

Proceedings

**2nd International Conference on Advancement
of Science and Technology for Environment,
Society and People (ICASTESP-2023)**

(6-7 January 2023)

Organised by

**Society for Technology,
Environment, Science & People,
Kozhikode, India**



(<https://www.societypesp.org/>)

Proceedings
of the
2nd International Conference
On
**Advancement of Science and Technology for Environment,
Society and People (ICASTESP-2023)**
Kozhikode, Kerala, India
(6-7 January 2023)

Editor

Devi Dayal

Organised by



Society for Technology, Environment, Science & People, Kozhikode, India

(<https://www.societytesp.org/>)

Citation:

Devi Dayal. 2023. Proceedings of the 2nd International Conference on Advancement of Science and Technology for Environment, Society and People (ICASTESP-2023) (6-7 January 2023), Kozhikode, India. Znan Publishers, Kozhikode, India. (ISBN: 978-81-956227-3-3). p. 37.

Title: Proceedings of the 2nd International Conference on Advancement of Science and Technology for Environment, Society and People (ICASTESP-2023)

Editors' Name: Devi Dayal

ISBN: 978-81-956227-3-3

Published by:

ZNAN Publishers for

Society for Technology, Environment, Science & People, Kozhikode, India,
(<https://www.societytesp.org/>)

e-mail: societytesp@gmail.com

© Editor and authors, 2023

All rights reserved. All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the copyright holder/s.

This book contains information obtained from authentic and highly regarded sources. Reasonable efforts have been made to publish reliable data and information, but the author, Editors and publisher cannot assume responsibility for the validity of all materials or the consequences of their use. The author/s, editor/s and publisher have attempted to trace and acknowledge the copyright holders of all material reproduce in this publication and apologise to copyright holders if permission and acknowledgements to publish in this form have not been taken. If any copyright materials have not been acknowledged please write and let us know so that we may rectify it subsequently.

Published on: 7 January 2023

INDEX

Sl. No.	Paper Details	Page No.
1.	Management of aquatic weed biomass and assessment of its manurial value <i>B. Aparna, Anushma. S, Gladis. R and Gowripriya</i>	5
2.	Working models of SHG bank linkage programme <i>Nidhi and Pushpa Kumawat</i>	6
3.	Feedback of the farmers in Cultivation of Oilseed crops in Raigad district of Maharashtra <i>Talathi, M.S., Mandavkar, P.M., Arekar J.S., Manjrekar R.G., Padhye S.J., Gitte M.J., and Bhave S.G.</i>	6
4.	Epidemiology of abortion in the goats reared under field condition <i>A.K. Mishra, A. Kumar, K. Gururaj, N. Sharma and C. Gangwar</i>	7
5.	Role of egg parasitoid, <i>Trichogramma chilonis</i> against Sugarcane early shoot borer, <i>Chilo infuscatellus</i> <i>Sudha Rani D, Sailaja Rani J and Nagendra Rao, K</i>	8
6.	Impact of textile industry effluent on root biomass of <i>Solanum lycopersicum</i> L. <i>Shakuntala Giri and R.P. Singh</i>	9
7.	Nano-fertilizers: Foliar Application – A Way towards Nutrient Use Efficient Agriculture <i>Kurhade Ankita Kailas and Chetandeep Prasanth</i>	10
8.	Soil erosion and crop productivity as influenced by soil amendments in degraded ecosystem of Chambal tablelands <i>I. Rashmi, Shakir Ali, Kuldeep Kumar, Ashok Kumar, and Kala S.</i>	10
9.	Realizing benefits of rice straw management in rice-wheat cropping system <i>Annu Sagwal</i>	11
10.	Carbon fractions, microbial metabolic quotient, and digital mapping of carbon stock in laterite derived tropical wetland soils of northern Kerala <i>M. M. Sreelakshmi, B. Aparna and Rani. B</i>	12

11.	IoT-based artificial intelligence for prediction of field soil moisture content in sweet corn root zone <i>Vinod Kumar S, C D Singh, K V Ramana Rao, K. Upendar</i>	13
12.	Impact of temperature and relative humidity on population density of <i>Apis</i> sp. on coriander <i>Thakur Mandar Vijay and Munj Sujal Suhas</i>	13
13.	Reverse breeding: A novel breeding approach for targeted heterosis <i>Shivam Sharma1, Sonia Sood, D.R. Chaudhary, Viveka Katoch</i>	14
14.	A review on agronomic manipulations for enhancing nitrogen use efficiency <i>Sandeep and Jitender</i>	15
15.	Effect of long-term integrated nutrient management on bio-fortification of Zn in wheat <i>Diksha and Narender</i>	16
16.	An economic analysis of rabi sorghum and chickpea seed delivery system in Karnataka <i>Shriram, Prabhuling Tevari, Jagrati B. Deshmanya and Devendra Beeraladinni</i>	17
17.	Assessment of Performance of Kisan Credit Card Scheme in India <i>Sonia and D. P. Malik</i>	17
18.	Production potential and economics of castor (<i>Ricinus communis</i> L.) based intercropping system under semi-arid region of Haryana <i>Gangadhar K, J.S. Yadav, A.K. Yadav, Veena C..1, Madhu D.M</i>	18
19.	Role of Farmer Producer Organizations in doubling of farmers income - Policy impetus by Government of India <i>Praveen Kumar, Priyanka Kumari and Ankit</i>	19
20.	Nanotechnology for enhancing crop productivity in agriculture <i>Ankit, Deachen Dolma, Sachin and Praveen Kumar</i>	21
21.	PIR Sensor Based Safety Alarm System for Fodder Cutter Machine <i>Asha K.R., Adarsh Kumar, J.K. Singh, H.L. Kushwaha, D.K. Kushwaha, and Arpan Bhowmik</i>	22

22.	Horticulture as an emerging sector	22
	<i>Parveen, Raj Pal Singh, Chetna, M.L. Jat and Deepak Sangwan</i>	
23.	Influence of <i>Phalaris minor</i> roots on root system architecture, 15N-influx and expression of putative nitrate transceptor gene (TaNPF6.4) of bread wheat under nitrogen limited condition	23
	<i>Priyanka Kumari, Amresh Kumar, Tapas Kumar Das, Pranab Kumar Manda, Subodh Kumar Sinha</i>	
24.	Impact of Self-Help Group on economic empowerment of rural women in Nagaland, India	24
	<i>Mary N. Odyuo, Kuvi K. Chophi, Benthunglo Lotha, Sentinungshi and Deepa Thangjam</i>	
25.	Artificial Intelligence: using technology for empowering farmers	25
	<i>Ayush Mishra and Joginder Singh</i>	
26.	Cocopeat: An organic growing media	26
	<i>Bharti Choudhary</i>	
27.	Impact of K.V.K.'s trainings for nutritional kitchen garden on behaviour of rural women	27
	<i>Deepali Chauhan</i>	
28.	Haploidy and its success stories in vegetable crops	28
	<i>Payal Sharma, Parveen Sharma, Shivam Sharma</i>	
29.	Physico-chemical, and biological properties of soils in Northern Kole land of Thrissur district in the post-flood scenario	29
	<i>Anusree T and K.M. Durga Devi</i>	
30.	Employment generation for Women through Production and Marketing of Mulberry Silk in Karnataka	29
	<i>Madhu D M; D.K. Sinha, Tulika Kumari1 and Gangadhar, K</i>	
31.	Hydroponics: An emerging technology for climate resilient horticulture	30
	<i>Kumari Shashi Bala, Seema, Manish Kumar, Shashikant and Sanjay Kumar Singh</i>	

32.	Edible mushroom cultivation: A means of nutritional security & quality life <i>Seema, Kumari Shashi Bala, Manish Kumar, Shashikant and Sanjay Kumar Singh</i>	30
33.	Weed surveillance for management of invasive weeds <i>Sahaja Deva and M.K. Jyosthna</i>	33
34.	AgriTourism - A new agriprenurship <i>Kadiri Mohan and M.Suresh Kumar</i>	33
35.	Allelopathic interactions in agroforestry ecosystems: A key for natural resource management <i>Anju B. Raj and Jacob John</i>	34
36.	Scenario of food processing and value addition in horticulture in India <i>Ravi Gautam, Reetika and Vivek Beniwal</i>	35
37.	About the editors	37

Management of aquatic weed biomass and assessment of its manurial value

B. Aparna¹, Anushma. S¹, Gladis. R² and Gowripriya

¹*Professor and Head, Dept of Organic Agriculture*

²*Associate Professor. Dept of Soil Science and Agri chemistry*

³*Assistant Professor, Dept of Soil Science and Agri Chemistry
College of Agriculture, Vellayani, Thiruvananthapuram-695522
(Corresponding author e-mail: aparna.b@kau.in)*

ABSTRACT: The study entitled was conducted at the Department of Soil Science & Agricultural Chemistry, College of Agriculture, Vellayani to manage the aquatic weed biomass and assessment of its manurial value. The study involved collection of representative samples such as water cabbage (*Limnocharis flava*), water hyacinth (*Eichhornia crassipes*), farm wastes (dried leaves and pseudostem of banana) and coir pith from different locations. The design adopted for the experiment was Completely Randomized Design (CRD) with four treatments and five replications. The substrates used in the study are S₁-Water cabbage, S₂-Coir pith, S₃ -Water hyacinth, S₄ -Farm waste. The inoculants used in the study were I₁ - *Trichoderma reesei*, I₂ - *Pleurotus sajor*, I₃ -Composting Inoculum developed by the Dept. of Agricultural Microbiology, College of Agriculture, Vellayani, I₄ - Commercial enzyme cocktail (Cellulase / pectinase and laccase) . The resultant composts from the previous stage were evaluated for their performance as manure in a pot culture experiment with test crop amaranthus (variety - Arun). A mixture of water cabbage and Composting Inoculum) was concluded as the best in terms of nitrogen content, cellulase activity, maturity period, C:N ratio and no detectable levels of heavy metals except Ni (0.414 ppm) below the detectable limit. Considering the effect of inoculants on different substrates, Composting Inoculum was concluded as the best in terms of moisture content, EC, N, P, K, dehydrogenase activity, cellulase activity, maturity period and C:N ratio. The resultant composts from the previous stage were evaluated for their performance as manure in a pot culture experiment with test crop amaranthus (variety - Arun). Application of 100 % N as compost from water cabbage and Composting Inoculum was found to be good and on par with T₁₃ in many of the soil biological characters. Thus it was inferred from the study, water cabbage + Composting Inoculum was recorded as the best compost followed by water hyacinth + Composting Inoculum. 100 % N as compost (water hyacinth + Composting Inoculum) was noticed as the best treatment in pot culture. With regards to inoculants used on different substrates, Composting Inoculum was found to be the most effective for composting the agrowastes.

Working models of SHG bank linkage programme

Nidhi¹ and Pushpa Kumawat²

¹Subject Matter Specialist at Krishi Vigyan Kendra, Athiyasan, Nagaur-I

²Programme Assistant at Krishi Vigyan Kendra, Maulasar, Nagaur-II
(Corresponding author e-mail: aroranidhi156@gmail.com)

ABSTRACT: SHGs are either registered or unregistered, affinity group of about ten to twenty people from a homogenous class, who come together for addressing their socio-economic problems. They start with saving and not with credit and make voluntary thrift on a regular basis and use these pooled resources to make small interest-bearing loans to their members. The vision of the formation of SHG is to empower rural poor women for overall development of the country. The main object of the SHG approach is providing access to credit in the context of poverty reduction and women empowerment. There was a net addition of 6.73 lakh SHGs during the year. The SHGs having savings linkage to 85.77 lakh as on 31 March, 2017. The savings outstanding of SHGs with banks as on 31 March, 2017 had reached an all-time high of ₹ 16114.22 crore. The growth of SHG was found positive in the year 2016-17.

Key Words: SHG, credit, saving & bank etc.

Feedback of the farmers in Cultivation of Oilseed crops in Raigad district of Maharashtra

Talathi, M.S., Mandavkar, P.M., Arekar J.S., Manjrekar R.G., Padhye S.J., Gitte M.J., and Bhave S.G.

Krishi Vigyan Kendra, Killa-Roha, Dist. Raigad, Dr. B.S. Konkan Krishi Vidyapeeth, Dapoli Maharashtra

ABSTRACT: The population is increasing, the demand for agricultural produce is increasing rapidly and the scope of bringing more land under cultivation is receding fast. Thus, increasing production per unit of available land is the only answer to the problem. Therefore, the Indian Council of Agricultural Research (ICAR), in order to boost the production and productivity by using the latest technologies introduced the concept of Front-Line Demonstrations (FLDs). In order to bring production to the forefront and to achieve even higher level of production, FLDs play the most pivotal role in terms of providing viable technological inputs. These demonstrations will also provide scientists with an opportunity to demonstrate the technology under actual farmer's conditions and get direct feedback from the field so that the performance

of the new technology could be further modified and improved. Oilseeds form the second largest agricultural commodity in India after cereals sharing 15.5 % of gross cropped area and accounting for nearly 3.6 % of the gross National product and 10.4% of value of all agricultural products. The study revealed that the possible reason behind big farmer's adoption level to medium extent might be due to medium level of scientific orientation and risk bearing ability. Low adoption level was found in small farmer's category (45.68 per cent) as compared to medium and big farmer's category. In the practices like, recommended improved/hybrid variety, FYM application, fertilizer application, intercultural operations and weed/water management, the demonstrator farmers had more adoption level. Frequency of constraints related to technological and extension category was relatively less as compared to other constraints like availability of inputs and financial. Emphasis should be given on conduct of off campus training and field demonstrations on recommended agricultural technologies. Still there is a need for greater attention on the part of officials involved at the grass root levels and need to strengthen the staffing pattern and infrastructures of various technology transfer organizations.

Key words: Adoption, constraints, oilseeds

Epidemiology of abortion in the goats reared under field condition

A.K. Mishra, A. Kumar, K. Gururaj, N. Sharma and C. Gangwar

*Animal Health Division, ICAR-Central Institute for Research on Goats (ICAR-CIRG),
Makhdoom, Farah-281122, Mathura, Uttar Pradesh*

(Corresponding author e-mail: anilmishradr@gmail.com)

ABSTRACT: In a healthy herd of goats, the proportion of visible abortions is generally below 2 %. Abortion rate between 2 to 5 % indicates its endemic nature and abortion level beyond 5% requires thorough investigation. In the present study, a total of 507 goat farmers of Uttar Pradesh and Rajasthan were visited for collection of the epidemiological data on abortions. A total of 576 abortions occurred amongst 6286 goats serviced/bred. Thus, the annual abortion rate was assessed as 9.16 % which shows its alarming situation in the field goats. Occurrence of the abortions in field goats was categorized according to season, parity of the goats and stage of pregnancy. Quantum of abortions was the highest in the late stage (52.25%; 301/576)

followed by early stage (25.86%; 149/576) and mid stage of pregnancy (21.87%; 126/576). Majority of abortions were noticed in winter (42.01%; 242/576) followed by rainy as well as summer seasons. In rainy and summer seasons, equal occurrence of abortion was observed (28.99%; 167/576). Likewise, maximum abortions (88.02%; 507/576) were seen in the goats having parity 1 to 3. Winter season poses stress in the goats, which may be the possible reason behind the maximum abortions in the season. Most of the infectious agents (*Brucella melitensis*, *Coxiella burnetii*, *Chlamydomphila* spp., *Listeria monocytogenes*, *Leptospira interrogans*, *Toxoplasma gondii* etc.) cause abortions in the later stage of pregnancy. That is why, majority of the abortions were found in this stage of pregnancy. In general, older goats acquire immunity against the infectious agents in due course of time, because of this; rate of abortion in the older goats was found low.

Role of egg parasitoid, *Trichogramma chilonis* against Sugarcane early shoot borer, *Chilo infuscatellus*

Sudha Rani D*, Sailaja Rani J and Nagendra Rao, K

Sugarcane Research Station, Vuyyuru, Krishna district, Acharya N G Ranga Agricultural University, Lam, Guntur, Andhra Pradesh, India
(Corresponding author e-mail: d.sudharani@angrau.ac.in)

ABSTRACT: The major production constraints of sugarcane cultivation is attack by insect pests and among the various pests infesting sugarcane early shoot borer, *Chilo infuscatellus*, Snellen (Crambidae: Lepidoptera) is the most destructive. The early shoot borer causes a yield loss ranging from 22-33 per cent in sugarcane and chemical usage against this pest is the most common and expedient method adopted by farmers. But, due to indiscriminate usage of insecticides resulted in ecological adversity, resistance among insects and residual effects in the environment. Biological based pest management tools are the need of the hour as they lack toxicity on non targeted organisms, long potency and compatible with other components of integrated pest management strategies. Among the various biological methods, inundative release of predators or parasitoids against the targeted pest is the most proved technology in pest management. Hence, an on farm trial was conducted in farmer fields of Krishna district, Andhra Pradesh for a period of three successive seasons *i.e.*, 2019-2020, 2020-2021 and 2021-22 to assess the efficacy of field release of *T.chilonis* (tricho cards) @ 50000 ha⁻¹ from 30 DAP to 240 DAP at an interval of 10 days against chemical based treatments. The results

inferred that chemical management had recorded comparatively low incidence of early shoot borer with 7.74, 8.15 and 8.58 per cent dead hearts compared to field release of tricho cards which had registered 15.57, 16.57 and 14.15 per cent dead hearts during 2019-2020, 2020-2021 and 2021-22 seasons, respectively. The per cent reduction of early shoot borer over control was also found to be more in chemical-based treatments (80.4, 79.9 and 79.84) than biological based methods (60.6, 59.2 and 57.34) during 2019-2020, 2020-2021 and 2021-22 seasons respectively. But, from the results it is clearly elucidated that biological based management is also offering best results in pest management ranging between 57.34 to 60.6 per cent control. Keeping in view deleterious effects of chemical usage the field release of tricho cards can be recommended as alternative to chemical-based insecticides with utmost priority leaving no scope for resistance/ resurgence tribulations.

Impact of textile industry effluent on root biomass of *Solanum lycopersicum* L.

Shakuntala Giri¹ and R.P. Singh²

¹*Department of Botany, S. N. P.G. College, Azamgarh*

²*Department of Ag. Chemistry and Soil Science, Udai Pratap (Autonomous) College, Varanasi*

ABSTRACT: Textile industry effluent contains various toxic substances which are harmful to the plants. The aim of the present study is to observe the impact of textile industry effluent on root biomass of *Solanum lycopersicum* (L.). Effluent of textile industry was taken from district Bhadohi and used in this study. A pot experiment was conducted adopting Completely Randomized Design with five treatments and three replications in the natural open weather conditions for 60 days during the plant season. Five concentrations viz; 0%, 25%, 50%, 75% and 100% were used for present experiment. Zero per cent concentration was treated as control. Observations related to root biomass (root fresh and dry weight) was recorded at harvest. Result reveals that root biomass of *Solanum lycopersicum* L. gradually decreased with increase in effluent concentrations and the maximum amount was recorded at 0% concentration level whereas minimum was with 100% concentration.

Keywords: Textile industry effluent, Tomato, Root fresh and dry weight.

Nano-fertilizers: Foliar Application – A Way towards Nutrient Use Efficient Agriculture

Kurhade Ankita Kailas and Chetandeepr Prasanth

Department of Genetics and Plant Breeding, Dr. RPCAU, Pusa, Samastipur, Bihar

(Corresponding author e-mail: ankitakurhade123@gmail.com)

ABSTRACT: As the global demand of food is increasing rapidly, owing to the surge in the population and the urbanization, the use of chemical fertilizers is increasing to cope up with the demand of increasing the crop production. These chemicals are detrimental to the human as well as environment. The nano-fertilizers are emerging out as a great alternative to deal with this problem. They increase the nutrient use efficiency (NUE), are environment friendly and will boost the production as well as the quality of the produce. The soil application of nutrients which is the common method, has many demerits such as leaching losses, fixation in soil, etc. Now recently the use of nano-fertilizers as foliar application is been popularized as the best way to supplement the plant with the required nutrients in the right amount as well as at the correct growth stage of plant. This method is more commonly used in the horticultural crops but now it's also been used for the other agronomic crops.

Keywords: Nano-fertilizers, foliar application, leaching losses, NUE, nutrients.

Soil erosion and crop productivity as influenced by soil amendments in degraded ecosystem of Chambal tablelands

I. Rashmi, Shakir Ali, Kuldeep Kumar, Ashok Kumar, and Kala S.

ICAR-Indian Institute of Soil and Water Conservation, Research Centre, Kota, Rajasthan

(Corresponding author e-mail: rashmiuas25@gmail.com)

ABSTRACT: Soil and water are a valuable natural resource and its conservation is very crucial for food security. for sustainable crop production and reducing environmental load especially in degraded lands. In semi-arid regions erratic rainfall pattern, soil loss, low soil moisture and organic carbon and sodicity resulting in poor soil condition are some of the major constrain in soybean production. Thus, to check soil erosion vis-à-vis degradation on table land, a study was conducted to compare different amendments like gypsum, crop residue (CR) and farm yard manure (FYM) with chemical fertilizers on crop productivity, resource conservation and soil health in soybean-mustard system in degraded vertisol. Results illustrated highest mean runoff and soil loss in control plots and lowest in RNPk+Gypsum+CR and RNPk+Gypsum+CR treatments. Soil loss rate increased linearly with increase in runoff loss in all the treatments.

Magnitude of runoff and soil loss reduction in combined amendment treatments was 37% and 51% respectively. Gypsum with CR and FYM showed higher soil and nutrient conservation followed by sole amendment treatments. With reduction in soil erosion, soybean crop yield improved in combined and sole amendment treatments as compared to only fertilizers applied plots. Soybean yield in combined and sole amendment treatments improved by 30-35% over chemical fertilizer treatment. Significant improved in organic carbon, reduction in exchangeable sodium percentage, increased available nutrients were observed with soil amendment application. Soil amendments such as gypsum, CR, FYM are easily available and economically viable options for farmers to reduce erosion, improve soil health and crop productivity in fragile ecosystems of semi-arid regions.

Keywords: soil amendments, runoff, soil loss, soybean, soil properties

Realizing benefits of rice straw management in rice-wheat cropping system

Annu Sagwal

*CCS, Haryana Agricultural University, Hisar, 125004, India
(Corresponding author e-mail: annusagwal3@gmail.com)*

ABSTRACT: Residue management, particularly in the Indo-Gangetic Plains, is a rising concern for the sustainability of Indian agriculture and environmental preservation. Out of total crop residues produced annually in the country, about 30% of it is contributed by rice and wheat. Around 16% of total crop residue being burnt, 62% is contributed by rice and wheat. Because of this, the majority of farmers burn rice residues in the field, which severely degrades the environment and harms human health. Farmers need to get clear fields within short period of time at any cost to ensure the timely sowing of wheat crop without any obstacle in farm operations offered by loose paddy straw. It takes time to manage loose paddy straw by mechanical operation to ensure smooth and timely sowing of wheat crop in standing stubble of rice crop which force farmers to go for paddy straw burning. Field burning of paddy straw was not given much attention by policy makers in past because it was at a small scale, but nowadays, it is considered as the serious agricultural contaminant, which is directly affecting environmental and human health and causes global warming as burning produces greenhouse gases. At the time of Rice harvesting, Punjab, Haryana, Western Uttar Pradesh and Delhi face heavy smog problem because of rice straw burning and soil fertility is also deprived. In the Indo-Gangetic plains, rice-wheat is a major cropping system and both crops produce a lot of

excess residues which is eventually disposed of by burning in the field mainly the rice residues. There are strict laws, severe punishments, and imprisonment for violators. We need to manage on-farm and post-harvest management of rice residues either by machineries and by adjustment in the cropping system and utilizing rice straw in industrial uses and power generation.

Keywords: Residues, Burning, Machinery.

Carbon fractions, microbial metabolic quotient, and digital mapping of carbon stock in laterite derived tropical wetland soils of northern Kerala

M. M. Sreelakshmi, B. Aparna and Rani. B

*Department of Soil Science, Kerala Agricultural University,
College of Agriculture, Vellayani, Trivandrum, Kerala– 695522
(Corresponding author e-mail: sreelakshmi.m.m345@gmail.com)*

ABSTRACT: Since the unintended consequences of climate change engendered by global carbon dioxide concentration have been recognized in recent decades, it is imperative to reduce the carbon emissions from terrestrial and aquatic ecosystems in a prudent manner. In this study, a broad range of tropical soils were collected from eight benchmark soil series of Kerala, India to understand the distribution of organic carbon in detrital wetland Ultisols. Most soil samples belong to the textural class Sandy clay loam. The $\text{pH}_{(\text{KCl})}$ was observed to be 0.65 - 0.98 units lower than pH_{water} . We investigated the fractional distribution of labile carbon, water-soluble carbon, microbial biomass carbon, and mineralizable carbon and dehydrogenase activity. In surface soil, the highest OC content was found in the Kunnamangalam series with a mean value of 1.82 %. Angadipuram series has shown the highest C stock with a mean value of $36.2 \pm 6.36 \text{ mg ha}^{-1}$. Significant changes were observed down the profile regarding soil microbial quotient and microbial metabolic quotient. PCA of surface soils revealed the highest factor loadings for EC, organic carbon, carbon stock, and soil respiration. The pH, bulk density, labile carbon, organic carbon, and carbon stock had significant variations at two depths. In surface soils, mineralizable carbon and soil respiration were positively correlated with $\text{pH}_{(\text{H}_2\text{O})}$. Hence, we conclude that it is crucial to comprehend the relevance of wetland conservation, its capacity to store carbon in the soil, and its inevitable role in climate change mitigation

Keywords: *Ultisols, Detrital laterites, Wetlands, Carbon stock, Microbial Metabolic Quotient*

IoT-based artificial intelligence for prediction of field soil moisture content in sweet corn root zone

Vinod Kumar S, C D Singh, K V Ramana Rao, K. Upendar

ICAR-Central Institute of Agricultural Engineering, Bhopal (CIAE), Madhya Pradesh-462038, India

(Corresponding author e-mail: srinivasvinod1994@gmail.com)

ABSTRACT: For precision irrigation management, it is crucial to accurately estimate crop root zone soil moisture content (SMC) in the field. Ground methods to measure SMC are currently limited by small-scale monitoring and high costs. However, soil moisture is affected by soil, crop, and meteorological factors, and ideal mathematical models are difficult to develop. The Internet of Things and machine learning techniques can be used to optimize water usage in irrigation. In this study, IoT smart device was developed to collect the field soil moisture in real-time using different sensors (soil moisture, ambient temperature, relative humidity and soil temperatures sensor). We investigated various machine-learning techniques for predicting soil moisture. Specifically, the evaluated machine learning techniques included random forest regression (RFR), support vector regression (SVR), boosted regression trees (BRT), extreme *learning machine* (ELM), *Multilayer perceptron* (MLP), bagged classification and regression trees (CART), bidirectional recurrent neural networks (BRNN). The objective of this study was to determine the effectiveness of these machine-learning techniques and evaluate the importance of predictor variables. The RFR algorithm performed the best, with mean absolute errors (MAE) of 0.29 m³ m⁻³; root means square errors (RMSE), mean square error (MSE) and R² of 0.64, 0.41 m³ m⁻³ and 0.96, respectively. Extending the forecast period, the prediction accuracy values of the RFR model for the soil moisture content on day 3 were comparable, with an average MSE of less than 1.0.

Keywords: Soil water content, IoT, Sweet corn root zone, Feature selection, Machine learning

Impact of temperature and relative humidity on population density of *Apis* sp. on coriander

Thakur Mandar Vijay¹ and Munj Sujal Suhas²

¹*Department of Entomology, Post Graduate College of Agriculture, Dr. RPCAU, Pusa, Bihar, India.*

²*Department of Agricultural Entomology, College of Agriculture, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India.*

(Corresponding Author e-mail: mandarthakur1298@gmail.com)

ABSTRACT: India is endowed with 63 distinct types of spice crops, 20 of which are seed spices that grow on 35.41 lakh hectares and yield 6.32 million tonne of seeds. Important tropical spice crop coriander (*Coriandrum sativum L.*) belongs to the Apiaceae family (Umbelliferae). Coriander is highly cross-pollinated crop due to protandrous condition. Many previous researches indicated low yield due to absence of pollinators. In cross pollinated crops population density of pollinators is directly proportional to yield. Temperature and relative humidity are two important abiotic factors that have significant effect on insect activities. In this experiment, the precise effects of temperature and relative humidity on bee abundance are investigated. The experiment was conducted at University Apiary, RPCAU, Pusa (Samastipur) and Beekeeping Unit, TCA, Dholi (Muzaffarpur) in 'Rabi 2021-22' on Rajendra Dhania-2 variety of coriander. Study showed that population density of *Apis mellifera* and *Apis dorsata* increased with increase in temperature while population density reduced with increasing relative humidity, whereas *Apis florea* and *Apis cerana indica* showed exactly opposite pattern which was due to their smaller size.

Key words: *Apis* sp., Temperature, Relative humidity and Correlation.

Reverse breeding: A novel breeding approach for targeted heterosis

Shivam Sharma¹, Sonia Sood², D.R. Chaudhary³, Viveka Katoch⁴

^{1,2,3} Department of Vegetable Science and Floriculture, CSK HPKV Palampur (H.P)-176062

⁴ Senior Vegetable Breeder, Department of Seed Science and Technology, CSK HPKV Palampur (H.P)-176062

(Corresponding author e-mail: shivamsharma7154@gmail.com)

ABSTRACT: A barrier to achieving significant variation in current plant breeding programs is that uncharacterized heterozygotes are difficult to reproduce with seeds. Favourable allele combinations of the elite heterozygote are lost in the next generation due to the segregation of traits. Reverse breeding overcomes this challenge of preservation of heterozygous genotypes by producing complement parental lines for any heterozygous plant through aachismatic meiosis. The major strategy comprises the suppression of crossover recombination in selected plants followed by the regeneration of Double haploids (DHs) from spores containing non-recombinant chromosomes and then the selection of complementary parental lines through marker-assisted selection. Crossing over is suppressed by producing gametes directly from heterozygotes or suppression of recombination during spore formation. Later it is achieved via

biological process in which RNA molecules inhibit gene expression, typically by causing the destruction of specific mRNA molecules (RNAi), Virus-induced gene silencing (VIGS) that exploits an antiviral defense mechanism in plants and silencing molecules delivered by graft transmission. Thus, reverse breeding increases the available genetic combinations and facilitates the selection of superior hybrid plants, also large no. of plants are generated, screened, and regenerated without prior knowledge of their genetic constitution. Reverse breeding turns this century-long endeavor upside down by starting with superior hybrid selection and recovery of parental lines.

A review on agronomic manipulations for enhancing nitrogen use efficiency

Sandeep and Jitender

¹*Department of Agronomy, CCS Haryana Agricultural University, Hisar, Haryana – 125004, India*

(Corresponding author e-mail: sc118568@gmail.com)

ABSTRACT: Nitrogen (N) is the most critical externally added input for any crop production system. The half of the global population directly or indirectly depends on nitrogenous fertilizers for food supply. Today, Rice, wheat, and maize are consuming more than 90% of total nitrogenous fertilizer used in cereals. Underuse of nitrogen is associated with lower crop production while overuse leads to several soil and environmental related consequences. Therefore, response to applied nitrogen and its use efficiency have to be monitored properly for obtaining the maximum potential and sustainable yield. Efficiency of applied nitrogenous fertilizers is very low due to its various losses i.e. volatilization, leaching, surface runoff and denitrification from soil-plant system. Therefore, for improving nitrogen use efficiency of various crops some methods are adopted like conservation tillage, soil chemistry modification, use of cover crops, foliar application of nitrogenous fertilizers etc (Yadav *et al.*, 2017).

Patra *et al.* (2002) at IARI conducted a study to find out the influence of DCD on dry matter yield, apparent nitrogen recovery in Japanese mint. The study established that application of nitrogen @100kg/ha with DCD used as coating gives maximum dry matter yield and apparent nitrogen recovery as compare to all other doses of nitrogen and DCD under investigation. Singh (2018) at Malan studied the comparative effect of different treatments on nitrogen use efficiency and agronomic efficiency in rice and found that when 75% recommended dose of nitrogen applied in three splits gives maximum nitrogen use efficiency and agronomic

efficiency as compare to all other treatments. Kumar *et al.* (2017) at Rajasthan studied the influence of organic and inorganic fertilizers on apparent recovery of nitrogen by rice and found that incorporation of green manure in soil gives significantly higher apparent nitrogen recovery as compared to FYM, fallow and straw incorporation. Similarly, higher grain yield was obtained in wheat after the adoption of zero tillage as compared to all other treatments (Singh *et al.*, 2018).

Keywords: FYM, DCD, denitrification

Effect of long-term integrated nutrient management on bio-fortification of Zn in wheat

Diksha and Narender

*Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana
(Corresponding author e-mail: sarohadiksha1997@gmail.com)*

ABSTRACT: The globally increasing deficiency of micronutrients in the soil has challenged the sustainability of food and nutritional security. In particular, Zn is the most critical essential micronutrient. In this concern, the integrated approach of nutrient management (INM) was hypothesized to be the viable option for the agronomic bio-fortification of Zn in wheat. The research was carried out on the 54th pearl-millet wheat cropping cycle of the long-term experiment (LTE) at the Soil Research Farm, CCSHAU, Hisar. The LTE includes the application of FYM (0, 5, 10 and 15 Mg ha⁻¹) and Nitrogen (0, 60 and 120 Kg ha⁻¹) at two different modes of application (annually and biannually). The wheat grain and straw yield increased with the increasing doses and frequency of application of FYM and nitrogen. Maximum grain yield (6.08 Mg ha⁻¹) was obtained under dual season (both in pearl-millet and wheat) application of 10 Mg ha⁻¹ FYM with 120 kg ha⁻¹ nitrogen which was *at par* (6.04 mg ha⁻¹) with single (only wheat) application of FYM @ 15 Mg ha⁻¹ and nitrogen @ 120 kg ha⁻¹. The dual season application of FYM @ 15 Mg ha⁻¹ and nitrogen @ 120 kg ha⁻¹ was found to sustain the total Zn content (38.95 mg kg⁻¹) in wheat grains. The highest total grain Zn uptake was found under the both season application of 10 Mg ha⁻¹ FYM and 60 kg ha⁻¹ nitrogen. The significant enrichment of wheat grains with Zn showed the potential of long-term incorporation of FYM in enhancing the bioavailability of Zn without any extraneous application of zinc fertilizers.

Keywords: FYM, long-term, nitrogen, wheat, Zinc

An economic analysis of rabi sorghum and chickpea seed delivery system in Karnataka

Shriram, Prabhuling Tevari, Jagrati B. Deshmanya and Devendra Beeraladinni

*Department of Agricultural Economics, University of Agricultural Sciences, Raichur, 584104
(Corresponding author: e-mail: ptevari@gmail.com)*

ABSTRACT: The utilisation of improved seeds is reliant on distribution system and farmers preference in using the seed. The study on seed delivery system of rabi sorghum and chickpea was conducted in North-Eastern Karnataka, wherein the primary data was collected from Bellary district. The study was conducted with public and private institution seed producing farmers and seed dealers. A total of 80 sorghum seed growers, 80 chickpea growers, 5 private companies, 3 public institutions and 5 seed dealers were selected randomly for the study. In both the crops public institutions were having less profit compared to private agencies in seed. Almost all the seed companies and public institutions were mainly involved in seed distribution and advisory services. High rejection rate, delayed payment, breach of contract and manipulation of norms were the major constraints faced by seed growers. Market competition and delayed payments were the major problems faced by the seed dealers in seed delivery system. Less rejection rate, early payment, incentives, and assured payments were some of the major reasons to choose either public or private seed production in the study area.

Key words: *delivery system, constraints, reasons*

Assessment of Performance of Kisan Credit Card Scheme in India

Sonia and D. P. Malik

*Department of Agricultural Economics, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana- 125004
(Corresponding author: sonialohchab123@gmail.com)*

ABSTRACT: Kisan Credit Card scheme was first time proposed in the budget 1998-99 by Finance Minister, Govt. of India. Kisan Credit Card scheme was introduced in the country on the recommendations of Shri R.V.Gupta committee to extend credit facility to the farming community. The study revealed that number of KCCs issued and amount sanctioned showed positive growth rates during time period 1999-2019. But the progress of KCC scheme was not

found uniform in different regions of India. Commercial banks and RRBs showed growth rate whereas co-operative banks showed negative annual growth rate in terms of KCCs issued and amount sanctioned. The progress of KCC scheme was uniform in different zones of Haryana. The variation was highest in commercial banks both in terms of cards issued and amount sanctioned during study period. Major share of total amount sanctioned under KCC scheme was utilized for purchase of machinery and creation of irrigation structure followed by crop production activities, dairy enterprise, high value crops and minimum for crop insurance. Logit model manifested that education level and size of owned area of farmer were positively influenced the adoption of KCC scheme and age of head of household and family type were the factors which negatively influenced the adoption of KCC scheme. Mean percent score analysis conveyed that lengthy paper work, cumbersome procedure, *etc.* were the some of major constraints reported by beneficiary farmers whereas, subdivision of land, fear of being defaulter, lack of motivation from officials, difficulty in opening bank account, *etc.* were some of the major constraints encountered by the non-beneficiary farmers.

Keywords: compound annual growth rate, logit model, mean percent score, constraints, and utilization pattern.

Production potential and economics of castor (*Ricinus communis L.*) based intercropping system under semi-arid region of Haryana

Gangadhar K¹, J.S. Yadav¹, A.K. Yadav¹, Veena C.V¹, Madhu D.M²

¹CCSHAU, Hisar-125004, Haryana

² UAS, Bengaluru-560065, India

(Corresponding author e-mail: ganga0239@gmail.com)

ABSTRACT: The castor based intercropping system creates favourable micro-climate for intercrops and helps in production of higher yields and also has low labour requirements. It provides additional income per unit area and also having vast scope for intercrops to spread between the castor rows, due to the slow-growing nature of castor in the early stage also creates favourable conditions enhancing weed competition in this crop, which can be managed by either growing short or long duration intercrops. This offers a wide range of cultivation of intercropping system in order to maximise the production and productivity per unit area. Hence the experiment was planned with entitled "Production potential and economics of castor

(*Ricinus communis l.*) based intercropping system under semi-arid region of Haryana" was conducted at Regional Research station, Bawal, CCSHAU during the *kharif* season of 2020-21, with the objectives to find out best suitable intercrops for intercropping system for castor crop and also to work out the economics, planned in randomized block design with three replications, comprising of 11 treatments i.e., sole crops of castor (DCH 177) at 150 and 200 cm row spacing, mungbean (MH 421), pearl millet (HHB 67 Imp.) and sesame (HT 2) along with intercropping of mungbean, pearl millet and sesame with castor in 1:2 and 1:4 row ratios. The results showed that significantly higher yields (seed and stalk) were recorded with values of 3,879 kg ha⁻¹ and 5,656 kg ha⁻¹, respectively in the sole castor (200 cm), which was at par with castor sole (150 cm) and castor (150 cm) + mungbean (1:2) intercropping system. The highest castor equivalent yield (4220 kg ha⁻¹) was obtained in castor (200 cm) + mungbean (1:4). Economic evaluation of different treatments exhibited highest net returns (1,57,453 Rs. ha⁻¹) and B:C (3.78) in castor (200 cm) + mungbean (1:4) intercropping system.

Keywords: Cereal, Legume, Oilseed, Intercropping system, Yield, Economics

Financial Support: Regional Research Station (Bawal), AICRP on Castor

Role of Farmer Producer Organizations in doubling of farmers income - Policy impetus by Government of India

Praveen Kumar, Priyanka Kumari and Ankit

ICAR- Indian Agricultural Research Institute, New Delhi, 110012, India

(Corresponding author e-mail: prvnkumr01@gmail.com)

ABSTRACT: India being a country have diversified agro-climatic conditions which possess a large potential to cultivate vast range of agricultural produce and to generates varied raw material base for agro-based and food processing industries. The main policy objective in agricultural sector is to increase incomes of farmers or assuring returns to farmers who are the main stakeholder in agricultural sector. There are seven sources of income growth which includes improvement in crop productivity, improvement in livestock productivity, resource use efficiency or saving in cost of production, increase in cropping intensity, diversification towards high value crops, improvement in real process received by farmers, shift from farm to non-farm occupations. NITI aayog has finalized fool proof mechanism for income enhancement of farmers in consultation with central and state governments through market

driven interventions, export promotion, competitive agricultural wholesale markets and GrAMs and FPOs. FPOs are the groups of producers coming together based on the principle of membership, to pursue specific common interests of their members and developing technical and economic activities that benefit their members and maintaining relation with partners operating in their economic and industrial environment. Several government interventions include formation of 10000 new Farmer Producer Organizations by -2023-24 with a budget allocation of Rs. 4496 crores and an additional Rs. 2369 crore has been estimated for handholding of these FPOs until 2027-28. Presently 09 implementing Agencies are working on promotion of new FPOs across the country and there are two lead institutes identified for capacity development and trainings of new FPOs i.e. BIRD, Lucknow, and LINAC. FPOs have major role in providing marketing services (input supply, out marketing and processing, marketing information), financial services (savings, loans and others forms of credit), technology services (education and extension), education services (business skills, health, general), welfare services etc. Major agribusiness challenges faced by the FPOs in India at present are lack of sustainable vision and direction from CEO and BOD, Poor professional and operational management skill, no strategic business plans. Lack of skilled human resource management, lack of legal, managerial, and technical knowledge among the directors and staff, poor capital, investment and financial management, difficulty in obtaining various licenses, lack of unity among the group and failure to normalize group norms, long term expectation of hand holdings, lack of sustainability. In view of these challenges, it is imperatives for need of agribusiness knowledge to FPOs through changing their mind set and behaviour and impart the managerial skill, giving FPOs a sustainable business acumen, making them borrowing and managing finance easy and targeting for their smooth running. There are several examples of successful FPOs i.e. Sahyadri Farms, khargone farmer producer company limited, the indian organic farmers producer company limited and ajaymeru Kishan Samruddhi Producer company limited from which a lot can be learned for achieving the objective of doubling the income of farmers in India.

Keywords: Farmers, FPOs, Credit, Policy, Government.

Financial Support: ICAR-IARI, New Delhi, UGC

Nanotechnology for enhancing crop productivity in agriculture

Ankit, Deachen Dolma, Sachin and Praveen Kumar

*ICAR-Indian Agricultural Research Institute, New Delhi, 110012, India
(Corresponding author e-mail:ankitdahiya827@gmail.com)*

ABSTRACT: In modern agriculture, nanotechnology is one of the most important recent tool for increasing crop productivity. Inside this the main economic driving force in near future is the agri-food nanotechnology. The application of nanotechnology in agriculture is getting significance because of the added beneficial effects in the form of longer shelf life, increased food values, improved nutrients contents and decreased agricultural inputs. Nanotechnology enhances crop productivity and reduces pesticides use by providing different delivery mechanisms for new agrochemical agents. It has many applications in all stages of production, processing, storing, packaging and transport of agricultural products. These include: 1) agrochemicals formulations of nanoparticles for crop improvement by applying pesticides and fertilizers; 2) nanosensors for diseases and agrochemical residues identification; 3) management of postharvest produce; 4) diagnostics of plant diseases; 5) genetic alterations in plants; 6) poultry production. The reduced use of herbicides, pesticides and fertilizers with increased efficiency, controlled release and targeted delivery will lead to precision farming. The use of nanotechnology in food processing and storage, adding nanoparticles to feed, creating insect-resistant plant kinds, and extending product shelf life are just a few examples. The advancement of technologies for producing biofuels from biomass is predicted to be sped up by nanotechnology. According to experts, the potential advantages of nanotechnology for agriculture, food production, fisheries, and aquaculture need to be weighed against potential negative effects on the environment, employees' occupational health, and soil, water, and air. One of the keys to influencing customer acceptability is raising awareness of nanotechnology in the agri-food business, including feed and food ingredients, intelligent packaging, and quick-detection systems. Concerns have been raised about the safety of nanomaterials based on a small number of toxicological studies, and researchers are working to address these concerns.

Keywords: Productivity, Nanotechnology, Agriculture, Agri-food, Precision farming

Financial Support: ICAR- IARI, New Delhi

PIR Sensor Based Safety Alarm System for Fodder Cutter Machine

Asha K.R.¹, Adarsh Kumar², J.K. Singh², H.L. Kushwaha², D.K. Kushwaha³, and Arpan Bhowmik⁴

^{1,2&3} *Division of Agricultural Engineering, ICAR- Indian Agricultural Research Institute, Pusa, New Delhi-110012, India*

⁴ *Division of Agriculture Statistics, ICAR-Indian Agricultural Statistics Research Institute (IASRI), Pusa, New Delhi-110012, India*

(Corresponding author e-mail: ashakrv199493@gmail.com)

ABSTRACT: Farmers, generally use the chaff cutter or fodder cutter machine to chop the fodder which adds enhanced fodder storage characteristics, but the machine can cause permanent upper limb (hand) injuries while working with it. This adversely impacts the productivity of farmworkers, health, safety, and economic status. To overcome this critical issue, workers should be forewarned as their hand or upper limb enters the vicinity of an injury-prone zone of the fodder cutter machine. Thus, we developed a microcontroller-based alarming system to address the issue. The system contained a passive infrared (PIR) sensor comprising of a motion detection element detects the infrared radiation emitted by the human body. The sensor was pre-tested under different conditions to monitor response to human and non-human subjects. Then the system was designed to sound an alarm when hand motion was detected in the danger zone. The parameters like distance between the sensor and human hand (50 to 200 mm), different hand orientations (pronation, supination, and fodder holding position), with room temperature and fodder temperature were studied with subjects of different age groups. The regression equations were derived using the Response Surface Methodology (RSM). It was found that the optimal distance for mounting the sensor system was 125mm ahead of the identified danger zone on the feeding chute of the fodder cutter. When a hand orientation was pronated or supinated, the sensor gave a good response under different temperature conditions, followed by a holding position. A temperature ranging from 23 to 28°C obtained ideal for the best use of the system. Hand movement speed or fodder pushing speed and worker response to audible frequency was found effective to alert them.

Keywords: PIR sensor, safety alarm system, fodder cutter machine, injury, hand orientation, etc.

Horticulture as an emerging sector

Parveen¹, Raj Pal Singh², Chetna³, M.L. Jat⁴ and Deepak Sangwan⁵

^{1,2&4} *Department of Horticulture, College of Agriculture, CCS HAU, Hisar, Haryana 125004*

³ *Department of Mathematics & Statistics, College of Basic Science & Humanities, CCS HAU, Hisar, Haryana 125004*

⁵ *Department of Fruit Science, College of Horticulture. MHU, Karnal, Haryana 132001*

(Corresponding author e-mail: lakra889@gmail.com)

ABSTRACT: India faces a number of difficulties, including population growth, food insecurity, climate change, industrialization, urbanization, and employment migration from rural to urban areas. Food, with these, nutritional security are another major obstacle, but, farmers now have a wider range of options in horticulture, including a new outlook change in cultivating has been observed towards agriculture based farming frameworks. Greening, environmental protection, and the provision of nutrient-dense food will all result from this expansion of cropping systems. Horticulture is currently regarded as an emerging sector of the Indian economy. "Urban Horticulture," a new idea in horticulture that supports sustainable food supply and food security. It has good options for agricultural diversification expanding quickly and now become an essential component of food security, nutrition, and poverty alleviation. 30–40 per cent of India's population lives off of this industry alone. Modern cropping systems like indoor farming, vertical gardens, rooftop gardens, edible green walls, aeroponics, hydroponics, and aquaponics are being used in urban horticulture production in several countries as part of the green environment. These systems are environmentally friendly and provide consistent food throughout the year to ensure food security. According to the current trend, cereal-based diets are being replaced by cereal-plus-vegetable/fruit-based diets as income rises. It is well established that the horticulture industry is the most suitable option for agricultural diversification in order to guarantee food and healthcare.

Keywords: Aeroponics, Aquaponics, Horticulture, Indoor farming, Nutritional security

Influence of *Phalaris minor* roots on root system architecture, ¹⁵N-influx and expression of putative nitrate transceptor gene (*TaNPF6.4*) of bread wheat under nitrogen limited condition

Priyanka Kumari¹, Amresh Kumar¹, Tapas Kumar Das², Pranab Kumar Mandal¹, Subodh Kumar Sinha¹

^{1,2,3}ICAR- Indian Agricultural Research Institute, New Delhi, 110012, India

(Corresponding author e-mail: subodh.sinha@icar.gov.in/subsinha@gmail.com)

ABSTRACT: Roots are one of the most important plant organ for its life. It helps in acquisition of nutrients and water from soil. Weed appears as non-kin plant to any crops in agricultural field that are recognized by crop roots by "Identity Recognition". *Phalaris minor* is one of the devastating weeds that causes yield reduction of wheat by 20-30%, and in severe cases complete crop failure may also occur. Also, *P. minor* depletes considerable amount of nitrogen

from wheat field and thereby further reducing nitrogen use efficiency of wheat. In our study, we tried to find out the effects of *P. minor* on wheat root system, ¹⁵N-uptake by wheat, and further the expression of *AtNRT1.1* orthologs (a nitrate transceptor), in seminal and lateral roots of K9107 wheat genotype under optimal as well as NO₃⁻-limited conditions. Further we cloned and compared the upstream sequences of three homeologs of K9107. Root length, its fresh and dry weight invariably increased under N-limited condition which further increased in the presence of *P. minor*. Both length-based root traits, e.g., Total Root Size, Main Root Path length and Lateral Root Size, as well as numbers-based traits, e.g., first and second order lateral root numbers, have been found to be increased in the presence of *P. minor*, especially under N-limited condition. Further we did phylogenetic study and based on the phylogenetic analysis, 4 closest sequences were selected as putative nitrate transceptor of wheat (*TaNPF6.4*), located on chromosome 4, 5 and 7. The homeolog specific expression of *TaNPF6.4* in K9107 revealed that sub-genome A is highest expressing homeolog in both seminal and lateral roots. The upstream sequences of three homeologs revealed variation in number of Cis-Acting Regulatory Elements.

Keywords: *Phalaris minor*, Nitrate, Sequences, Root

Financial Support: ICAR-IARI, New Delhi, UGC

Impact of Self-Help Group on economic empowerment of rural women in Nagaland, India

Mary N. Odyuo¹, Kuvi K. Chophi¹, Benthunglo Lotha², Sentinungshi¹ and Deepa Thangjam¹

¹*Department of Rural Development and Planning, Nagaland University, SASRD, Medziphema Campus, Medziphema, 797106.*

²*Benthunglo Lotha, Research scholar, Department of Agricultural Extension, Nagaland University, SASRD, Medziphema Campus, Medziphema, 797106*

(Corresponding author e-mail: maryodyuo@nagalanduniversity.ac.in)

ABSTRACT: The Northeast region of India has seen rapid growth of Self-Help Groups (SHGs) with the onset of microfinance concept whereby the women folks come together and collect savings and help each other on need basis with minimum interest rate. Thus, a study was conducted in Atoizu Block of Zunheboto district in Nagaland with an objective to examine the impact of SHGs on economic empowerment of rural women. Nagaland is a state in the north-eastern region of India with Kohima district as its capital covering an area of 16579 sq. Km. As per 2011 census, the main economic activity here is agriculture and 75 per cent of the

population resides in rural areas. A total of 120 respondents from 8 villages and 24 SHGs were selected randomly, where 3 SHGs from each village and 5 members from each group has been randomly selected as respondents. The data was collected using structured interview schedule and the ex-post facto research design was employed. The findings revealed that, in overall impact, the respondents had 'medium level' economic impact through SHG activities. In specific areas of employment, the highest economic impact of SHG on the respondents was seen on their opportunity to avail for loan (qualitative). Finally, on their quantitative change in economic status, it was concluded that, there was an average difference of Rs 16000 in their economic income and an average increase of Rs. 2100 in their monthly savings, before and after joining SHG. Thus, it can be inferred from the study that, rural women involvement in SHGs has helped in economic empowerment by raising their earnings and savings ensuring them financial independence and enabling them to come out of poverty.

Keywords: Self Help Groups, Naga, Economic, Empowerment, Poverty, Alleviation.

Artificial Intelligence: using technology for empowering farmers

Ayush Mishra¹ and Joginder Singh²

¹*Department of Extension Education, CCS Haryana Agricultural University, Hisar-125004 (Haryana) India*
(Corresponding author e-mail: mishra13ayush@gmail.com)

ABSTRACT: Indian agriculture is witnessing a number of challenges in recent times such as continuous land degradation due to intensive cultivation & overuse of agrochemicals, unpredictable weather events & increased risk of crop damage due to climate change, water scarcity & fall in ground water level and increasing cost of production affecting farmers income. This calls for a shift in paradigm that brings out efficient growth, so that an increase in productivity is associated with reduction in cost of production. AI and automation technologies promises solutions to these challenges. AI powered solutions will not just enable farmers to improve efficiency but will also improve quality, quantity and market accessibility for their produce. Some recent AI solutions that could prove to be a game changer for Indian agriculture in multiple ways such as; crop & soil monitoring using visual sensing, insect & plant disease detection and control using image recognition technology and UAVs (Drones), livestock health monitoring, grading and sorting of farm produce using AI computer vision, and crop yield and price forecasting using satellite imagery and Big Data technology that can

estimate output and predict prices. While AI promises quick solutions to farmers, there should be increased focus on developing rural infrastructure like power supply and internet connectivity in order to make use of these advanced technologies. Extension efforts should focus towards increasing awareness of farmers to adopt these modern technologies. AI is not intended to replace farmers knowledge but to complement and change the way decisions are made and improve farming practices.

Keywords: Artificial Intelligence, Automation technology, Big Data, Image recognition, Empowerment, Technology

Cocopeat: An organic growing media

Bharti Choudhary

*Department of Horticulture, College of Agriculture, JNKVV, Jabalpur (MP)
(Corresponding author e-mail: bharati.choudhary06@gmail.com)*

ABSTRACT: Growing media referred to as “substrate” or “potting soil”, a growing medium is a material, other than soil on the spot, in which plants are grown. The growing media should have enough nutrients, good water holding capacity and drainage to ensure better growth of seedlings. Growing media are used to grow a wide variety of plants including vegetables, fruits, floriculture ornamentals, tree and shrub ornamentals and speciality plants. Growing media components are either organic or inorganic. Organic components like peat moss, bark, coconut coir, rice hulls, wood fiber etc. Inorganic components include, perlite, pumice, vermiculite, sand, hydrogel, etc. Coco peat is created from coco coir, which in simple terms is the layer of pith that surrounds the husk of a coconut. Coco peat will do an excellent job of keeping your plants healthy, due to its anti-fungal properties. It is also resistant to mould, which in turn will help protect your plants from disease and decay as they grow. Coir is also slightly alkaline, with a pH value of 5.8–6.8. As a soil amendment, it improves soil structure and also adds organic matter to the soil. Unlike soil, through which excess water leaches below the root zone, coco peat helps in retaining water and also prevents soggy and waterlogged conditions at the same time. It holds water around 7-8 times its weight and eliminates excess water. It improves aeration and drainage, prevents nutrient leaching, increase nutrient uptake. Coco peat is a sterile and bio-degradable organic matter and is free of weed seeds and pathogens. Cocopeat is a growing medium that was discovered back in the 1940s. Have you noticed the fine dust that is created when the coir fibres are extracted from the coconut husk? This dust fascinated the soil scientist E.P. Hume, and he noted that it had properties resembling peat moss. He identified its

potential as a growing medium and called it coco peat. Cocopeat finds application in various fields such as greenhouses, nurseries, seedling nurseries, indoor gardening, horticulture, turf farming, mushroom farming, lawn or golf course constructions, and hydroponic farming.

Keywords: Coco-peat, organic manure, soil enrichment

Impact of K.V.K.'s trainings for nutritional kitchen garden on behaviour of rural women

Deepali Chauhan

Krishi Vigyan Kendra, Raibareli (C.S.A.U.A&T., Kanpur)

(Corresponding author e-mail: deepali_chauhan20@rediffmail.com)

ABSTRACT: A balanced food has been always high on human agenda. However, due to poor economic condition, rural women are unable to purchase fruits & vegetables from market for their daily dietary need. This is resulted in poor health and imbalance nutritional status of farmers, farm women and children. Kitchen gardening can play an imperative role for rural families to recover diversified vegetables in their daily diet as well as to combat malnutrition prevailing among rural families. In this reference, K.V.K., Raibareli has given trainings and demonstrations to rural women on Nutritional kitchen garden. After trainings and demonstration, impact of these trainings programs and demonstrations on behavior of rural women was assessed in terms of their knowledge regarding various aspects of kitchen gardening, attitude towards kitchen gardening and skill of developing and managing kitchen garden. Total 120 rural women, 60 trained rural women and 60 untrained rural women of district Raebareli were selected purposively for the study. Data were collected through personal interview method. Results suggest positive impact of K.V. K's. trainings related to nutritional kitchen gardening on knowledge, skill and attitudes of farm women as well as vegetables intake in their daily diet. Thus, on the basis of findings of the study it can be concluded that KVK had significant impact in improving health status of rural families through changing their behavior by imparting trainings on nutritional kitchen garden.

Keywords: Balance food, Nutritional status, trainings, farm women, kitchen garden.

Haploidy and its success stories in vegetable crops

Payal Sharma, Parveen Sharma, Shivam Sharma

Department of Vegetable Science and Floriculture, CSK HPKV Palampur (H.P)-176062

(Corresponding author e-mail: payalsharma472@gmail.com)

ABSTRACT: At present, world's population increasing in log phase but the availability of land remain constant at a same time cultivable land is decreasing. For feeding growing population it is necessary to improve genetic makeup of the plant. Traditional breeding approaches are time consuming in developing improved varieties/ hybrids. So nowadays "Speed Breeding" is playing an important role in improvement of crop. The main requirement for Plant Breeding is inbred/pure lines as a parent. Haploid Breeding enables development of inbred line with shortest possible time hence we can reduce Breeding cycle duration. Haploids produced from diploid species ($2n=2x$), known as monploids, contain only one set of chromosomes in the sporophytic phase ($2n=x$). They are smaller and exhibit a lower plant vigor compared to donor plants and are sterile due to the inability of their chromosomes to pair during meiosis. In order to propagate them through seed and to include them in breeding programs, their fertility has to be restored with spontaneous or induced chromosome doubling. The obtained DHs are homozygous at all loci and can represent a new variety (self-pollinated crops) or parental inbred line to produce hybrid varieties (cross-pollinated crops). In fact, cross pollinated species often express a high degree of inbreeding depression. For these species, the induction process per se can serve not only as a fast method for the production of homozygous lines but also as a selection tool for the elimination of genotypes expressing strong inbreeding depression. Selection can be expected for traits caused by recessive deleterious genes that are associated with vegetative growth. Traits associated with flower fertility might not be related and should be eliminated by recurrent selection among DH lines.

Keywords: Haploidy, Traditional breeding, Speed breeding, Homozygous lines.

Physico-chemical, and biological properties of soils in Northern Kole land of Thrissur district in the post-flood scenario

Anusree T and K.M. Durga Devi

Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vellanikkara, Thrissur, Kerala Agricultural University, 680656, (Corresponding author e-mail: anusreesoilsience@gmail.com)

ABSTRACT: The physical chemical, and biological characteristics of soils in Northern Kole lands of the Thrissur district were evaluated in post-flood scenarios to assess the fertility and productivity of the soils. Kole land, which is an important wet land of Kerala, undergoes cyclical nutrient recharging throughout the flood season and hence a peculiar type of paddy cultivation is practiced. Ten soil samples were collected from various locations of ‘Pavutai padashekharam’ of Mullasserri block of Thrissur district and were analyzed for texture, electro chemical properties (pH, EC, organic carbon), available macronutrients (potassium, phosphorus, calcium, magnesium and sulfur), available micronutrients (iron, manganese, zinc and Cu) and microbial population. The soils under study were sandy loam in texture. The soil was strongly acidic with pH range of 5.22 - 5.59. It had higher available sulfur (12.73-33.13 kg ha⁻¹), medium available potassium (124.08- 238.24 kg ha⁻¹), and phosphorus (10.98-13.38 kg ha⁻¹). The soils were adequate in available calcium (421.31 – 553.94 mg kg⁻¹) and available Mg (95.66-128.77 mg kg⁻¹) but the available iron (1156.09 – 3889.99 mg kg⁻¹) was in the toxic range. The presence of significant organic matter in the soil with a high organic carbon content (2.11- 2.87 %) enriched it with a diverse population of bacteria (2-6x10⁶), fungus (2-4x10⁵), and actinomycetes (5-8x10⁴).

Employment generation for Women through Production and Marketing of Mulberry Silk in Karnataka

Madhu D M¹, D.K. Sinha¹, Tulika Kumari¹ and Gangadhar, K²

¹*Department of Agricultural Economics, Dr. Rajendra Prasad Central Agricultural University, Pusa-848125, Bihar*

²*College of Agriculture, GKVK, University Agricultural Sciences, Bengaluru-560065, Karnataka*

(Corresponding author e-mail: dmmadhu.econ07@gmail.com)

ABSTRACT: Women are significant workforce in the field of sericulture. Approximately, 60 per cent workforce composed of women. The present study aims at assessing the share and income of women in production and marketing of mulberry silk in Chikkaballapur district of Karnataka. The primary data was obtained from 90 sericulture farmers from six randomly selected villages and 35 silk reelers from two randomly selected blocks of district. In establishment of mulberry plantation, the share of women is 51 per cent (25 man days per acre). The women labour participation in weeding activities accounted highest share i.e. 21.36% of total man days, followed by mulberry planting (13.50%). In mulberry maintenance, the share of women is 57 per cent and activity wise it is comparatively high in case of weeding with 6.96 man days (34.55%), followed by FYM application with 3.44 man days (17.08 %). In case of cocoon production, 60 per cent workers are women. The share of women labour was enumerated higher in case of feeding of silkworms (at different stages) with 5.02 man days (16.20%), followed by leaf harvesting with 3.83 man days (12.36 %). The share of women in raw silk production was 62 per cent in which the major utilization of women labour was about 808.93 man-days (43.19 %) in case of cooking with reeling of cocoons & changing water in the pans, followed by about 123.75 man days (6.60%) in cleaning and sorting of cocoons. The result also revealed that selling of raw silk is completely done by men.

Keywords: Cocoon, Feeding of silkworms, Mulberry Silk, Silk Reeling, Women Share.

Hydroponics: An emerging technology for climate resilient horticulture

Kumari Shashi Bala, Seema, Manish Kumar, Shashikant and Sanjay Kumar Singh
*Nalanda College of Horticulture, Noorsarai, Nalanda,
Bihar Agricultural University, Sabour, Bhagalpur
(Corresponding author e-mail: shashib808@gmail.com)*

ABSTRACT: The environmental changes predicted as a result of climate change are likely to intensify the pressures on Indian agriculture, along with on-going stresses of yield stagnation, land-usage, competition for land, water, and other resources, and globalization. Under such

circumstances, hydroponics is emerging as a technology to produce seeds and plants free from the diseases. Hydroponics is a cultivation method that uses water supplemented with nutrients rather than soil to grow plants. Either root is supported by growing media like pebbles, clay, or rocks or they are suspended in water. Adoption of Hydroponics is promoted as a strategy to combat climate change, to lessen the environmental damage and species extinction due to over exploitation and intensive farming. By using shades and LED lighting, fans to circulate air, and the ability to precisely control the water temperatures, hydroponics can deal with a hotter and wetter world, taking climate change head on. Hydroponic systems promote the growth of crops, along with environmental benefits such as dramatic reductions in water and fertilizer use. Reusing and capturing water and fertiliser also stops fertiliser runoff into rivers, which prevent water pollution that can harm ecosystems and obliterate aquatic life. Additionally, this method is effective in quality production of high value fruits and vegetables. The technology has its application in vertical gardening as well. It provide continuous crop production, eliminate herbicide and pesticide use, defend from weather-associated variations in crop production, conserve and recycle water, and are people and climate friendly. In metropolitan locations with a shortage of fertile land, hydroponics is a significant alternative planting technique for growing fruit and vegetables. Therefore, there is a need for promoting hydroponics to provide higher income per unit area of land and water, which can help farmers to achieve the enhanced income in climate change scenario.

Key words: Climate change, hydroponics, reuse and recycle of water, water conservation

Edible mushroom cultivation: A means of nutritional security & quality life

Seema, Kumari Shashi Bala, Manish Kumar, Shashikant and Sanjay Kumar Singh
Nalanda College of Horticulture, Noorsarai, Nalanda
Bihar Agriculture University, Sabour, Bhagalpur
(Corresponding author e-mail: drseema3012@gmail.com)

ABSTRACT: It will be important to concentrate on secondary agriculture and innovative crops, like mushrooms, due to the world's rising population and declining per capita arable land, as well as fast urbanization and industrialization, climate change, and a desire for high-quality and functional foods. Production of mushrooms helps to increase sustainability through agricultural system diversification. Commercially growing edible mushrooms is a novel use of a microbial technique for the biotransformation of domestic, commercial, industrial, and

forestry wastes into nutrient-dense food. There are over 14,000 different species of mushroom 31 of these genera are thought to be the best eating mushrooms. Only 200 of these are now being grown for research purposes, and 100 are being economically cultivated. Out of these, 60 are thought to be commercially significant, and only 10 have reached industrial scale production. However, due to the fact that mushrooms are a non-traditional crop, the rotational cultivation of various mushrooms is still uncommon in India. The vast majority of farmers only grow mushrooms during a specific season. Farmers cultivate mushroom during winter season while in summer, they cease cultivating mushrooms. Observing that India is mostly a tropical nation while primarily cultivating temperate mushrooms (*A. bisporus*) seems incongruous. Oyster (*Pleurotus* spp.), paddy straw (*Volvariella* spp.), milky (*Calocybes* spp.), reishi (*Ganoderma* spp.) and wood ear (*Auricularia* spp.) mushrooms are examples of tropical and subtropical mushrooms that are not widely cultivated. Like other field crops, mushrooms can also be grown all year round. There are 700 million tonnes of agricultural leftovers produced in India each year that can be profitably used for mushroom farming. Only 0.03% of these residues are being used in India to create 1.2 lakh tonnes of mushrooms. One percent of the world's total production of mushrooms comes from India. Growing mushrooms turns agricultural wastes into a source of easily assimilated protein that improves the human diet. Mushroom being rich in protein, vitamins and minerals can form an important ingredient of food for a balanced diet. They 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. The substrate can be composted and added to the soil as an amendment to improve soil health after mushroom growing. Mushroom cultivation with labor-intensive, low-production methods has the potential to provide a large number of jobs and raise the income of the rural population.

Keywords: Mushroom, agricultural waste, health benefit, quality protein, quality life.

Weed surveillance for management of invasive weeds

Sahaja Deva and M.K. Jyosthna

Krishi Vigyan Kendra, Kalikiri

(Corresponding author e-mail: sahajareddy.deva@gmail.com)

ABSTRACT: Invasive weeds are those which do not naturally occur in a region but they proliferate in an area where they are introduced. They also cause loss of biodiversity, economic loss to farmers as it requires lots of investment and time to control the weeds and also deteriorates human health. In order to manage invasive weeds timely Department of Conservation has developed weed surveillance system. By using this system invasive weeds can be detected early so that they can be managed and controlled early before proliferation. Weed surveillance can help in searching and documenting the new weeds that are concerning the conservation. Weed surveillance can detect weeds that are new to area and are in limited distribution. Surveillance includes both active and fortuitous. In Active surveillance one can check the presence of new invasive weeds on sites where there is chance to establish first, sites of high conservation value. Fortuitous surveillance encourages the reporting of new weeds when anyone find them anywhere. In this both valuable and vulnerable sites are included. By using weed surveillance early eradication is possible which has many advantages like eradication of potential weeds can be done very early which is cost effective. By using this cost is reduced very much and chance of spread of weeds can also be reduced. For this weeds if control is delayed cost increase exponentially as the weeds species spreads. For weed surveillance keeping a watch for known weed species is required which are not seen in that area. For surveillance species which have worst potential impact on conservation values, species that have high chances to occur in near future, species that are difficult to identify should be included in surveillance list. After surveillance reporting is compulsory as it helps to ensure the data gathered helps to improve the effectiveness of surveillance in the future.

AgriTourism - A new agriprenurship

Kadiri Mohan and M.Suresh Kumar

*Acharya N.G.Ranga Agricultural University, Regional Agricultural Research Station,
Chinthapalli – 531111, Alluri Seetharama Raju District, Andhra Pradesh, India*

ABSTRACT: Agri farms are becoming an important destination for tourist across local to global. Day-by-day the percent of farmers leaving agriculture and pursuing non-agricultural

occupation. The conversation ratio from agri to non-agri operations is increasing every year. At the same time, agriculture is becoming an attractive and life important destination for non-agri sector people to know, visit, experience and do farming activities. Tradition long with technology driven farming is always an attractive destination for tourists. Many agripreneurship activities are emerging every day and one among them is AgriTourism. Massive urbanization and diversification of sectors is making agriculture an unique and interested designation for the masses. Along with other tourism destination like wild life tourism, eco-tourism, health tourism, adventure tourism etc people want to visit agri farms to know agriculture, to know what feeds them to live, to make better health consciousness, to make their next generations to own farming etc. In this scenario, there is huge potential for agri graduates and other allied sector youth to take up an agritourism as one of the innovative entrepreneurship activity which not only create their own careers and also they will be creating a destination of employment opportunity for the rural people. This paper discusses the various opportunities, potentials, way and means for agri graduates and others to venture into agritourism as a new agripreneurship activity.

Key words: Agritourism, Agripreneurship, Agricultural Graduates.

Allelopathic interactions in agroforestry ecosystems: A key for natural resource management

Anju B. Raj¹ and Jacob John²

¹*Department of Agronomy, College of Agriculture Vellayani, Kerala Agricultural University, India*

²*Integrated Farming System Research Station, Kerala Agricultural University, India*

(Corresponding author e-mail: anjubraj95@gmail.com)

ABSTRACT: Excess pressure of the ever increasing human population on land for producing more food and wood has made it necessary to search for other alternatives to maximise the use of agricultural land. This has led to the concept of agroforestry. Trees are key components in several agroecosystems and when trees and crops are grown together, plant-plant interactions involving allelopathy are presumed. Allelopathy could be used to increase crop production, to reduce crop production expenses and to diminish the current reliance on synthetic agrochemicals that degrade the environmental quality. Allelopathy has been undisputedly recognized as an ecological phenomenon with immense applications in agriculture. Allelopathy can be adopted as a viable alternative for enhancing crop growth and productivity and also for weed, disease and insect pests management. As trees remain a part of the

agroforestry system for a longer period, and most of them produce a large amount of leaves and litter, their allelochemicals may play an important role in an overall improvement of the system. The introduction of the concept of allelopathic compatibility between various components of the agroforestry system is further expected to increase its utility and productivity besides conservation of the environment, biodiversity, and natural resource base. Allelopathic properties can be exploited as alternative options for weeds, insect pest and disease management. Hence, a better understanding of allelopathy in tree species can aid in promoting eco-friendly agriculture and developing sustainable agroforestry systems.

Keywords: Allelopathy, Tree species, Agroforestry, Weed control

Scenario of food processing and value addition in horticulture in India

Ravi Gautam, Reetika and Vivek Beniwal

Horticulture Development Officer, Government of Haryana

ABSTRACT: Even though food production has increased significantly on a worldwide scale, the FAO estimates that almost half of the world's population lacks access to sufficient food supply. Recent investigations in Rwanda, Ghana, Benin, and India have produced results that are similar, with losses ranging from 30% to 80%. One of the many causes of this is food losses that occur during post-harvest management. In order to provide efficient post-harvest processing and protection of the agricultural output, this covers the main importance and requirements. Poor temperature control, the use of subpar packaging, rough handling, and a general lack of education regarding the requirements for maintaining the quality and safety of perishables at the producer, wholesaler, and retailer levels are the main causes of physical and qualitative losses. Beyond encouraging access to food, the market depends on each product's ability to retain its flavour. There are several things that could hurt or destroy the food before it gets to the market. Numerous studies indicate that before their produce is consumed, producers lose between 30% and 40% of the value of their fruits and vegetables. These losses are noted during several stages of handling, including harvesting, packing, transportation, wholesale and retail marketplaces, and delays. Horticulture urgently needs value addition to increase farmer profitability, empower farmers and other underprivileged groups of society, especially women, through opportunities for gainful employment, and revitalise rural

areas. It also needs to emphasise primary and secondary processing and reduce post-harvest losses. Increasing foreign exchange, encouraging the development of subsidiary industries, lowering the financial risk associated with marketing, expanding opportunities for smaller farms and businesses through the development of markets, diversifying the economic foundation of rural communities, and ultimately concentrating on the government of India's commitment to double farmer income are all ways to reduce imports and meet export demands.

Keywords: Horticulture, Losses, Food Processing, Market

ABOUT THE EDITOR

Dr. Devi Dayal

Dr. Devi Dayal is former Head, ICAR- Central Arid Zone Research Institute, Regional Station, Gujarat. He started Agricultural Research Service in January 1984 and has worked in different capacities in technology development and dissemination related to groundnut and other dryland crops for about 36 years in different institutes such as Directorate of Groundnut Research, Junagadh. He was instrumental in developing paired row planting pattern and in-situ moisture conservation technologies for groundnut and other dryland crops. During his career, he mobilised external funding from different agencies such as PPV&FRA, NATP, NAIP and NASF for various research activities and handled collaborative projects with international CGIAR institutions like ICRISAT, Hyderabad & ICARDA, Jordan. He conducted many national seminars in the capacity of organising secretary. He has edited 15 books and published more than 100 research papers in journals of national and international repute. He has also contributed to several book chapters to books and proceedings of the symposia apart from many technical bulletins and training manuals. He has received many awards including Fellow 2015 by the Indian Society of Oil Seeds Research and Gold Medal and Distinguished Plant Scientist Award-2013 by the Academy of Plant Sciences. He serves as member of Editorial Board for Indian Journal of Oil Seeds Research and Advances in Plant Sciences. He acts as external examiner for post-graduate and doctoral students for several universities Junagadh Agricultural University, Junagadh and MPKV, Rahuri, TNAU, Coimbatore and Osmania University, Hyderabad.

ABOUT THE BOOK

This book consists of compilation of abstracts and papers presented in the the 2nd International Conference on Advancement of Science and Technology for Environment, Society and People (ICASTESP-2023), Organised by the Society for Technology, Environment, Science & People, Kozhikode, Kerala during 6-7 January 2023. A number of topics covering natural resource management, crop production, post-harvest handling, farm empowerment and social science were some of the major highlights in the conference.

ZNAN Publishers

Society for Technology, Environment, Science
& People, Kozhikode, India,
(<https://www.societytesp.org/>)
G-Road, Kozhikode, 673602, India
Email: societytesp@gmail.com

ISBN: 978-81-956227-3-3

