akola

Groundnut or peanut is commonly known as the poor man's cashew nut. India is the second-largest producer of groundnuts followed by China and occupies crucial place in Indian agriculture economy. Harvesting of groundnut is one of the most important operations in groundnut cultivation. During peak seasons, due to the non-availability of labour, delay the harvesting of ground nut and results in heavy loss. For minimizing the labour problems during peak seasons and to ensure timeliness operation an attempt was made to develop groundnut harvester. Various crop parameters and soil parameters were measured during the study. The measured values were used for deciding the dimensions of various working components such as digging unit, conveying unit, depth of digging etc. The developed prototype was evaluated in groundnut variety TAG-24. The field evaluation results showed that the average digging efficiency, picking efficiency and conveying efficiency of the harvester was 98.38, 90.32 and 96.73 per cent, respectively. The average operating width, depth & average pod damage was observed as 348.7 mm and 130 mm & 4.77 per cent respectively. The average effective field capacity and field efficiency of the harvester was observed 0.059 ha/h and 66.67 per cent, respectively at optimum combinations of variables.

**Key words:** Groundnut harvester, picking efficiency and pod loss

## Interaction effect of phosphate and zinc solubilizing bacteria on quantity and quality parameters of paddy

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<sup>2</sup>Department of Soil Science and Agricultural Chemistry

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University of Agricultural Sciences, Raichur

The primary objective of this study was to examine the interaction effect of phosphate and zinc-solubilizing bacteria on yield and nutrient content of paddy under field condition. Forty phosphate solubilizing bacteria were isolated and characterized. On screening, two efficient isolates were selected and identified as *Pseudomonas sp.* (PPSB-21) and *Bacillus sp.* (PPSB-5). Efficient isolates of phosphate-solubilizing bacteria along with zinc solubilizing bacteria were used as inoculants. It has concurrently increased the yield, phosphorous and zinc content in plants. The study consisted of eight treatments with three replications each in a randomized complete block design. The treatment (T<sub>6</sub>) with combine inoculation of 75 % RDF + PPSB 5 + PPSB 21+ ZSB has significantly increased the grain yield (5745kg/ha) and straw yield (6217 kg/ha) along with phosphorous (2.95%) and zinc content (26.825 mg/kg) of paddy over other treatments. The addition of P and Zn solubilizers to the soil stimulated the availability of applied phosphatic fertilizer by converting from unavailable to available form as a result enhanced the yield and nutrient content of paddy. It has been reported that phosphate solubilizing bacteria are the most promising bacteria which may be used as biofertilizers for plant growth and nutrient use efficiency.

**Keywords:** Phosphate solubilizing bacteria, Zinc solubilizing bacteria, *Pseudomonas sp.* *Bacillus sp.* Biofertilizer

## **Influence of different sowing times on growth and yield of Wheat (*Triticum aestivum* L.)**

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An experiment was conducted during *rabi*, 2016-17 at Kolhapur region. To find out suitable sowing time and varieties of wheat under extended sowing times. The experiment was laid out in split plot design *viz.* five sowing times (45<sup>th</sup> MW, 47<sup>th</sup> MW, 49<sup>th</sup> MW, 51<sup>th</sup> MW and 1<sup>st</sup> MW) as main plot and four varieties (NIAW-301(Trimbak), NIAW-917 (Tapovan), NIAW-34 (Niphad -34) and NIAW-1994 (Phule Samadhan)) as sub plot with three replications. The growth and development of wheat measured in terms of plant height, number of leaves, total number of tillers m<sup>2</sup>, leaf area and total dry matter per plant was observed to higher when sowing was done at 47<sup>th</sup> MW (19<sup>th</sup>- 25<sup>th</sup> Nov.) at all growth stages. The yield contributing character such as length of spike, number of spikelets spike<sup>-1</sup> was higher when crop sown at 47<sup>th</sup> MW (19<sup>th</sup>-25<sup>th</sup> Nov.). The grain yield (39.90 q ha<sup>-1</sup>) was also maximum when crop sown at 47<sup>th</sup> MW (19<sup>th</sup>-25<sup>th</sup> Nov.). Straw yield (61.58 q ha<sup>-1</sup>) was highest with sowing at 47<sup>th</sup> MW. It may be concluded that optimum sowing time of wheat crop is 47<sup>th</sup> MW (19<sup>th</sup>-25<sup>th</sup> Nov.) as compare to late sown of wheat.

**Keywords:** Sowing times, Growth and Yield

## Hydrodynamic Cavitation: Sustainable Approach to Food Processing

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The 20th century has witnessed a remarkable enhancement in the demand for varieties of consumer products, ranging from food, pharmaceutical and other industries. To enhance the quality of the product and to reduce the production cost, industries are gradually inclined towards greener processing technologies. Cavitation based technologies are gaining interest among processing technologies due to their cost effectiveness in operation, minimization of toxic solvent usage, and ability to obtain superior processed food products compared to conventional methods. Cavitation is produced by pressure variation-interchange of pressure and kinetic energy. Hydrodynamic cavitation (HC) is one of the AOP (Advanced oxidation process) which takes less time and releases large magnitude of energy. It is generated by using orifice plate or venturi. HC has wider applications in brewing, dairy industry and juice processing, palm oil processing and waste management etc.

**Keywords:** Cavitation, Hydrodynamic, pressure, kinetic energy and Venturi etc.

## **Evaluation of landraces for high grain protein content and yield in rice**

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<sup>1</sup>Professor Jayashankar Telangana State Agricultural University

<sup>2</sup>ICAR- Indian Institute of Rice Research

Despite being the major food for many people in Asia, Africa and South America, rice has the lowest protein content (4-8%) of the major cereals. Only 20% of the people in the world have access to nutritious diet. To overcome this there is a need of considerable efforts into producing rice lines with enhanced levels of protein and amino acids. Towards achievement of the objective a field experiment was conducted at ICAR-IIRR, Hyderabad. Maximum yields of 28.25, 28.19 & 27.94 g plant<sup>-1</sup> were recorded by JAK389, JAK10 & JAK688 respectively. In these lines JAK688 has high grain yield (27.94), high protein yield (3.39 g plant<sup>-1</sup>) and GPC (12.12). Correlation analysis revealed that the milled grain protein content has significant positive correlation with SCMR values (0.545), leaf translocated nitrogen (0.516), stem translocated nitrogen (0.769), leaf translocated carbon (0.636) and stem translocated carbon (0.835) from seed setting to harvest stage. With this experiment it was concluded that JAK688 can be used as high protein donor in breeding programmes.

# **Assessing the Influence of Annual and Perennial Alley Cropping Systems on Soil Fertility and Productivity of Organic Cotton in Vertisols: Insights from a Participatory On-Farm Research Initiative in India**

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In the pursuit of sustainable agriculture, the assessment of farming practices on soil health and crop productivity stands as an imperative endeavor. Our inquiry focuses on assessing the impact of annual ( $AC_{an}$ ) and perennial ( $AC_{pe}$ ) alley cropping systems, closely examining their effects on both soil fertility and the yield of organic cotton. The POR methodology adds a collaborative aspect to our study, promoting the sharing of expertise between farmers and researchers. The results indicated that the perennial  $AC_{pe}$  system had a more significant impact on soil parameters such as electrical conductivity (EC: 0.26 to 0.27  $dSm^{-1}$ ), soil organic carbon (SOC: 0.59 to 0.79%), total nitrogen (total N: 0.29 to 0.40%), available nitrogen (available N: 159 to 182  $kg\ ha^{-1}$ ), zinc (Zn: 1.49 to 1.32 ppm), and iron (Fe: 6.32 to 7.39 ppm). Conversely, the annual  $AC_{an}$  system demonstrated a positive influence on soil pH (7.86 to 7.70  $dSm^{-1}$ ), total phosphorus (total P: 443 to 681 ppm), available phosphorus (available P: 24.23 to 15.09  $kg\ ha^{-1}$ ), total potassium (total K: 11551 to 13836 ppm), available potassium (available K: 657 to 772  $kg\ ha^{-1}$ ), manganese (Mn: 12.32 to 14.87 ppm), and copper (Cu: 3.33 to 3.80 ppm). Intense competition within the soil food web led to the depletion of certain nutrients. Ultimately, the annual  $AC_{an}$  system excelled in terms of organic cotton seed yield, achieving a substantial 7.75 quintals per hectare, while the perennial  $AC_{pe}$  system yielded a comparatively modest 5.76 quintals per hectare.



**Keywords:** soil health, crop productivity, annual alley cropping system (AC<sub>an</sub>), perennial alley cropping system (AC<sub>pe</sub>), soil fertility, organic cotton, participatory research, Vertisols

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## **A novel approach for management of weed dynamics, herbicide efficacy and wheat productivity**

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Rice residue mulch of 8 t ha<sup>-1</sup> suppressed most of the weed flora under study; however, magnitude of suppression was higher for some weeds (*Coronopus didymus*, *Chenopodium album*, *Anagallis arvensis*, *Rumex dentatus* and *Phalaris minor*) than others (*Melilotus alba*, *Medicago denticulata* and *Lathyrus aphaca*). Increase in wheat seed rate by 25% caused 11-20% reduction in total weed density and biomass under weedy conditions, though, suppressive effect of higher seed rate was not so evident with effective herbicides. Higher seed rates significantly improved crop emergence through heavy residues and consequently spike density and grain yield. Interaction effects showed that integration of higher seed rate + PRE herbicides (applied beneath the mulch) + 8 t ha<sup>-1</sup> rice residue mulch, reduced the weed density and biomass close to zero in ZT wheat. Dissipation of PRE herbicides from soil surface was found slower when applied beneath 8 t ha<sup>-1</sup> mulch than bare soil. In wheat sown with turbo happy seeder (ZT + rice residue), application of herbicides onto mulch either as PRE with high carrier volume (1000 L ha<sup>-1</sup>) improved herbicide penetration through mulch and provided satisfactory weed control (85-90%); and grain yield similar to weed-free.

**Keywords:** seed rate, rice residue, weeds, herbicides, productivity

# Analysis of Performance and Competitiveness of Tomato Export from India

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This study aims to investigate the trade direction and competitiveness of India's tomato exports. The study used Markov Chain Approach to analyse the structural composition of tomato exports from India during period from 2007-08 to 2021-22. The Revealed Comparative Advantage Index (RCA) was employed to assess competitiveness from 2010 to 2021. A negative growth in the total quantity of tomato exports from India during the study period was observed, while the value of the exports showed a statistically insignificant positive growth rate. Major importing countries namely, Bangladesh, Nepal, UAE, Qatar, Maldives and Oman, were selected for study. Results of Markov chain analysis revealed that, Bangladesh emerged as the most reliable market for Indian tomato, followed by Nepal and the UAE. On other hand, Oman was most unstable destination market for Indian tomato during this period. The study also projected an increase in tomato exports to the UAE over the next five years. The Revealed Competitive Index reported that Bangladesh and Nepal were the competitive markets for Indian tomatoes during the study period, Comparative Export Performance index revealed that the major global tomato exporters maintain a competitive edge over India, despite India's status as the second-largest producer of tomatoes. According to International Trade Centre India reported estimated potential export of US\$ 38 million in year 2022, whereas actual export during the same period was US\$ 30 million, therefore the gap between potential and actual export i. e. untapped export potential was estimated at US\$ 8 million, which accounted for 21.05 per cent of the total export potential of tomato export from India. So it can be interpreted as India has potential to become a competitive in world tomato market. To enhance competitiveness, measures such as upgrading infrastructure facilities like cold chains, processing to ensure quality improvement, meet international market demand and better port facilities could be implemented.

**Keywords:** Tomato, Export, Markov chain, Competitiveness, Export potential

# Impact of processing on underutilized nutrient rich millets

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Millets are the harbinger of nutrition required for human health. Millets are the sixth-highest yielding grains in the world and a staple crop for millions of people living in semi-arid regions. The most important kind of millets are proso millet (*Panicum miliaceum* L.), pearl millet (*Pennisetum glaucum* L.), finger millet (*Eleusine coracana* L.) and foxtail millet (*Setaria italica* L.) in Asia. Besides the diverse essential nutritional constituents like minerals, vitamins, micronutrients, etc., millets grains also contain a considerable amount of anti-nutritional constituents. The removal of anti-nutritional compounds from the particular type of millet is a mandatory requirement prior to its consumption otherwise it creates serious health hazards. Different type of processing treatments has been given to the millet grains at household level from ancient times to make them suitable for human consumption. Different processing treatments include soaking, heating, roasting, fermentation, germination, cooking, etc. which are used for value additions and to enhance bioavailability and reduction of antinutritional factors. The adoption of appropriate type of processing technology with suitable type of equipment decreases the anti-nutritional constituents, off taste, and off flavours from the millet. Because of this, day by day the consumers of millets products are continuously increasing. Also, the commercial scale production of various value-added products of millets are boosting due to the availability of suitable type of processing machineries and equipment. The advancement in the processing technologies of millets opens a new horizon and it will help to raise millets at competitive level of staple food.

**Keywords:** Millets, Anti-nutritional factor, Millet's processing and Anti-oxidant activity

## **Studies on response of cauliflower (*Brassica oleracea* var. *botrytis* L.) to NAA and GA<sub>3</sub> for growth dynamics and curd formation characters under Chhattisgarh plains**

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The present experiment was conducted during *Rabi* 2020-2021 at Precision Farming Development Centre (PFDC), Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The research was conducted in RBD with 9 treatment combinations in three replications. In this experiment the four different concentrations of NAA viz. (80, 100, 120 and 140 ppm) and four different concentrations of GA<sub>3</sub> (50, 100, 150 and 200 ppm) were used over control. Among all the treatments, it was concluded that for growth attributing characters T3- GA<sub>3</sub> 150 ppm gave maximum plant height (cm) at 30, 45 and 60 DAT (28.77, 40.67, 45.00), No. of leaves/plant at 30, 45 and 60 DAT (10, 14, 21), canopy spread (cm<sup>2</sup>) at 30, 45 and 60 DAT (39.33, 55.50, 73.17), length of leaves (cm) at 30, 45 and 60 DAT (18.67, 30.00, 37.00), width of leaves (cm) at 30, 45 and 60 DAT (10.00, 16.33, 19.20), minimum no. of days from transplant to the start of the curd (44.00), minimum no. of days from transplant to 50% curd formation (57.00), minimum no. of days from transplant to harvesting of crop (67.00). From this experiment, it was concluded that 150 ppm of GA<sub>3</sub> can be recommended in cauliflower for higher growth dynamics and curd formation characters.

### **Key words**

Cauliflower (*Brassica oleracea* var. *botrytis* L.), Plant growth regulators, growth dynamics and curd formation.

## **Studies on response of cauliflower (*Brassica oleracea* var. *botrytis* L.) to NAA and GA<sub>3</sub> for yield and yield attributing characters under Chhattisgarh plains**

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The present experiment was conducted during *Rabi* 2020-2021 at Precision Farming Development Centre (PFDC), Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The research was conducted in RBD with 9 treatment combinations in three replications. In this experiment the four different concentrations of NAA viz. (80, 100, 120 and 140 ppm) and four different concentrations of GA<sub>3</sub> (50, 100, 150 and 200 ppm) were used over control. Among all the treatments, it was concluded that for yield attributing characters T3- GA<sub>3</sub> 150 ppm gave maximum yield attributing characters such as maximum curd yield per plant (g) (0.97), curd yield per plot (Kg) (3.88), curd yield (q/ha) (358.90), curd diameter (cm) (68.33), was recorded in T3- GA<sub>3</sub> 150 ppm, and the minimum was recorded under T9-control. From this experiment, it was concluded that 150 ppm of GA<sub>3</sub> can be recommended in cauliflower for higher yield.

**Key words:** Cauliflower (*Brassica oleracea* var. *botrytis* L.), Plant growth regulators, curd yield.

## To study the effect of GA<sub>3</sub> and NAA on quality parameters of cauliflower (*Brassica oleracea* var. *botrytis* L.) under Chhattisgarh plains

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The present experiment was conducted during Rabi 2020-2021 at Precision Farming Development Centre (PFDC), Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The research was conducted in RBD with 9 treatment combinations in three replications. In this experiment the four different concentrations of NAA viz. (80, 100, 120 and 140 ppm) and four different concentrations of GA<sub>3</sub> (50, 100, 150 and 200 ppm) were used over control. Among all the treatments, it was concluded that for growth attributing characters T3- GA<sub>3</sub> 150 ppm gave maximum quality attributing characters such as maximum TSS of the curd (%) (12.57), dry weight of curd per 100g fresh weight (10.37), ascorbic acid content in curd (mg/100g) (74.43) was recorded in T3- GA<sub>3</sub> 150 ppm. followed by the treatments T7- NAA - 120 ppm, T2- GA<sub>3</sub> - 100 ppm, T4- GA<sub>3</sub> - 200 ppm, and T8- NAA - 140 ppm and the minimum was recorded under T9-control.

From this experiment, it was concluded that 150 ppm of GA<sub>3</sub> can be recommended in cauliflower for higher quality attributing characters.

**Key words:** Cauliflower (*Brassica oleracea* var. *botrytis* L.), Plant growth regulators, quality attributing characters.

**To find out the economics of the effect of GA<sub>3</sub>  
and NAA on cauliflower (*Brassica oleracea* var.  
*botrytis* L.) under Chhattisgarh plains**

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The present experiment was conducted during *Rabi* 2020-2021 at Precision Farming Development Centre (PFDC), Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The research was conducted in RBD with 9 treatment combinations in three replications. In this experiment the four different concentrations of NAA viz. (80, 100, 120 and 140 ppm) and four different concentrations of GA<sub>3</sub> (50, 100, 150 and 200 ppm) were used over control.

Maximum cost of cultivation was recorded in T8- NAA - 140 ppm (Rs 79,961.67/ha) and minimum was recorded under T9-control (Rs 74000/ha). Treatment T3- GA<sub>3</sub> 150 ppm was recorded maximum gross income (Rs 358900/ha), net return (Rs 2,80,068 /ha) and maximum Benefit: Cost ratio (4.55), followed by the treatments viz. T7 (4.48), T2 (4.00) and T4 (3.31) respectively against T9 (2.06).

From this experiment, it was concluded that 150 ppm of GA<sub>3</sub> can be recommended in cauliflower for maximum Benefit: Cost ratio.

**Key words:** Cauliflower (*Brassica oleracea* var. *botrytis* L.), Plant growth regulators, maximum Benefit: Cost ratio.

# Generation of phenotypically stable transgenic tobacco plants by targeting *cry2Aa* gene to the chloroplast

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The success of genetically engineered (GE) crops in combating insect pests while maintaining desirable agricultural traits is pivotal for their widespread adoption. However, the expression of insecticidal genes from *Bacillus thuringiensis* in the cytosol often leads to cytotoxicity and undesirable phenotypic changes in transgenic plants, posing a major challenge to their commercial feasibility. To address this issue, our study aimed to explore the advantages of targeting the Cry2Aa protein into the chloroplasts by utilizing a chloroplast transit peptide (CTP) driven by *Arabidopsis* Rubisco small subunit (AraSSU-CTP) promoter, and compare the phenotype with the plants expressing the gene in the cytosol using the AraSSU and CaMV35S gene promoters. By following the *Agrobacterium* mediated transformation method, we established a total of 51 tobacco transgenic lines using three *cry2Aa* gene constructs as confirmed by PCR. The ELISA tests demonstrated that the expression level of Cry2Aa protein ranged from 0.100 to 205 ng/mg of fresh weight (FW). The Cry2Aa tobacco lines with AraSSU and AraSSU-CTP promoter accumulated highest (>150 ng/mg FW tissue) levels of protein in the leaves. However, a tobacco line expressing high levels of Cry2Aa protein in the cytosol displayed stunted growth and yellowish leaves when compared to the control. Conversely, tobacco lines with chloroplast-targeted Cry2Aa exhibited no phenotypic abnormalities. These findings suggest that directing the Cry2Aa protein to chloroplasts effectively mitigates cytotoxicity and phenotypic anomalies associated with the expression of insecticidal genes in the cytosol.

**Keywords:** *Arabidopsis* Rubisco small subunit, *Bacillus thuringiensis*, *cry2Aa* gene, chloroplast target peptide, insecticidal genes, tobacco



## **Effect of dietary inulin, *Bacillus subtilis* based probiotics and its synbiotic combination on performance, nutrients utilization and health in Barbari goats**

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The aim of the study was to investigate the effect of dietary inulin, *Bacillus subtilis* based probiotics and its synbiotic combination on performance, nutrients utilization and health in Barbari goats. For the study twenty-four healthy Barbari goats of similar age and weight were taken from Livestock Farm Complex II (LFC II), SVPUAT. The nutrient requirements of Barbari goats were met by feeding concentrate mixture, wheat straw, and available fodder as per NRC standards of nutrient requirements for goats. They were allocated into four groups with six animals per treatment distributed based on their live body weights using completely randomized block design. The control group was fed on basal diet without any supplementation and Treatment group T1 fed with basal diet which was supplemented with 2% inulin on dry matter basis, T2 fed with basal diet which was supplemented with *B. subtilis* ( $2 \times 10^9$ cfu/kg), and T3 fed with basal diet which was supplemented with synbiotics combination of 2% Inulin on DM basis and *B. subtilis* ( $2 \times 10^9$ cfu/kg). The results showed that there was an increase in dry matter intake in T3 group supplemented with synbiotic followed by T2 probiotic, T1 prebiotic and control group respectively. The mean daily body weight gain was higher in group T3 followed by group T2, T1 and control group. The body condition

score of experimental goats were improved in synbiotic treated group compared to control, T2 and T1 group during the trial period. The supplementation of inulin, *Bacillus subtilis* and its synbiotic were not visually changes in faeces. The supplementation of inulin, *Bacillus subtilis* and its synbiotic had no adverse effect on biochemical parameters. It is suggested that the synbiotic combination at 2% level can effectively be used to improve performance, growth, feed efficiency and overall health in Barbari goats.

**Keywords:** *Bacillus subtilis*, Barbari goat, Body weight gain, Inulin, Probiotic, Synbiotic,

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## **Evaluation of Fungitoxicants against Septoria leaf spot on tomato**

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Tomato (*Solanum lycopersicum* L.) regarded as poor man's apple is one of the most remunerable and widely grown vegetable crop. Among several diseases affecting tomato, Septoria leaf spot has attained the status of a major disease. The disease is characterized as small, irregular spots with dark borders and grey centres measuring approximately 2mm in size which later enlarged, coalesced and formed irregular necrotic patches. The disease ultimately results in premature defoliation and consequently significant yield losses due to sunscald of fruits. Various fungitoxicants *viz.* systemic, non-systemic and their combi-products were evaluated against the disease *in vitro* as well as on season sprays for inhibiting spore germination of the fungus and restricting disease extent. Among the systematic fungitoxicants, hexaconazole 5EC @ 0.05% proved to be the most effective in suppressing 96.42 per cent of spore germination compared to 84.46 per cent and 78.64 per cent recorded in combi-products (captan +hexaconazole) and non-systematic fungotoxicant (captan),

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respectively. *In vivo* evaluation of test fungitoxicants revealed that hexaconazole 5EC @ 0.05% (5.14%) was most effective in restricting the intensity of septoria leaf spot compared to 45.36 per cent recorded in check.

**Keywords:** *Solanum lycopersicum* L., Septoria leaf spot, fungitoxicants, combi-products

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## Dynamics of Organic Manure Nitrogen (N) in the Soil-Plant-Atmosphere Continuum

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Nitrogen is one of the most essential macro elements which play an important role in increasing the agricultural production and being a constituent of protein, it increases the food value. Soil- plant atmosphere-continuum is the near surface environment in which water, nutrients and energy transfer occurs from soil through plant to the atmosphere. A bulk of total nitrogen is present in the organic form and only about 2 per cent is present in inorganic form. Nitrogen present in the organic manures, green manures, crop residues and organic wastes is mostly in the form of organic nitrogen. The organic nitrogen, particularly the hydrolysable form, is slowly mineralized and is transformed to mineral nitrogen through ammonification, nitrification and nitrification processes and becomes available to crops, unless these organic forms of nitrogen are mineralized to inorganic forms plants cannot utilize nitrogen. Plants absorb nitrogen mostly as nitrate NO<sub>3</sub> and ammonical NH<sub>4</sub> and are translocated to leaves by transpiration stream and get converted to glutamic acid. Animals and other living beings consume plants and release nitrogen back into the atmosphere in the form of dung or urine which is either utilized by plants or subjected to losses. This entire process continues as cycle and plays a key role in maintaining nitrogen balance in the atmosphere.

**Keywords:** Ammonification, Nitrification, Ammonization and Organic manures

## Agri is the backbone of every occupation

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Agriculture is often referred to as the backbone of every occupation, and for good reason. It is a fundamental pillar of human civilization, providing sustenance, livelihoods, and raw materials for countless industries. In this short note, we will explore the significance of agriculture and how it plays a central role in supporting various occupations and the overall well-being of society:

**Historical Perspective:** Agriculture has been the foundation of human societies for thousands of years. It marked the shift from nomadic hunter-gatherer lifestyles to settled, organized communities. The ability to cultivate crops and raise livestock allowed humans to produce a surplus of food, which in turn enabled the growth of populations and the development of advanced civilizations.

**Food Production:** The primary function of agriculture is to produce food. Crops like wheat, rice, maize, and vegetables, along with livestock such as cattle, poultry, and fish, are essential sources of nutrition for billions of people worldwide. Without a robust agricultural sector, the world would struggle to feed its ever-expanding population.

**Livelihood:** Agriculture is not just about farming; it encompasses a wide range of occupations. Farmers, agricultural laborers, agronomists, agricultural engineers, and countless others depend on the agricultural sector for their livelihoods. These jobs provide income, stability, and economic opportunities for individuals and families, especially in rural areas.

**Raw Materials:** Beyond food, agriculture supplies raw materials for various industries. Cotton from agricultural fields is used to make textiles, while wood from tree farming is used for construction and paper production. Furthermore, agriculture contributes to the production of biofuels, pharmaceuticals, and various other products that are vital to modern life.

**Economic Contribution:** Agriculture significantly contributes to the economic growth of nations. It generates revenue through the sale of agricultural products domestically and internationally, contributing to a

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country's GDP. Additionally, it creates value chains that involve processing, transportation, and marketing, which further stimulate economic activity.

**Rural Development:** Agriculture is the lifeline of rural communities. It helps to reduce unemployment and underemployment in these areas by providing jobs and income opportunities. Investment in rural infrastructure, such as roads and irrigation, is often tied to agricultural development, leading to improved living standards for rural populations.

**Food Security:** Agriculture plays a critical role in ensuring food security. A stable and productive agricultural sector helps countries meet their domestic food demands, reducing their reliance on food imports. This, in turn, makes nations more resilient to external shocks, such as global food price fluctuations or disruptions in supply chains.

**Environmental Stewardship:** While agriculture is essential, it also poses environmental challenges. Sustainable farming practices are crucial to protect natural resources, including soil, water, and biodiversity. Farmers, scientists, and policymakers are continually working together to develop and implement practices that minimize the negative environmental impacts of agriculture.

**Technological Advancements:** Modern agriculture has benefited immensely from technological advancements. Mechanization, precision agriculture, and the use of genetically modified crops have significantly increased productivity. These innovations not only support food production but also create opportunities for employment in the technology and research sectors.

**Challenges Ahead:** Despite its pivotal role, agriculture faces numerous challenges in the 21st century. Climate change, water scarcity, pests, and diseases pose significant threats to crop yields. Additionally, the need to feed a growing global population while preserving the environment calls for sustainable farming practices and responsible land use.

In conclusion, agriculture is indeed the backbone of every occupation. It sustains human life by providing food, supports livelihoods across the globe, and contributes to economic growth and development. Its role is not limited to feeding people but extends to providing raw materials for industries and maintaining the social fabric of rural communities. While agriculture faces various challenges, it remains a cornerstone of human civilization, essential for the prosperity and well-being of societies worldwide.

## **Challenges and Opportunity of Drone in the Agriculture Application**

**Dr Priyanka Rajkumar Khole, Subject Matter Specialist and Sanskriti Samvardhan Mandal's**

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India's agriculture is facing challenges due to a decline in productivity, climate change, and sustainability. Sustainable agriculture can be achieved through the use of drones in farming in terms of social, economic, and environmental dimensions.

The use of drones in agriculture goes beyond pesticide spraying and has enormous scope in organic and natural farming. It has a wide range of applications such as monitoring crop stress, plant growth, yield estimation, delivering props like herbicides, fertilizers and water, soil analysis, crop health assessment, disaster management, aerial mapping, Planning stage and emergence stage, Nutrient inputs, zonation, and precision spraying, livestock monitoring and so on.

According to reports, drones are time-saving and efficient in resource utilization, with significant water savings. The applicability of drones will lead to a revolution in the lives of small-scale and marginal farmers. The use of drones has the potential to revolutionize agricultural practices, increase production, and contribute to sustainable agriculture in the future through sustained innovation and collaboration.

On one side, the initial investment for drones might be prohibitively expensive for many farmers. Furthermore, training employees to operate drones and analyze data increases the entire cost. Drone technology in agriculture is limited due to cost, environmental and weather conditions, data processing complexity, and farmer perception.

Farmers can reap the benefits of drones, which include increased efficiency, improved yields, soil and water conservation, and reduced costs. There are worries that farmers may be hesitant to use drone technology due to the loss of jobs or lack of knowledge. There are many challenges to adapt and use agricultural drones in India. The lack of knowledge and

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training among farmers regarding the use and application of drones is one of the most significant factors.

Our focus should be on drone training and education, which could assist in addressing the lack of knowledge and training among farmers. Creating a pool of well-trained personnel in rural areas is another challenge. Aspirational youth in the areas can find numerous employment opportunities through the drone, as well as opportunities for skill development. According to the Jyotiraditya Hon Minister, Civil Aviation, 1 lakh drone pilots are needed by 2025. The need for a drone pilot and trained personnel for drone flying, operations, and maintenance/services presents both a challenge and an opportunity.

Establishing a drone pilot training and education center (with or without franchises) is the best option at the institute level for rural areas to solve the above limitations.

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## **Appraisal of water quality in relation to soil properties of Shegaon and Sangrampur tehsils of Buldhana district in Purna tract of Central India**

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The present investigation was conducted to study the water quality in relation to soil properties of Shegaon and Sangrampur tehsils of Buldhana district in Purna tract of Central India at Dr. PDKV, Akola, Maharashtra, India during 2020-21.

The twenty water samples from borewell and other irrigation sources consisting of well and river were collected from Shegaon and Sangrampur tehsils and analyzed for various quality parameters. Simultaneously respective soil samples were also taken after irrigation in

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post monsoon season and analyzed for paste extract and exchangeable ions so as to assess the effect of irrigation water on soils.

The irrigation water was having very high salinity and low sodium hazard ( $C_4S_1$ ) during post monsoon (winter) season, the cations  $Ca^{2+}$ ,  $Mg^{2+}$  and  $K^+$  and anion like  $SO_4^{2-}$  was within the permissible limit in borewell and other sources of irrigation water, except sodium and  $HCO_3^-$  and  $Cl^-$  which were above permissible limit in borewell water as well as other sources of irrigation water. Total dissolved solid in ground water were categorized as severe to unsuitable.

The SAR was within the permissible limit in post monsoon season, whereas the adjusted SAR of some samples falls above acceptable range and Mg:Ca ratio of all samples during post monsoon (winter) season falls in permissible limit. On the basis of permeability index ground water came under Class-II (categorized as medium) during post monsoon season. The RSC of all samples during post monsoon were found above acceptable range. As per magnesium adsorption ratio all samples from both the sources found within the permissible limit during post monsoon season. Soluble sodium percentage of all ground water samples during post monsoon season from both the sources are unsuitable for irrigation.

The pH and EC of soil irrigated with borewell was comparatively higher than soils irrigated with other sources of irrigation. In respect of fertility parameters available N, P and K in soil were found in low to medium range. The CEC, HC,  $CaCO_3$  and OC of the soils irrigated with borewell was lower than other irrigation sources.

From the study it can be suggested that irrigation water samples from various water sources during post monsoon season falls in very high salinity and low sodium hazards class. Therefore, the water collected from other irrigation sources than borewell are advisable for irrigation. However, the irrigation water from borewell is also advisable with adopting proper management practices.



## **Assessment of water quality in Akot and Balapur tehsil of Akola district in Purna valley of Vidarbha region in Central India**

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The present investigation entitled "Appraisal of water quality in Akot and Balapur tehsil in Purna tract of Vidarbha region" was undertaken at Dr. PDKV, Akola (M.S.). Forty water samples from borewell and other sources consisting of river, farm pond, dam were collected and analyzed for various quality parameters. Simultaneously respective soil samples were also taken after irrigation and analyzed for various parameters in post monsoon season.

Amongst the cations  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{K}^+$  was within the permissible limit in all sources of irrigation, while, sodium which was above permissible limit in all sources of sources of irrigation. The irrigation water was having high salinity and low sodium hazard ( $\text{C}_3\text{S}_1$ ) during post monsoon (winter) season. The all anionic composition in which  $\text{HCO}_3^-$  and  $\text{Cl}^-$  was above permissible limit and  $\text{SO}_4^{2-}$  were, below permissible limit in post monsoon season. Total dissolved solid in ground water were categorized as permissible to unsuitable.

The residual sodium bicarbonate of all samples during post monsoon were found in above acceptable range. Soluble sodium percentage of the all-ground water samples during post monsoon season from both the sources are unsuitable for irrigation. The sodium adsorption ratio was within the permissible limit in post monsoon season, Whereas the adjusted sodium adsorption ratio some samples falls above acceptable range and Mg:Ca ratio all samples during post monsoon (winter) season falls in permissible limit.

The pH and EC of soil irrigated with borewell was comparatively higher than soils irrigated with other sources of irrigation. The continuous irrigation with borewell water found to be measurable in declining

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available N, P and K in the soil. The cation exchange capacity and hydraulic conductivity of the soils irrigated with borewell was lower than other sources due to enhanced dispersion and decrease in pore spaces due to borewell water.

From the study it can be suggested that the irrigation water collected from various water sources during post monsoon season falls in high salinity and low sodium hazards class. Therefore, the water collected from other sources than borewell are advisable for irrigation but the irrigation water collected from borewell water is also advisable for irrigation by adopting proper management practices.

# Hydrodynamic Cavitation: Sustainable Approach to Food Processing

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The 20th century has witnessed a remarkable enhancement in the demand for varieties of consumer products, ranging from food, pharmaceutical and other industries. To enhance the quality of the product and to reduce the production cost, industries are gradually inclined towards greener processing technologies. Cavitation based technologies are gaining interest among processing technologies due to their cost effectiveness in operation, minimization of toxic solvent usage, and ability to obtain superior processed food products compared to conventional methods. Cavitation is produced by pressure variation-interchange of pressure and kinetic energy. Hydrodynamic cavitation (HC) is one of the AOP (Advanced oxidation process) which takes less time and releases large magnitude of energy. It is generated by using orifice plate or venturi. HC has wider applications in brewing, dairy industry and juice processing, palm oil processing and waste management etc.

**Keywords:** Cavitation, Hydrodynamic, pressure, kinetic energy and Venturi etc.

## Effect of CIDR + FSH superstimulation on follicle development and oocyte recovery rate in Sahiwal cows and heifer

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Superstimulation treatments with gonadotrophin administration like porcine FSH (pFSH) or Pregnant Mare Serum Gonadotrophin (PMSG) prior to the Ovum pickup (OPU) has improved *in vitro* Embryo Production (IVEP) in *Bos taurus* donors, still there is difference in the effects produced by superstimulation among heifer and cow. Therefore the present study was aimed to compare the effect of CIDR and FSH superstimulation on follicle development and oocyte recovery rate in Sahiwal cows and heifer maintained at Livestock farm complex, College of Veterinary Science, Korutla, Telangana under ET & IVF Project, Rashtriya Gokul Mission (RGM). The Sahiwal cattle were divided into two groups - Group 1 (Heifer, n = 8) and Group 2 (Cow, n = 8). Both group cattle were superstimulated with CIDR and FSH (Controlled Internal Drug Release device + Follicle Stimulating Hormone) prior to OPU. The total and mean numbers of follicles along with their diameters and cumulus oocyte complexes (COC) recovered along with their quality were observed in both the groups and it was found that there was no significant difference in total and mean numbers of follicles as well as total and mean number of COC recovered in both the groups. Therefore, it can be concluded from the present study that there is no significant difference between Sahiwal Cow and Heifer superstimulated with CIDR + FSH prior to OPU.

**Keywords:-** CIDR, FSH, Sahiwal, OPU, Follicle development, Oocyte recovery rate

# Harmony in the Woods: Achieving Sustainable Forest Management

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Sustainable forest management is the practice of managing forests to meet adequate return for fulfilling current needs and desires of society as well as future needs and desires of society forests are the natural resources which is lifeline of the existence of earth. Forests provide everything with regards to lively support, economic support, environmental support etc. Forest management is that branch of forestry whose function is organization of forest property for management and maintenance by ordering in time and place the various operations necessary for the conservation, protection and improvement of the forest sustainability management consists of the practices of the organization that ultimately lead to sustainable development, it involves economic production and consumption on that alleviates environmental impact and increment in the rate of conservation of forest resources. Increasing the productivity of forests to meet essential national and global needs. Global forest management, certification and ownership as well as implications for sustainable forest management is defined by the Montreal process criteria according to FAO as of 2000 the world had 3.9 billion ha of forest with 187Mha in forest plantation under sustainable forest management. In India the sustainable forest management practices on the processing all moderately dense forest land with a canopy density of 40-70%. It covers nearly 9.33% of the country's area in 2021 and all open forest cover with a canopy density of 10-40%, it covers nearly 9.34% of the country's area in 2021. Sustainable forest management is an effective and essential practice for managing permanent forest land to achieve one or more objectives of management with respect to production of continuous flow of desired forest products for satisfying current needs or requirements and future requirements of society also include.

## Preparation of Aloe Vera Pulp Powder by Different Drying Methods

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The present research was carried at department of PHM of MAPSF of PGI PHM Killa, Roha, Dist. Raigad, (Dr. B. S. K. K. V., Dapoli, Dist. Ratnagiri ) Maharashtra. India, during the year 2020-21. The main objective of the research was to find out suitable drying method and to standardized the process for preparation of Aloe vera pulp powder. Which evaluates physico – chemical properties of Aloe vera pulp powder and storage stability of Aloe vera pulp powder. The quality powder with good shelf life was prepared from convective tray drying method at 50° C. Standardized powder was packed in polyethylene bags. This product was kept at room temperature for further storage studies after packaging. Aloe vera pulp powder for different quality parameters during drying time and storage were conducted at 0, 30, 60 and 90 days. During the storage L\* value, b\* value of colour, total ash, titrable acidity, fat, protein, fiber and solubility decreased with increase in storage period. The a\* value of colour, TSS, moisture content, pH were increased with increase in storage period. All the parameter were significantly influenced packaging material and storage time.

In the process of preparation of Aloe vera pulp powder by different drying methods, convective tray drying method gave significant results. It was observed that Aloe vera pulp powder has particle size 37 micron, initial moisture 98.7 %, final moisture 3.7 %, drying time 17.40 hours, rate of drying 5.445, colour

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value for L\*, a\* and b\* was 39.18, 4.78 and 32.48 respectively, in chemical parameters total ash was 14.08 %, titrable acidity 0.47 %, fat 2.16 %, protein 4.18%, fiber 16.54 %, pH 4.31, TSS 4.50 °Brix, moisture content 3.85 % and solubility 3.16 minute respectively.

From overall observation it was concluded that convective tray drying was the suitable method for preparation of Aloe vera pulp powder followed by microwave drying, Polytunnel drying and Sun drying. In convective tray drying at 50°C was suitable temperature for preparation of Aloe vera pulp powder and it was stored for 90 days at room temperature without affecting its quality and also found suitable for human consumption.

**Keywords:** Aloe vera leaves, Fresh Aloe vera pulp, Aloe vera powder, Drying, Convective drying, storage of Aloe vera powder etc.

## The Impact of Ocean Dumping on Aquaculture

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The deliberate discharge of hazardous materials from ships, planes, platforms, and other man-made structures into the ocean is known as "ocean dumping." It involves disposal into the seafloor and burning in the ocean. Chemicals and debris, most of which originates on land and is blown or carried into the water, make up marine pollution. The ecology, the health of all living things, and global economic systems are all harmed by this pollution. The ocean is dumping pollutants. Every year, almost 10 million metric tons of plastic garbage end up in the oceans, harming fish, marine mammals, and seabirds. 300 million tons of plastic gets created yearly, and this weighs the same as the entire human population, and 50% is single-use only. There are 5.25 trillion pieces of plastic waste estimated to be in our oceans. 269,000 tons float, 4 billion microfibers per km<sup>2</sup> dwell below the surface. 70% of our debris sinks into the ocean's ecosystem, 15% floats, and 15% lands on our beaches. In the past 10 years, we've made more plastic than the last century. By 2050, the pollution of fish will be outnumbered by our dumped plastics. If garbage is dumped into the ocean, the oxygen in the water could be depleted which results in poor health for marine life due to lack of oxygen. Animals such as seals, dolphins, penguins, sharks, whales, and herring could all die. Therefore, if we continue to pollute our oceans, we are at a risk of losing many of these species, which in turn may also have significant negative effects on food web and humanity.

**Keywords:** Ocean, Pollutants, Plastic waste, Environmental damage, Oxygen lack, Marine life



## Application of Magnetic Water in Agriculture

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In India, agriculture is the largest consumer of water (81%) and hence more efficient use of water in agriculture needs to be top most priority. Besides, the use of low-quality irrigation water viz., high salinity, hardness and waste water, is gaining importance in Indian agriculture because of the water quality problems and due to the scarcity of good quality. Magnetic water treatment is a method of reducing the effects of hard water and scaling by passing it through a magnetic field as a non-chemical alternative to water softening. Magnetic water treatment is an unconventional approach that has garnered attention in various fields, including agriculture and irrigation. The method involves exposing water to a magnetic field before its use in irrigation systems or other applications. This treatment is proposed to alter the physical and chemical properties of water, with the aim of potentially improving its effectiveness for specific purposes. Safety, compatibility, environmental friendliness, low operating cost and no proven harmful effects are the main advantage of MWT over traditional water treatments. The concept behind these devices is based on the belief that exposing water to a magnetic field can influence the behaviour of dissolved minerals, particularly calcium and magnesium ions, which are responsible for the formation of scale in pipes and appliances. By subjecting the water to a magnetic field, proponents claim that the minerals become less likely to adhere to surface and form scale. The magnetic water treatment has shown promising potential in saving water resources and the magnetic treatment of irrigation water has therapeutic effect like, preventing scale deposition, improving irrigation water quality, improve crop yield, soil improvement, corrosion control and wastewater treatment.

**Keywords:** Magnetic field, Water treatment, Hardness, Irrigation, Water quality

# **Estimation of Biomass and Carbon Storage Potential in Coffee-Based Agroforestry Chikkamagaluru Karnataka**

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Carbon dioxide and other greenhouse gases are recognized as a serious environmental issue of the present era. Forests play vital role in carbon storage sink of terrestrial vegetation through land use practices such as afforestation, reforestation, regeneration and agroforestry system. As different trees have variable capacity to sequester carbon, therefore in order to study the potentiality of carbon sequestration of different tree species under block were selected to assess carbon sequestered coffee-based agroforestry in Chikkamagaluru District Karnataka. Present investigation conducted to determine Biomass and carbon stock of trees by calculating basal area, volume, above ground biomass and carbon stock by measuring the Girth at a height of 1.37m using girth tape. The amount carbon sequestered in vegetation is assessed by Nondestructive method of Biomass estimation. Total enumeration was carried out in block A, B, C, and D of adjoining area and measured the height of entire tree species above 30cm girth at a breast height of 1.37 m and GPS is used for the tree positioning. The calculated above ground biomass and converted into carbon stock. Among selected block A recorded abundant above ground biomass (113.9 t ha<sup>-1</sup>). Whereas, B, C and D are 104.4 t ha<sup>-1</sup>, 91.4 t ha<sup>-1</sup>, 92.1 t ha<sup>-1</sup> respectively and Carbon in block A is 57 Mg C/ha and trend is in the order B>D>C (52.2 Mg ha<sup>-1</sup> >46.0 Mg ha<sup>-1</sup> >45.7 Mg ha<sup>-1</sup>). Management of coffee agroforests, mainly shade tree management plays an essential role in carbon storage and dynamics. This study suggests that coffee-based agroforests in the Western Ghats region offers more significant opportunities for biodiversity conservation and higher amount carbon storage in this region. Agroforestry plays major role in climate mitigation,

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both by sequestering carbon in living biomass, soil and wood products, reduces pressure on nearby forests, thereby reducing the emission of greenhouse gases from deforestation.

**Keywords:** Biomass, Coffee based agroforestry, Carbon sequestration, Biodiversity

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## Optimization of Irrigation Water Through Rain Hose Irrigation

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Irrigation is the backbone of agriculture; micro irrigation played a crucial role in Indian agriculture. The combination of both drip and sprinkler irrigation have received considerable attention from researchers, policymakers, economists and farmers. Despite the long journey of micro irrigation, the coverage is still limited. As a result, more efforts are required to increase the penetration of micro irrigation in the country. Climate change has brought changes to rainfall patterns and the farmers suffer from water scarcity for cultivation. To overcome this, rain hose irrigation technology is a best suitable technique for low height closely growing crops like groundnut, blackgram, greengram and vegetables like radish, spinach, carrot, coriander. The irrigation system must satisfy various demands while meeting minimum pressure requirements. In such condition rain pipe irrigation can operate under low pressure and best suited to grow vegetables crops and closely spaced crop like groundnut, onion, garlic *etc.* it is adaptable for almost all types of soils. Rain pipe irrigation systems can easily work under fluctuating pressure as well as low pressure condition effective operating pressure of 0.75 kg cm<sup>-2</sup>. The micro water spray

produced by rain pipe will make it the mistiest irrigation system. It is much mistier and softer than traditional sprinklers. The conventional method of irrigation has not been as efficient in the use of water thus resulting in excessive wastage of water. So, there is a need to improve irrigation efficiency through optimization of irrigation water under conditions of limited water availability & less energy consumption which can be achieved by rain hose irrigation.

**Keywords:** Micro irrigation, Rain pipe irrigation, Close growing crop, Irrigation efficiency

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## **Preliminary and Specific Tests of California Mastitis Test (CMT) Positive Milk Samples Bovine Mastitis Pathogens Obtained from Selected Regions of South Karnataka to Characterize It's Genus and Species Identity**

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Bovine mastitis isolates of 45 numbers from positive milk samples of CMT obtained from selected regions of south Karnataka area were obtained from the Department of Veterinary Microbiology, Veterinary College, Bangalore were transferred in nutrient broth. Milk samples from Channapatna, 10 isolates were obtained followed by 9 each from Ramanagara and Anekal area; 8 isolates from Rajanukunte; 7 from Doddaballapur and 1 each from Hoskote and Nelamangala. A total of 45 numbers of the isolates were purified on nutrient agar media by streaking

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method. The purified isolates were further subjected to preliminary and specific tests to arrive at genus and species level identification. The cell morphology of the isolates grouped them as Gram positive streptococci, staphylococci and Gram negative short rods. Few of the preliminary identification tests like oxidase, catalase and oxidative-fermentative (OF) tests, further confirmed the isolate identity to genus level. Isolates of 22 numbers having Gram positive cocci in chains, oxidase negative, catalase negative and only fermentative were assigned to the genus *Streptococcus* while 18 isolates of Gram positive cocci in bunches, oxidase positive, catalase negative, both oxidative and fermentative were placed under the genus *Staphylococcus*. Gram negative short rods (3 isolates) with oxidase negative, catalase positive, only fermentative with acid butt and slant as well gas production was placed under Genus *Escherichia* or *Enterobacter* similarly acid butt, alkaline slant with H<sub>2</sub>S producing one isolate was assigned the genus *Salmonella* (1 isolate). Gram negative rod of one isolate showing oxidase positive, catalase negative, unable to oxidize and ferment in of test, with alkaline butt and slant with no gas belonged to genus *Alcaligenes*.

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## **Purification, Identification and Characterization of Cell and Colony Morphology of the California Mastitis Test (CMT) Positive Milk Samples Bovine Mastitis Pathones Obtained from Selected Regions of in and Around Bangalore**

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Bovine mastitis isolates of 45 numbers from positive milk samples of California Mastitis Test (CMT) in and around Bangalore area obtained from the Department of Veterinary Microbiology, Veterinary College, Bangalore were transferred in nutrient broth. Milk samples from Channapatna, 10 isolates were obtained followed by 9 each from Ramanagara and Anekal area; 8 isolates from Rajanukunte; 7 from Doddaballapur and 1 each from Hoskote and Nelamangala. All the isolates were subculture in nutrient broth, the 18 hrs culture were subjected to purification through the streaking method technique, were in the loop full of culture was streaked on the solidified nutrient agar medium, which was freshly prepared in the Petri plate. The plates were incubated for the 24°C / 24-48 hrs. Plates were noted for colony morphology and the selected colony is subjected to preliminary tests like gram staining to assign the cell morphology. The colonies obtained out of 45 isolates, 22 (M2, M3, M4, M5, M6, M9, M12, M13, M15, M17, M18, M19, M22, M26, M30, M31, M34, M36, M39, M40, M44, M45) showed punctiform, raised, entire margined colonies with single, paired, chains of cocci and placed under streptococci. The isolates of 18 numbers (M1, M7, M8, M10, M11, M16, M20, M21, M23, M24, M25, M28, M29, M32, M35, M37, M41, M43) also showed punctiform, raised, entire with elevated margin with Gram positive bunches of cocci and placed as staphylococci. Circular, convex, entire colonies of 3 isolates (M14, M27, M33) and punctiform, flat, entire colonies of 2 isolates (M38, M42) were Gram negative short rods. The cell morphology of the isolates grouped them as Gram positive streptococci, staphylococci and Gram negative short rods.

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## **Lantana Camera Plant Poisoning in Livestock Animals**

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*Lantana camara* is a poisonous plant that causes phototoxicity in ruminants, leading to symptoms such as anorexia, depression, swelling of eyelids, and sloughing of skin. Symptomatic treatment includes oral activated charcoal, purgative, liver tonic, electrolyte therapy, and parental administration of antihistaminic and vitamin B-complex with liver

extract. The plant is commonly isolated from herds and can cause skin itching.

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## **Evaluation of Different Herbicides for Weed Management in Transplanted Finger Millet (*Eleusine coracana* L.)**

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Weed management is a serious challenge for the cultivation of finger millet or ragi. As finger millet is a slow growing crop, weeds pose severe problem during initial stages. The critical period of weed in finger millet is identified to be around 30 to 45 days after sowing and further delay in the control of weeds leads to severe reduction in the grain yield. In order to increase the productivity, it is essential to follow the weed management practices. For this, the benefits of using herbicides could be of much use in controlling weeds, compared to the conventional method of weeding. In this situation, to explore the best weed management option for transplanted finger millet, field experiments were conducted with the following treatment options. The treatments comprised of T<sub>1</sub>- Unweeded control, T<sub>2</sub>- Hand weeding twice at 15 and 30 DAT, T<sub>3</sub>- Butachlor @ 0.75 kg ha<sup>-1</sup> (Pre-emergence), T<sub>4</sub>- Pendimethalin @ 0.75 kg ha<sup>-1</sup> (Pre-emergence), T<sub>5</sub> - Oxyflurofen @ 75 g ha<sup>-1</sup> (Pre-emergence), T<sub>6</sub> - Bensulfuron methyl + pretilachlor @ 0.66 kg ha<sup>-1</sup> (pre-mix) (Pre-emergence), T<sub>7</sub>- Oxadiargyl @ 80 g ha<sup>-1</sup> (Early post-emergence) and T<sub>8</sub>- Bispyribac sodium @ 20 g ha<sup>-1</sup> (Early post-emergence) were taken up. All the treatments significantly influenced the weed biometrics in transplanted ragi. Among the weed management practices studied, T<sub>2</sub>- Hand weeding twice at 15 and 30 DAT recorded the least weed count (18.07 m<sup>-2</sup>) and highest weed control efficiency (90.19 per cent) that favoured higher grain yield (2985.72 kg ha<sup>-1</sup>) and straw yield (4501.98 kg ha<sup>-1</sup>). Further, the treatment T<sub>2</sub>- Hand weeding twice at 15 and 30 DAT was on par with the treatment T<sub>6</sub>- Bensulfuron methyl + pretilachlor @ 0.66 kg ha<sup>-1</sup> (pre-mix) (Pre-emergence). These treatments were significantly superior to rest of the treatments in reducing the weed infestation.

The highest weed counts and lowest grain yield and straw yield were recorded with the treatment Unweeded control. From the above studies, it was found that, weed control by either hand weeding twice at 15 and 30 DAT or by the treatment with pre-emergence application of bensulfuron methyl + pretilachlor @ 0.66 kg ha<sup>-1</sup> (pre-mix) could be recommended for transplanted finger millet or ragi with better weed management and also to obtain higher yield. However, the treatment with pre-emergence application of bensulfuron methyl + pretilachlor @ 0.66 kg ha<sup>-1</sup> (pre-mix) could be a best option at times of higher labour cost incurred for hand weeding and in situations with inadequacy of labour.

**Key words:** Finger millet, Ragi, Weed Management, Bensulfuron methyl + pretilachlor

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## **Assessment of Insecticidal Efficacy of Certain Plant Leaf Powders against Pulse Beetle, *Callosobruchus chinensis* L. (Coleoptera: Bruchidae) in Black Gram**

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Blackgram, (*Vigna mungo* L.) Hepper as a legume crop, has been grown extensively and utilized as protein source for human consumption. It played a vital role in maintaining the nutrient balance in the soil by fixing atmospheric nitrogen through root nodules. The pulse beetle, *C. chinensis* L. (Coleoptera: Bruchidae) is the most widespread and destructive major insect pest of stored blackgram. *C. chinensis* is a direct pest causing quantitative and qualitative loss. Feeding of larvae on the cotyledons causes significant loss in seed weight and viability. The present study was undertaken to evaluate the insecticidal efficacy of certain plant leaf powders against the pulse beetle, *Callosobruchus chinensis* L., in stored black gram under laboratory conditions. Whereas, Custard apple leaf powder at 10g/kg treated blackgram recorded highest per cent mortality (38.33%) followed by Custard apple leaf powder at 5g/kg (35.00%). The



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result obtained with respect to number of eggs laid by the pulse beetle, Custard apple leaf powder at 10g/kg (25.00) and 5g/kg (29.66) followed by Neem leaf powder at 10g/kg (34.66) were less preferred by pulse beetle for oviposition. Among all the treatments, Custard apple leaf powder at 10g/kg (11.66%) and 5g/kg (16.66%) recorded lowest per cent grain damage followed by Neem leaf powder at 10g/kg (20.00%). The highest per cent grain damage was recorded on Periwinkle leaf powder at the dose level of 5g/kg (45.00%) and 10g/kg (41.66%) was found to be less effective which was significantly different from untreated control (51.66%).

**Keywords:** Blackgram, *C. chinensis*, Botanical leaf powders, Mortality rate, Oviposition and Grain damage.

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## Prospective of Chitinolytic Bacterial Consortium in the Management of Certain Fungal Diseases in Groundnut – An Innovative Approach

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Groundnut is the king of oil seed crop, originated from Central Brazil. Nutritionally it contains high quality minerals and vitamins, with considerable amount of oil and proteins. Yield loss in groundnut is due to several factors *viz.*, weeds, pest, bacteria, virus and fungal disease. The chitinolytic bacteria *viz.*, *Bacillus subtilis*, *Bacillus licheniformis*, and *Pseudomonas fluorescens* which is capable of producing chitinase enzyme were isolated from the rhizosphere soils of groundnut crop. Effect of chitinolytic bacterial culture filtrate was tested against Dry root rot, Tikka leaf spot and collar rot fungal diseases in groundnut and from the field experiment results were revealed that, Among the chitinolytic bacterial culture filtrate tested individually and in combination, the novel bio formulated consortium of culture filtrate of Treatment, T<sub>9</sub> - *B. subtilis* (Bs<sub>1</sub>) + *B. licheniformis* (Bl<sub>3</sub>) + *P. fluorescens* (Pf<sub>4</sub>) @ 10 ml/Kg of seed recorded maximum control of Dry root rot, Tikka leaf spot and collar rot at 8.62%,

11.70% and 8.30%. Hence it is concluded that the consortium of chitinolytic bacteria shows general trends towards the greater suppression of fungal diseases such as dry root rot, tikka leaf spot, collar rot in groundnut and without chemical fertilizers, as demonstrated in this study better nutrient uptake, plant growth promotion and enhanced yield was observed.

**Key words:** Chitinolytic bacterial consortium, fungal diseases and Biocontrol

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## **Production of bioethanol from *Physalis minima* and *Cordia dichotoma***

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Bioethanol is the one of the most important biofuel due to its positive on the environment. The production of bioethanol has been produced from agricultural waste and different types of fruits. The main aim of this study to produce bioethanol from the fruits of *Cordia dichotoma* and *Physalis minima*. These fruits were abundantly available, cost effective and found in most of the cultivated fields and near road sides. These fruits make interesting for bioethanol production by microorganisms. A total of 12 yeast isolates obtained from different fruit waste like banana, apple, sapota, jamun, jackfruit, dragon fruit, pineapple, pomegranate, grapes, guava, papaya, mango. Among the 12 selected yeast isolates screened, CAY, MY, BY recorded the highest ethanol yield with corresponding decreasing in residual reducing sugars in glucose fermentation. These three isolates further used to produce bioethanol in *Physalis minima* and *Cordia dichotoma* used as substrate. The CAY yeast isolate was efficient as compared to other yeast isolates when inoculated into *Physalis minima* and *Cordia dichotoma* separately. Maximum ethanol yield of *Physalis minima* powder (18.644 g L<sup>-1</sup>) was recorded with residual reducing sugar content (2.488 gL<sup>-1</sup>) whereas, the maximum ethanol yield of *Cordia dichotoma* powder (28.024 gL<sup>-1</sup>) was recorded with residual reducing sugars content (3.37 g L<sup>-1</sup>). Thus, it can be concluded that fruits of *Physalis minima* and *Cordia dichotoma* can be successfully used for bioethanol production.

**Key words:** Yeast isolates, *Physalis minima*, *Cordia dichotoma*, bioethanol

## Evaluating the impact of bioinoculants and plant growth regulators on survivability of wild ber seeds under *in-vivo* conditions

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Some adaptable plant species have evolved to flourish in tough climatic circumstances in dry parts of the world where agricultural yield is frequently limited. The wild ber (*Ziziphus rotundifolia* Lamk.) is one such species that has enormous ecological and commercial value. This resistant tree, which is frequently found in arid and semi-arid areas, occupies a special place in the desert ecosystem and is essential to the survival of both the environment and the populations living in these harsh environments. The prime objective was to investigate the effectiveness of bioinoculants and plant growth regulators to improve the germination of wild ber seeds and producing vigorous seedlings through rootstock. The experiment was conducted at fruit nursery, Department of Horticulture, CCS Haryana Agricultural University, Hisar during the year 2021-22. There were five different bioinoculants viz. Azoteeka-Mac 27, Azoteeka-HT 54, Phosphoteeka-P 36, *Azospirillum*-J 11-12 and integrated biofertilizer (NPK-1:1:1) and three plant growth regulators viz, gibberellic acid (GA<sub>3</sub>), 1-naphthalene acetic acid (NAA), indole-3-butyric acid (IBA) with two different concentrations (50 mg/L and 100 mg/L) of each. The experiment was carried out in completely randomized design (CRD) design with three replications. Among all the treatments, 100mg/L GA<sub>3</sub> showed maximum germination percentage (73±1.15%), relative seed germination increased by 159.93±3.46, minimum days taken for germination (3.33±0.33days), fresh weight per seedling (11.57±0.09 g) and dry weight per seedling (5.14±1.14 g).

**Keywords:** Bioinoculants, Plant growth regulators, Seed germination, Vigorous seedling growth.

## To study the effect of different fertility levels on growth and morphological parameters of Mustard (*Brassica juncea* L.)

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A field experiment was conducted to “Effect of organic and inorganic fertilizers on growth, yield and oil content of mustard (*Brassica juncea* L.)” The experiment was carried out during Rabi season 2015-16, at Department of Biological Sciences, SHIATS, Allahabad (U.P.) which is located at 25° 24' 42" N latitude, 81° 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Allahabad Rewa Road about 5 km away from Allahabad city. The experiment consisted of seven treatments with different organic and inorganic manures and laid out in randomized block design with three replications. results indicated that the application of 75% recommended dose N,P,K + 20 kg ha<sup>-1</sup> Azotobacter + 20 kg ha<sup>-1</sup> phosphate solubilizing bacteria recorded significantly plant height (cm) 30 days (12.60), 60 days (125.55) and 90 days (141.73), Number of leaves plant<sup>-1</sup> 30 days (3.53), 60 days (28.60) and 90 days (38.53), Number of primary branches plant<sup>-1</sup> 60 days (15.53) and 90 days (17.43), Dry matter plant<sup>-1</sup> (37.00), compared to others treatments.

**Key words:** Organic and inorganic fertilizers, Growth, Farmyard manure, Vermicompost, Azotobacter, phosphate solubilizing bacteria, Recommended dose of fertilizer, growth and morphological parameters.

## Effect of different fertility levels on yield and yield parameters of Mustard (*Brassica juncea* L.)

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**Key words:** Organic and inorganic fertilizers, Growth, Farmyard manure, Vermicompost, Azotobacter, phosphate solubilizing bacteria, Recommended dose of fertilizer, yield parameters.

## Effect of different fertility levels on biochemical and quality parameters of Mustard (*Brassica juncea* L.)

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**Key words:** Organic and inorganic fertilizers, Growth, Farmyard manure, Vermicompost, Azotobacter, phosphate solubilizing bacteria, Recommended dose of fertilizer, Oil content, biochemical and quality parameters.

## To Study The Economics For Cultivation Of Mustard (*Brassica Juncea L.*)

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A field experiment was conducted to “Effect of organic and inorganic fertilizers on growth, yield and oil content of mustard (*Brassica juncea L.*)” The experiment was carried out during Rabi season 2015-16, at Department of Biological Sciences, SHIATS, Allahabad (U.P.) which is located at 25° 24' 42" N latitude, 81° 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Allahabad Rewa Road about 5 km away from Allahabad city. The experiment consisted of seven treatments with different organic and inorganic manures and laid out in randomized block design with three replications.

Economics is the ultimate deciding factor to adopt a particular practice by farmers. It is governed by the cost involved in production and price given to the final product. Variable nutrient doses and application of plant growth regulator were used in the study hence they affect the total cost of individual treatment. The data presented in Table 4.17 clearly indicate among the different organic and inorganic fertilizers application practices, the maximum cost of cultivation was involved under the application of T<sub>2</sub> (75% recommended dose N,P,K + 5t ha<sup>-1</sup> farm yard manure). The highest gross income (Rs 60133.27 ha<sup>-1</sup>), net returns (Rs 12,202 ha<sup>-1</sup>) and B: C ratio (1.25) was achieved in treatment T<sub>6</sub> (75% recommended dose N,P,K + 20 kg ha<sup>-1</sup> Azotobacter + 20 kg ha<sup>-1</sup> phosphate solubilizing bacteria). The lower cost of cultivation (42,000 Rs ha<sup>-1</sup>), gross income (42560.00 Rs ha<sup>-1</sup>), net income (560 Rs ha<sup>-1</sup>) and B:C ratio (1.01) was found in T<sub>0</sub> (Control Treatment).

**Key words:** Organic and inorganic fertilizers, Growth, Farmyard manure, Vermicompost, Azotobacter, phosphate solubilizing bacteria, Recommended dose of fertilizer, B:C ratio.

## Hydrodynamic Cavitation: Sustainable Approach to Food Processing

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The 20th century has witnessed a remarkable enhancement in the demand for varieties of consumer products, ranging from food, pharmaceutical and other industries. To enhance the quality of the product and to reduce the production cost, industries are gradually inclined towards greener processing technologies. Cavitation based technologies are gaining interest among processing technologies due to their cost effectiveness in operation, minimization of toxic solvent usage, and ability to obtain superior processed food products compared to conventional methods. Cavitation is produced by pressure variation-interchange of pressure and kinetic energy. Hydrodynamic cavitation (HC) is one of the AOP (Advanced oxidation process) which takes less time and releases large magnitude of energy. It is generated by using orifice plate or venturi. HC has wider applications in brewing, dairy industry and juice processing, palm oil processing and waste management etc.

**Keywords:** Cavitation, Hydrodynamic, pressure, kinetic energy and Venturi etc.



## Studies on Preparation and Quality Evaluation of *Sesbania grandiflora* Flower 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. Its 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 flowers good source many vital nutrients such as protein, carbohydrate, fibre, calcium, iron, phosphorus and vitamins. Besides having nutritional, phytochemical and medicinal value *Sesbania grandiflora* flowers was underutilized because available seasonally and highly perishable. Therefore in present investigation process of preparation of powder from *S. grandiflora* flower was standardized to enhance its utilization for value addtion. For preparation of powder flowers subjected to different pre-treatment (without blanching, blanching and blanching + sulphitation). The effect of pre-treatment on drying characteristics, physical, functional and reconstititional properties of flower powder were investigated. Data revealed that there is remarkable decrease in the drying time of blanched and blanched + sulphited *Sesbania grandiflora* flower. The colour attributes show increase in lightness ie L\* value and reduction in the a\* and b\* value in treated flower powder sample than control. Regarding particle size among treatment the blanching + sulphitation powder received the higher percentage in 80, 60 and 30 mesh having pore size 180, 250 and

300 µm pore size in flower (43.75 %). The results on the functional properties of *Sesbania grandiflora* flower powder, the highest bulk density recorded in sample blanched +sulphited sample (FP<sub>2</sub>). The maximum water absorption capacity and oil absorption capacity was recorded in blanched sample FP<sub>1</sub> over that of the untreated (control) sample. The treated sample shows higher swelling power than the control sample. The data pertaining to reconstitution properties of *Sesbania grandiflora* flower powder showed that the trend of increase in solubility and decrease in per cent dispersibility in blanched and blanched + sulphited powder. The time of wettability significantly reduced in blanched + sulphited treatment followed by blanching treatment than control. Hence can be concluded from present investigation that the treatment blanching + sulphitation was suitable for *Sesbania grandiflora* flower powder preparation. The prepared powder can be utilized in different value added food products .

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## **Comparative Histological and Histochemical study of Epiglottis Cartilage in Deccani Sheep and Bidri Goat**

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The epiglottis cartilage in both species consisted of lamina epithelia, lamina propria, submucosa and a cartilaginous layer. The lamina epithelia in both species on the laryngeal surface was lined by stratified squamous epithelium with finger like projection extended into the lamina propria whereas on the pharyngeal surface was lined by stratified squamous epithelium, but no projections were present in the lamina propria. Taste buds were noticed on laryngeal surface and pharyngeal surface. Aggregation of lymphatic cells was observed beneath the epithelium in

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both species. The laryngeal epithelium was thicker than the pharyngeal epithelium. The thickness of laryngeal epithelium in Deccani sheep was  $251 \pm 20.53 \mu\text{m}$  and Bidri goat was  $384.5 \pm 47.56 \mu\text{m}$  whereas, the thickness of pharyngeal epithelium in Deccani sheep was  $71.96 \pm 2.74 \mu\text{m}$  and in Bidri goat was  $76.63 \pm 3.75 \mu\text{m}$ . The lamina propria-submucosa was continuous in Deccani sheep but in Bidri goat a layer of muscularis mucosa was found between lamina propria and submucosa. The lamina propria-submucosa in both species was composed of loose connective tissue fibers and fibroblast, fibrocytes, plasma cells, macrophages, mast cells, blood vessels and nerve fibers. The lamina propria-submucosa in both species consisted of tubulo-acinar type glands which were sero-mucous in nature and found on both the sides of the cartilage. The cartilage in both species was elastic in nature and was distributed plate like structures. Fat cells were observed in between the plates of cartilage with Oil red O stain. Histochemical observation revealed mild PAS positive reaction in all secreting units of the glands in Deccani sheep whereas, in Bidri goat a strong positive reaction in few secretory units. Few secreting cells of the glands and the cartilage showed the Alcian Blue positive reaction at pH 2.5. The cartilage and secretory units of glands showed metachromasia with Toluidine blue stain.

**Key words:** Epiglottis cartilage, histology, histochemistry, Bidri Goat, Deccani Sheep

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## **Characterization of Bacteriocins Produced by Lactobacillus SP Isolated from Traditional Yoghurt and their Antimicrobial Activity Against Common Food Borne Bacterial Pathogens**

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Lactic acid bacteria (LAB) are widely known for their probiotic activities for centuries. These bacteria synthesise some secretory proteinaceous toxins, bacteriocins, which help destroy similar or interrelated bacterial strains. This study was aimed at characterising bacteriocins extracted from *Lactobacillus* spp. found in yoghurt and assessing their bactericidal effect on foodborne bacteria. Fifteen isolates of *Lactobacillus* spp. were examined to produce bacteriocins by the organic solvent extraction method. Bacteriocins produced by three of these strains, *Lactobacillus helveticus* (LAB1) and *Lactobacillus plantarum* (LAB2), *Lactobacillus acidophilus* (LAB3) showed the most significant antimicrobial activity, especially against *Staphylococcus aureus* and *Listeria monocytogenes* *Bacillus cereus*. Analysis of SDS-PAGE showed that *L. plantarum*, *Lactobacillus acidophilus* and *L. helveticus* bacteriocins have a molecular weight of ~10 kDa, 14 kDa and ~15 kDa, respectively. *L. plantarum* (LAB2) and *Lactobacillus acidophilus* (LAB3) bacteriocin was heat stable while *L. helveticus* (LAB1) bacteriocin was heat labile. All the three bacteriocins have shown activity at acidic pH. Different proteolytic enzymes confirmed the proteinaceous nature of above three bacteriocins. From this study, it was concluded that bacteriocin extracts from *Lactobacillus plantarum* (LAB2), *Lactobacillus acidophilus* (LAB3) can be considered a preferable candidate against foodborne pathogens as compared to *Lactobacillus helveticus*. *Lactobacillus plantarum* (LAB2), *Lactobacillus acidophilus* (LAB3) partially purified bacteriocins should be further processed to attain purified product that could be useful for food preservation purposes.

**Keywords:** bacteriocin, lactic acid bacteria, proteolytic enzymes preservation.

# **Characterization and classification of soil for suitability and alternate land use planning in Dharni Tehsil of Melghat region.**

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The present study was carried for characterization and classification of soils for suitability and alternate land use planning in tribal area of Dharni tehsil of Melghat in Amravati district of Maharashtra state. Sentinel-2A satellite data of study area obtained from Maharashtra Remote Sensing Center, Nagpur was used to identify probable profile sampling sites. However, profile sampling sites were finalized with help of ground truth and based on the variation in soil-site characteristics and different land use systems. Twenty Four (24) representative spot were selected on different land use system and the study area classify into three broad categories of land use viz., agricultural crop land, forest land and scrub land, respectively. The agricultural crop land was further divided into I) single cropping II) double cropping and III) triple cropping.

The soil occurring on very gently to gently sloping undulating land, plains and lower topographic position are moderately deep to very deep, moderately well drained to well drained, very dark greyish brown to light brownish grey in colour, and have clay to clay loam textural class and classified as Typic Haplusterts and Typic/Vertic Haplusteps. The soils occurring on very gently sloping and moderate to moderately steeply sloping landscapes and isolated hillocks are very shallow, somewhat excessively drained, reddish brown in colour, and have clay loam to sandy clay loam textural class and classified as Typic Ustorthents.

Soils were evaluated for, land capability, irrigability and suitability classes for the crops grown in the area. The soils are grouped into land capability class III, IV, VI, VIII and) land irrigability classes B (2), C (3), D(4) and E (5). The soil suitability evaluation indicates that, the Dharni tehsil soils are highly suitable for sorghum and soybean/ green gram-based cropping system with cultivation of wheat and chickpea as a double crop and cultivation of summer groundnut, summer green gram as triple crop based on availability of irrigation. Suggested land use plan of the Dharni tehsil has been prepared considering available natural resources and their evaluation for optimum utilization and management. This developed land use plan may be helpful in better agro technology transfer on similar soils under similar agro climatic conditions elsewhere.

**Keywords:** Melghat, capability, suitability, resources, cropping system.

## Cluster Analysis Studies of Rice Genotypes for Yield Characters

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The present investigation was carried out during *kharif* 2020 at Agricultural Research Station (ARS) Gangavathi. The experimental material for the current study comprised of 67 medium slender genotypes were evaluated in an augmented block design with repetition of five checks. The genetic diversity of the 67 genotypes and checks under study was evaluated with respect to 10 characters. Tocher's technique was used to construct clusters, the 67 genotypes and checks were divided into seven clusters. The cluster prototype demonstrated that cluster III consist of a maximum of 27 genotypes followed by cluster II having 20 genotypes. Intra and inter cluster distances were worked out using  $D^2$  values from divergence analysis. The maximum intra cluster distance was observed in cluster II followed by cluster III representing that the genotypes present in these cluster were relatively more diverse hence can be used in the crop improvement programme. The maximum inter cluster distance was recorded between cluster V and cluster VII followed by cluster III and cluster IV indicating that genotypes in these two respective clusters were highly diverse. As a result, genotypes from clusters with the greatest inter-cluster distance with highest grain yield are desirable to choose for future breeding efforts to generate new varieties and hybrids. The highest contribution towards genetic divergence in this present study was made by number of grains per panicle. In this study none of the clusters had all of the desirable features that could be directly selected and used. Characters should be chosen from clusters with the greatest cluster mean values for the characters. genotypes from clusters with higher mean values should be chosen as parents in future hybridization programme to take advantage of high variability and diversity.

# **Studies on the varietal response to different plant growth regulators for root tuber yield and yield parameters of sweet potato (*Ipomoea batatas* L.) under agro-climate condition of Chhattisgarh plains**

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The present investigation entitled “Studies on response of Sweet Potato [*Ipomoea batatas* (L.) Lam.] varieties to different plant growth regulators for vegetative growth, tuber yield and quality characters under agro-climate condition of Chhattisgarh plains” was conducted in the Horticultural Research-cum-Instructional Farm, Department of Vegetable Science, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) in the summer season during the year 2017-18 and 2018-19. Pooled data of 2 years revealed that, V<sub>1</sub>- Indira Nandini X P<sub>4</sub>- CCC-1000 ppm recorded significantly maximum root tuber yield parameters like number of root tubers per plant (8.17, 8.06 and 8.12), root tuber girth (cm) (19.50, 22.67 and 21.09), root tuber yield per plant (g) (372.41, 376.00 and 374.21), root tuber yield / plot (kg) (9.23, 9.40 and 9.32), total root tuber yield (q/ha) (307.57, 313.332 and 310.45), number of marketable tuber per plot (163.33, 161.11 and 162.22), number of unmarketable tuber per plot (40.83, 40.28 and 40.56) weight of marketable tuber yield / plot (kg) (8.80, 8.74 and 8.77), weight of unmarketable tuber yield / plot (kg) (0.738, 0.758 and 0.748), dry weight of root tuber per plant (g) (120.00, 123.00 and 121.50 respectively) during both years (2018-19 and 2019-20) and on the basis of mean data.

**Key words:** Sweet potato (*Ipomoea batatas* L.), varieties, Plant growth regulators, yield and yield parameters

# Exploring Physiological Traits and Correlations for Enhanced Seed Yield and Plant Health Assessment in Diverse Genotypes

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Mung bean (*Vigna radiata*) is a pea family (Fabaceae) legume plant that is believed to be indigenous to the Indian subcontinent and is commonly farmed across Asia and the Indian subcontinent. However, productivity is hindered by the occurrence of various abiotic and biotic stresses such as heat stress and MYMV disease. An attempt has been made to assess 303 mungbean germplasm in 3 seasons i.e., Summer 2022, Kharif 2022 and Summer 2023. The genotypes indicated substantial diversity in agreement with the pooled assessment of physiological characteristics. Positive relationships between seed yield and characteristics including LAI, LAD, NDVI, and CCI provide a possible path for indirect selection to increase seed production. The correlational analysis of the Chlorophyll Content Index (CCI), Normalized Differential Vegetation Index (NDVI), and Percentage Disease Incidence (PDI (%)) suggests a role in assessing plant health, disease susceptibility, and plant resistance to a variety of stresses, including MYMV.

**Keyword:** Mungbean, NDVI, CCI, MYMV, Biotic Stress resistance



## Variations in growth and leaf qualitative parameters observed among half-sibling progenies of *Cinnamomum zeylanicum* Blume.

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A field trial was conducted at the Bakkal Botanical Garden near Sirsi, to assess the growth and leaf qualitative parameters among two years old half-sib progenies of *Cinnamomum zeylanicum*. The trial included 15 half-sibling families with three replications derived from 15 plus trees identified from Uttara Kannada and Shimoga districts. The growth and leaf qualitative parameters of the progenies were evaluated at 24 months after planting. The germplasm was established in January 2020. A wide variation was observed among the progenies. The highest mean plant height was observed in K13 (171.66 cm) family, maximum average girth at the collar region was recorded in the family K13 (32.52 mm), higher mean number of leaves per plant were observed in G11 (591.66), the highest number of branches were found in the half-sib family G11 (43.33). The leaf flush colour was noted among the families with the G4, G16 and K13 families showing a medium purple colour and S4 showing a purple colour. The S4 had purple leaf flushing while the K18 had green leaf flushing. While considering the different growth parameters at 24 MAP the best families are K13, K16, S1, S4 and G11, these families can be used for further breeding and tree improvement programme.

**Keywords:** Half-sib progeny, Plus tree, Progeny evaluation and Months after planting

# **Heat Unit requirement and Radiation Use Efficiency of Kharif Soybean in Middle Gujarat Region as Influenced by Cultivars and Plant Geometry**

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The present study proposes to measure the thermal requirements, heat and radiation use efficiency of kharif soybean cultivars (NRC 37, GS 1 and GS 2) in the central region of Gujarat. The findings of study conclude that among all the different geometry 30 x 10 cm produced highest seed (4403 kg/ha) and total biomass yield (5818 kg/ha) over the other two spacing because higher heat use efficiency (heat use efficiency (HUE) for Growing degree day (GDD)- 0.69 kg/ha/°C Day; HUE for Heliothermal units (HTU) - 0.14 kg/ha/°C Day hour; HUE for Photothermal units (PTU) - 0.05 kg/ha/°C Day hour). The cultivar NRC 37 (4415 kg/ha) produced highest seed yield followed by GS 1 (3799 kg/ha) and GS 2 (3670 kg/ha). Heat unit requirement of cultivar NRC 37 (GDD - 1952°C Day; HTU - 9894°C Day hour; PTU-25974°C day hour) was more as compared to GS 2 (GDD - 1951°C day; HTU - 9893°C day hour; PTU-25973°C day hour) and GS 1 (GDD - 1931°C day; HTU - 9809°C day hour; PTU-25681°C day hour), respectively. The radiation use efficiency (RUE) for seed yield and biomass are more in 45 x 5 cm geometry.

# Empowerment of Poverty through Agri Enterprise

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Agriculture which is the backbone of Indian economy helps many people to come out of poverty through Agri enterprises. Traditional agriculture practices are revolutionized by technologies. The Agri based enterprises have brought a socio-economic change in many of the rural communities by providing different employment opportunities thus increasing their standard of living. The enterprises provide training to the communities through which clear knowledge of technology and everything about functionality of market can be gained. Some of the training courses are modern technology and machinery management, managing the livestock, cigar making, post-harvest management, diary management, fisheries management likewise in different ways trainings will be provided to upskill themselves and come out of poverty to lead a good standard of living. Women in rural areas of Telangana are educated about cigar making and now its many people livelihood source. The spirit of entrepreneurship has been infused into rural communities. The steps taken by many Agri enterprises have been huge such that farmers have experienced higher incomes which directly benefits their families as well. Mostly sustainable agricultural practices have been practiced and care has been taken that production is improved and same time zero damage is caused to the environment. However, for smooth functioning of this ecosystem there should be supportive policy framework. A Strategic approach to policy making access to market facilities, and skill development programs will be key for ensuring the longevity for empowering poor through Agri sector.

**Key words:** Enterprise, Empowering, Revolutionized, Traditional

## **Efficiency of foliar application of chitosan encapsulated zinc oxide nanoparticles on growth, yield and biofortification of maize crop (*Zea mays* L.)**

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Zinc (Zn) deficiencies in humans and crops continue to be serious health problems, particularly in underdeveloped nations where the primary cause is insufficient dietary intake. The main reason for this is the widespread consumption of Zn-deficient grains. This issue can be resolved through biofortification, the addition of zinc to cereals. Nano-fertilization is considered an emerging strategy for increasing plant production, while avoiding agroecosystem contamination. Chitosan encapsulated zinc oxide nanoparticles (C-ZnO NPs) are a useful zinc-based material that are made by coating zinc oxide with chitosan. Chemical synthesis method was used to produce C-ZnO NPs, which were then characterised via X-ray diffraction (XRD) and scanning electron microscopy (SEM) before being used to compare the efficacy of graded doses of C-ZnO NPs (50, 100, and 150 ppm) with conventional Zinc sulphate (0.5%) and control in boosting maize growth and nutrient absorption. The XRD pattern confirms the formation of NPs, and the SEM image reveals the various shapes and sizes of NPs, including irregular clusters of particles, smaller particles, and prism shaped particles. C-ZnO NP foliar spray linearly improved maize's growth parameters and biomass. In comparison to the control and conventional (ZnSo<sub>4</sub> 0.5%), a considerably higher concentration of zinc was observed in the roots, shoots, and grains of maize treated with C-ZnO NPs. This finding suggests that these particles could be employed as a source of zinc with the goal of reducing zinc deficiency in plants. However, field investigations under varied conditions and plants may improve the mechanistic understanding of the applicability of NPs in this field.

# **Wear pattern of different makes of Agricultural disc**

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The study has been undertaken to find the best suitable disc among the various commonly used makes available in Indian market and to estimate the life of each disc so the farmers can keep sufficient stock aforesaid, thus reducing downtime and replacement cost. The agricultural discs have large surface area exposed to the abrasive medium *i.e.*, soil and thus they are subjected to large abrasion due to the soil particles. An experiment was conducted to determine the wear of various makes (M1, M2, M3 and M4) of discs as weight reduction, radius reduction and thickness reduction in circular soil bin; and the effect of different soil (sand and silty-clay-loam), operating speed *viz.* 2.5, 3.5 and 4.5 km/h and soil moisture content on wear was taken into consideration. The data obtained from the laboratory test was then compared to the field test conducted at soil moisture content of 12-14 % with 4.5 km/h forward speed and depth of operation as 10 cm. The test was conducted in rice harvested field with duration of work 100 hours. According to both field and laboratory conditions, mathematical correlations were developed relating wear to different operating conditions. The weight loss, radius reduction and thickness reduction obtained at optimal condition were in good agreement with the predicted value obtained the optimization model. The life of the discs in number of working hours was calculated by the developed model keeping minimum allowable radius up to 228.6 mm and the working life of discs M1 (36.3 HRC), M2 (38.1 HRC), M3 (41.5 HRC) and M4 (42.1 HRC) were calculated as 423.86, 585.51, 950.64 and 1329.4 hours respectively. Based on the study, the make M4 showing minimum wear and maximum working life was selected as the best suitable for farmers followed by M3, M2 and M1.

## **Morbidity Profile of Gir Crossbred According to Age, Year and Season**

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The research entitled “Consequences of morbidity and disposal patterns on productivity of Gir crossbred under organized herd” was under taken by utilizing data generated at RCDP on cattle, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra. The data of morbidity cases 8274 morbidity cases and 888 disposed of animals were recorded over the period from 2000 to 2017 were utilized for the present study.

The morbidity and disposal of cattle were recorded at various age, year, season, birth weight and causes of morbidity observed. The significance of various factor under study was tested by chi-square test.

The overall morbidity cases were 8274 during the period of 2000-2017 out of which 40.91 per cent were Half breeds, 36.8 per cent were Phule Triveni and 22.4 per cent were 5/8<sup>th</sup> Gir crosses. Total 21.0 per cent animals were disposed of during the period under study out of which 10.8 per cent died and 10.2 per cent were sold.

The highest morbidity was recorded in the age group of (3-10 years) with the advancement of age and disposed of due increased mortality with the advancement of period. Disposed due to sell was declined with the advancement of period with some exceptions. Majority deaths were noticed during age group 0-3 months while sell was noticed in the age group of 3-10 year. Seasonal variations in disposed pattern were non-significant. According to the birth weight, the highest morbidity was found in the birth weights (20-25 kg) than

the heavy weight. According to season the highest morbidity and mortality occur in rainy season followed by winter and summer season.

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## **Pathomorphological Alterations in Cisplatin Induced Testicular Toxicity and its Amelioration by Gallic Acid**

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The study was aimed to investigate the efficacy of a phytochemical gallic acid (GA) in preventing the pathomorphological alterations induced by cisplatin (CP) in testicular tissue of Wistar albino rats. One hundred and eight Wistar albino rats were equally divided into six groups. Group I served as normal control, Group II received single dose of intraperitoneal injection of CP at 7.5 mg/kg bw, Group III received GA at 75 mg/kg bw for 45 days, Group IV was treated with GA daily for 15 days prior to CP injection and discontinued post CP injection, Group V received CP injection and concurrently received GA for 45 days post CP injection and Group VI was treated with GA for 15 days prior to CP injection and continued for 45 days post CP injection. The testis samples collected on 7th, 14th, 28th and 45th day of post CP injection were subjected for histopathological examination to study the sequential pathomorphological changes. CP administration produced moderate congestion and interstitial oedema, severe seminiferous tubular atrophy, tubular cell degeneration and necrosis. The Gallic acid supplemented groups showed significant improvement in CP induced pathological changes. The pre + concurrent GA

supplementation (Group VI) produced much earlier improvement in CP induced pathological changes than only pre and only concurrent GA supplementation. It was concluded that, GA supplementation have protective role against CP induced testicular toxicity.

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## **Immunological evaluation of mastitis causing *Escherichia coli* biofilm vaccine in cattle**

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The study was carried out to evaluate T cell proliferative response in cattle by analyzing lymphocyte subpopulation with reference to CD4 and CD8 cells by flow cytometry and humoral immune response with reference to serum IgG level by indirect ELISA, in mastitis causing *E.coli* Biofilm vaccinated and Free cell vaccinated groups. In all, eighteen cattle in early lactation which were free from mastitis were subjected to trials. Bentonite clay (an adjuvant by itself) based *E.coli* BF and FC vaccines were administered at 0, 30 and 60 days. Freund's incomplete adjuvant was incorporated in the first shot. In Flow cytometric analysis, vaccination based on the *E.coli* BF showed significant enhancement in CD4 and CD8 cells. The percentage of CD4 and CD8 increased significantly in the *E.coli* BF vaccinated groups than in the control group and further, in comparison with *E.coli* FC vaccine, the percentage of CD4 and CD8 cell population found to be marginally increased on days 60 and 90 and significantly increased on day 120 post vaccination. Further, serum IgG level detected by indirect ELISA was significantly higher in BF vaccinated than FC vaccinated groups. The increased levels of IgG in the BF vaccinated serum coincided with the CD4 levels determined by the flow cytometry, indicating the higher titres of



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IgG due to the presence of CD4 cells. Both BF and FC vaccinated groups showed significant difference with control group. T cell proliferative immunological response by analyzing lymphocyte subpopulation with reference to CD4 and CD8 cells and humoral immune responses indicated superiority of bovine mastitis causing *E.coli* BF vaccine over FC vaccine.

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## Genetic Variability, Character Association And path Analysis in Bread Wheat (*Triticum aestivum* L.)

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The experiment was conducted during *rabi* to study the genetic variability, character association and path analysis among 40 genotypes of bread wheat (*Triticumaestivum* L.). The ANOVA revealed the presence of sufficient variability among the genotypes. Moderate to high heritability coupled with high genetic advance expressed as percentage of mean were observed for grain yield per plant (78.1 %; 57.72 %), number of effective tillers per plant (73.8 %; 51.94 %), biological yield per plant (71.5 %; 47.10 %), length of main spike (68.1 %; 22.73 %) and number of grains per main spike (42.4 %; 19.00 %), thus selection pressure could profitably be applied on these characters for their rationale improvement. The grain yield per plant exhibited significant and positive genotypic and phenotypic correlation with biological yield per plant ( $r_g=1.0000$ ,  $r_p=0.9383$ ), number of effective tillers per plant ( $r_g=0.7726$ ,  $r_p=0.7503$ ) and harvest index ( $r_g=0.6648$ ,  $r_p=0.4405$ ). The path coefficient analysis revealed high and positive direct effects of biological yield per plant (1.7268), number of grains per main spike (0.6297), 100 grain weight (0.5677), days to maturity (0.4235), main spike length (0.3984) and harvest index (0.1311) on grain yield per plant, were turned-out to be the major components of grain yield.

**Keywords:** Correlation coefficient, Heritability, Genetic advance, Path analysis, Variability, Wheat

## Effect of different varieties on growth and yield attributing characters of Wheat (*Triticum aestivum* L.)

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An experiment was conducted in *rabi*, 2016-17 at Kolhapur. To find out suitable variety of wheat for extended sowing time. The experiment was laid out in split plot design *viz.* five sowing times (45<sup>th</sup> MW, 47<sup>th</sup> MW, 49<sup>th</sup> MW, 51<sup>th</sup> MW and 1<sup>st</sup> MW) as main plot and four varieties (NIAW-301(Trimbak), NIAW-917 (Tapovan), NIAW-34 (Niphad -34) and NIAW-1994 (Phule Samadhan) as sub plot with three replications. The height of plant was significantly higher in NIAW-1994 also number of tillers meter<sup>-2</sup>, leaf area plant<sup>-1</sup> and total dry matter accumulation was maximum in variety NIAW-1994. The yield attributing characters like number of grains spike<sup>-1</sup>, weight of grains spike<sup>-1</sup> and weight of grain plant<sup>-1</sup>, test weight was higher in variety NIAW-1994. The highest values of grain yield (37.48 q ha<sup>-1</sup>), straw yield (58.52 q ha<sup>-1</sup>) as well as harvest index (38.48 per cent), were maximum in NIAW-1994 as compared to other varieties. So, it concluded that among the variety NIAW-1994 (Phule Samadhan) is the most promising variety.

**Keywords:** Varieties, Growth and Yield

## Development of the process for preparation of aerial yam (*Dioscorea bulbifera*) cookies

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An investigation entitled “**Development of the process for preparation of aerial yam (*Dioscorea bulbifera*) cookies**” was undertaken at the Department of Fruit, Vegetable and Flower Crops, Faculty of Post Harvest Management, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, District Ratnagiri, during the year 2017-2018.

The study aimed to standardize the recipe for the aerial yam cookies from aerial yam flour and to study the storage behaviour of aerial yam cookies at ambient conditions. For this experiment, the Factorial Completely Randomized Design (F.C.R.D.) was used. The experiment was carried out with five treatments comprising of different proportions of aerial yam flour and *maida* i.e. 0:100, 20:80, 30:70, 40:60, 50:50 in the aerial yam cookies and the product was analysed for physico-chemical and sensory qualities initially and during 10, 20 and 30 days of storage.

The physical parameters except diameter, all other parameters such as thickness and volume of the cookies decreased with the increase in the level of aerial yam flour in the cookies. An increase in L\* values with decrease in the a\* and b\* value for colour of the cookies was observed during storage.

The present study revealed that all the chemical parameters except moisture and reducing sugars, all other chemical parameters such as TSS, titratable acidity, total sugars, ash, crude fat and crude fiber content exhibited a decreasing trend during storage period of 30 days at ambient condition.

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From the results of present studies, it can be concluded that the aerial yam cookies could be stored up to 30 days at ambient condition, when packed in 400 gauge low density polyethylene (LDPE). Based on the sensory qualities and economics, the aerial yam cookies could be prepared by using 20 per cent aerial yam flour level with higher overall acceptability.

**Keywords:** Aerial Yam, Cookies, Colour, physico-chemical Qualities and Storage, etc.



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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 9 lakh+ readers.



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