

ICAR-CIAE NEWSLETTER
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From the Director's Desk

Agriculture is one of the most important sectors of the Indian economy contributing 18% of national income, about 15% of total exports and supporting two-thirds of the work force. The small and marginal land holdings (less than 2.0 ha) account for more than 86% of land holdings. The labour availability in agriculture is also expected to go down to 26% of total workforce by 2050. Factors such as climate change, population growth and food security concerns have propelled the agricultural industry into seeking more innovative approaches to protect and improve crop yield.

Although the agriculture machinery industry has radically transformed over the past 50 years still it faces multiple challenges. Agricultural production system has witnessed a drastic change in last few decades with advancements in robotics and artificial intelligence based technologies. Also, scarcity of labour during peak cropping season has highlighted the need for alternative options for safe and sustainable agricultural system using Artificial Intelligence (AI), big data analytics, Internet of Things (IoTs), drones and other emerging technologies to increase yields and improve the efficient utilization of water and other inputs.

AI and IoT with drones are the latest technologies to penetrate the Indian agriculture that are adding major value to the integrated agriculture-based systems. Most operations in farming, such as seedbed preparation, sowing/planting, pest/disease detection, crop health monitoring and management, irrigation scheduling and watering and harvesting can benefit from these technological advancements. Other benefits include the decreased use of water, fertilizer and pesticides which in turn help in keeping food prices down and reducing impact on natural ecosystems, less runoff of chemicals into rivers and also groundwater and most importantly increasing worker safety.

ICAR-CIAE has already shifted its focus on these latest and innovative area and has been working in the area of application of Robotics, AI, IoT, Machine Learning, ANN, Deep Learning, drones etc in agriculture. The institute has initiated research and development in these areas for development of automated spraying system for polyhouse, unmanned ground vehicle for various field operations, autonomous rice transplanter, image based hand held device for disease identification in soybean, IoT based smart irrigation system for field crops, sensing system for safe storage of potato, onion and tomato, automated packing line for horticultural produces etc.

DIGEST

This issue of the newsletter focuses on research and development of farm equipment and machinery like garlic clove dibbler for raised beds, tractor operated side trencher and FYM applicator for grape orchards, small tractor operated orchard sprayer, power tiller operated groundnut digger, post-harvest treatment machine for fruits and vegetables, tractor operated potato digger-cum-collector, etc.

The Institute has received a patent for process technology of multi-nutrient composite mix for biscuits. Institute scientists received various ISAE awards, NAAS Recognition Award, etc. To commemorate 'Azadi ka Amrit Mahotsav', series of Webinars on Advances in Agricultural Engineering were organized. Two news colleagues joined the Institute, five staff members were promoted, two employees left the Institute to join their new place of posting and eight employees retired on attaining the age of superannuation.

As Director, ICAR-CIAE, I am happy to share this issue of Newsletter.

RESEARCH & DEVELOPMENT

Garlic clove dibbler for raised beds

Garlic cloves are planted in lines at a depth of 30-40 mm while maintaining the desired row to row and plant to plant spacing. About 65-85 man-days/ha are required for planting of garlic cloves. The farmers prefer manual sowing due to higher seed rate and uneven seeding in existing seed drills. To address this problem, a tractor operated eight-row garlic clove dibbler has been developed for precise dibbling of garlic cloves on broad beds at 150 mm row spacing. It consists of a main frame, dibbling unit, metering unit, stationary cups, seed box, cam and guide, levelling roller, depth control wheel, power transmission unit, bed shaper and three-point hitching system. The garlic cloves are picked from the seed box and dropped into the cups of the dibbling unit using the chain-cup type metering unit. Main function of the dibbling unit is to receive the garlic cloves from the metering unit cups and dibble them into the soil at proper depth. Levelling roller is attached to the main frame in front of the dibbling unit. The machine has been evaluated in the field for dibbling of garlic cloves in eight rows on broad beds of 150 mm height, 1200 mm top width and 300 mm furrow width. The depth of sowing has been maintained as 40 mm during operation. The effective field capacity and field efficiency of the developed unit are 0.22 ha/h and 73.6%, respectively at 2 km/h forward speed of operation. The missing and multiples are 3.5 and 8.5%, respectively.

Tractor operated side trencher and FYM applicator for grape orchards

FYM application is the most important operation in grape cultivation which is done manually by digging a continuous trench near the plant. Trench making near the grapevines is one of the most drudgery prone operation which is generally done manually in India. A tractor operated side trencher has been developed at ICAR-CIAE, Bhopal to make trench up to 300 mm depth. It consists of main frame, tractor hitch system, telescopic side frame (TSF) and two MB plough bottoms. It has provision for adjusting width as well as depth of trench. The width of trencher can be varied from 2.0 to 2.6 m to match the standard plant row spacings of 2.4, 2.7 and 3.0 m. The side trencher has been tested in the vineyards at ICAR-NRCG, Pune. The effective field capacity and field efficiency of the trencher are 0.2 ha/h and 71%, respectively when operated to dig a trench of 300 mm deep in 3 m wide vineyard at 2.0 km/h forward speed. The cost of operation of tractor operated side trencher is about ₹ 560/h. It saves in cost of operation, labour and time by 72, 94 and 80%, respectively as compared to digging of trench manually with hand tools.

The tractor operated FYM applicator of 1 tonne capacity has been developed for placing FYM near the plant. The applicator consists of a mixing chamber, central shaft, a pair of bottom augurs for dispensing FYM, hydraulic motor, flow control valve, reduction unit, soil covering device and a pair of side dispensing conveyor-type mechanisms at both sides (left and right). The FYM applicator is operated by hydraulic system of tractor using hydraulic motor. The side dispensing units on both sides of machinery rotate outwards through power transmission from hydraulic motor and chain-sprocket arrangement. The applicator dispenses FYM on both

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sides in the trenches. The FYM applicator has been tested in the vineyards at ICAR-NRCG, Pune. The observed application rate has been 8-10 kg/m as per recommended dose of 25 tonne/ha. The effective field capacity and field efficiency of FYM applicator are 0.2 ha/h and 71%, respectively at 2 km/h forward speed for 3.0 m wide rows of vineyards. The cost of operation of tractor operated FYM applicator is about ₹ 645/h. There was saving in labour, time and cost of operation by 98, 80 and 88%, respectively as compared to manual method.

Small tractor operated orchard sprayer

Horticulture is the leading agricultural sector in India and small machines need to be developed for orchards considering the landholding and headland area. Therefore, for orchard crops, a small tractor operated boom sprayer has been developed. The system consists of a storage tank, HTP horizontal triplex axial piston pump, hollow cone nozzles, pressure regulating valve, strainer, boom, pressure gauge and hose pipe. The pump is fixed over the drawbar and driven by the PTO of the tractor by belt pulley arrangement. The 300 l tank made of polyethylene plastic is fitted on a frame over the tractor. The pump discharges rate is 36 l/min at 28 bar pressure and 950 rpm. The height of the boom is 2.7 m and consists of 12 hollow cone nozzles. Six nozzles at a distance of 450 mm are brazed on each side of the boom. The spraying system has been evaluated in guava orchards at 2.5 km/h speed of operation and droplets characteristics have been taken on water-sensitive papers. The planting geometry of guava orchard and height of guava plant are 6×6 m and 3 to 4 m, respectively. The cost of the spraying system is ₹ 30,000/-. The discharge rate of boom sprayer was 608 l/h at 0.3 MPa pressure. The application rate and turning time of the spraying system were 475 l/ha and 12 s, respectively. The volume mean diameter (VMD) and volumetric spray deposition were 248 µm and 0.291 µl/cm², respectively.

Power tiller operated groundnut digger

Harvesting of groundnut pods is a major challenge for small farmers and mostly performed using bullock drawn blade harrow. The improper penetration of blade and frequent clogging with vines are common problems, resulting into higher percentage of left outs. Therefore, AICRP on ESA (OUAT, Bhubaneswar centre) developed a power tiller operated groundnut digger keeping in view relevant crop, soil and machine parameters. The developed equipment consists of a V shape blade, lifter, frame, power transmission system, conveying mechanism and hanging curved bar for depth management. The power tiller operated groundnut digger has been evaluated in central farm of OUAT, Bhubaneswar and effective field capacity of 0.07-0.11 ha/h was observed with digging efficiency of 97.6%. The average draft at no load condition has been 0.41 kN at 1.5 km/h forward speed.

Post-harvest treatment machine for fruits and vegetables

Sizeable amount of post-harvest losses of fruits and vegetables occur due to improper material handling practices. There are lot of scientific treatment protocols that fruits and vegetables can be subjected to before they are stored for market or transportation requirements. These treatments can increase the shelf life as well as the table life of the products. The machine is suitable for providing treatments viz. pre-cooling, washing, warm water treatment, anti-microbial treatment, anti-browning, and pulsed light treatment to the freshly harvested fruits and vegetables. There is also an inspection conveyor provided to sort out the deformed and damaged products. This is an ergonomically designed single operator machine of size 4.4 x

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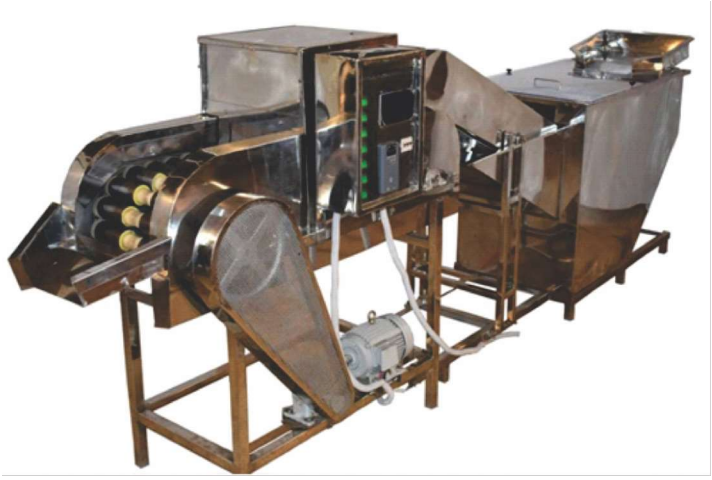

1.0 x 1.6 m (length x width x height) and made of SS-304. The machine has three phase electric power requirement of less than 2.5 kWh peak capacity. The capacity of the machine depends on the products being handled (e.g. 1.2 t/h for capsicum, 1.0 t/h for apple) at a linear belt speed of 5 m/min. There is a provision to vary the operating speed of the machine. This permits the required variations in the treatment time of commodity as per the established scientific protocols. Water forms the medium of treatment and stored in a tank of 500 l capacity. There are water jets operating at varying pressure to wash the commodities. Treated and washed commodities travel on a roller conveyor where rotation/rolling and linear motion ensure adequate exposure (up to 3 s) to pulse xenon light treatment.

Tractor operated potato digger-cum-collector

In India, harvesting of potato is done either manually or with mechanical digger. In case of potato digger, the dug material falls behind the machine in windrow and labour collects that material, which is a labour consuming process and increases the production cost of crop. To address this problem, a tractor operated potato digger with collection mechanism has been developed by AICRP on FIM (PAU, Ludhiana centre).The machine performs three operations viz. digging of potato tubers (two rows), separation of potatoes from soil and collection of potatoes in the collection unit. The effective working width of the machine is 1.00 m. The collection unit is made of MS sheet and box section. The base of the collector is made with iron bars leaving some space in between to facilitate the separation of any extra soil

material not removed by the separation unit. Hydraulics system is installed to empty the collection unit. The machine has been evaluated in two different soil types at University fields (sandy loam soil), PAU, Ludhiana and V.P.O Shah Wala (loamy soil), Kapurthala, Punjab. The best results have been obtained at forward speed of 1.5 km/h and blade depth of 140 mm for both soil types. The results obtained were cut (0.68%), bruised (1.96%), fuel consumption (4.27 l/h) and collection efficiency (98.78%) for sandy loam soil and cut (0.71%), bruised (1.95%), fuel consumption (4.68 l/h) and collection efficiency (98.73%) for loamy soil. The average field capacity and output capacity have been 0.12 ha/h, 2700 kg/h for sandy loam soil and 0.11 ha/h, 2685 kg/h for loamy soil, respectively.

Establishment of eddy covariance flux tower for evapo-transpiration study under National Hydrology Project (ISRO)

Eddy covariance is one of the most widely used direct methods available for collecting data for the purpose of esti-mating energy fluxes above a canopy. The eddy covariance measures the solar radiation, precipitation, soil and air temperature, soil moisture and soil heat flux, carbon dioxide flux, humidity, horizontal wind speed and wind direction. Thus, it will help in estimating evapotranspiration using energy balance technique with remote sensing data. An

RESEARCH & DEVELOPMENT/ TECHNOLOGY TRANSFER

MoU has been signed between National Remote Sensing Centre, Hyderabad of ISRO and ICAR-Central Institute of Agricultural Engineering, Bhopal for establishment of eddy covari-ance flux tower for measurement of evapo-transpiration under National Hydrology Project. The eddy covariance flux tower has been installed at the southern edge of C-3 Plot at Institute Research Farm. Estimating evapo-transpiration will be helpful in water balance studies in addition to suitable irrigation and crop management strategies for soybean-wheat agro-ecosystem.

Promotion of herbicide strip applicator-cum-seeder under NICRA

Herbicide strip applicator-cum-planter and ridge-furrow seeder have been demonstrated for cultivation of soybean (JS-2069). Six demonstrations have been conducted in four villages (Kachhi Barkheda, Raipur, Sagoniya and Mudia Kheda) of Bhopal district. Weed count was significantly less in herbicide strip applicator-cum-planter (40 weeds/m^2) in comparison to sowing with seeder (65 weeds/ m^2). In addition, average number of pods per plant was significantly higher (127 pods/plant) in comparison to sowing with seeder (46 pods/plant). The row-to-row spacing was 450 and 300 mm under herbicide strip applicator-cum-planter and ridge-furrow seeder, respectively. The yield of soybean was significantly higher under herbicide strip applicator (1.75 t/ha) in comparison to ridge-furrow seeder (1.60 t/ha).

Mainstreaming gender and empowerment through women friendly farm mechanization in tribal areas of Tamil Nadu

Gender Friendly Farm Machinery Banks were established at two tribal sites namely Thalavadi, Western Ghat hills, Erode district and Karumanthurai, Kalavarayan hills, Salem district of Tamil Nadu. These are operated as a Tribal Women Centric business model during COVID-19 pandemic through custom hiring of machinery in nearby villages by members of Women Self Help Group (SHG). The machinery supplied for creation of banks include manual seed drill, pull type manual transplanter, improved direct paddy seeder, battery operated sprayer, manually guided power weeder, dryland wheel hoe, cono weeder, sugarcane detrasher, groundnut decorticator, maize sheller, power operated sugarcane bud chipper, multi-millet thresher, root vegetable washer and coconut tree climber.

Technology outreach and agricultural engineering interventions for SC-BPL beneficiary

Considering the critical gaps and requirement of farmers, landless labourers and women workers, various training programmes were organized under SCSP programme for the selected 956 SC-BPL beneficiaries at main campus and regional campus of institute.

The participants were provided exposure on various technologies developed by the ICAR-CIAE particularly for small and marginal farmers. The demonstrations of land preparation equipment, manually operated weeder, ridger, spraying equipment etc. were carried out during the training. Maize shellers and weeders were introduced to women participants. The participants were made aware about importance of soy processing and value addition. The demonstration on production of soy-milk, paneer and other processed products was

TECHNOLOGY TRANSFER/ IPR

given to the participants. The primary processing machinery such as cleaner cum grader, daal mill, flour mill, destoner, spiral grader etc. were also demonstrated along with information on its repair, maintenance, adjustment and availability. The participants were sensitized on the efficient utilization of energy, generation of energy from renewable sources such as biomass, solar and wind energy. Energy gadgets such as cooking stove, solar lamp, briquetting machine etc. were demonstrated. A visit was arranged to the Precision Farming Development Centre and various cultivation practices along with irrigation and water management were introduced. Besides, the agricultural input in the form of fertilizer, chemicals and CIAE developed tools/ equipment were also distributed to selected beneficiaries of the villages. 78 numbers of beneficiaries were benefited through distribution of herbicides and insecticides (40 l) and about 2000 kg of fertilizer (DAP) was distributed among 40 farmers. Total 2321 number of equipment/tools (related to farm operations, post-harvest, energy and irrigation) were distributed to the SC-BPL beneficiaries of identified villages at CIAE Bhopal (1513) and RC, Coimbatore (808). Apart from this 15,000 kg of fertilizer and chemical was distributed to farmers by RC, Coimbatore.

MoA signed

A tripartite agreement was signed on 8 November, 2021 between Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shimoga, Karnataka (Host Institute as First Party); ICAR-Central Institute of Agricultural Engineering, Bhopal (Mentor Institute as Second Party) and Karnataka State Agricultural Product Processing and Export Corporation Limited (KAPPEC) and State Nodal Agency - PMFME Scheme (A Govt of Karnataka Entreprise), Bengaluru - Third party) for installation of common incubation centre for pineapple, other fruits and finger.

Patent Granted

Process technology of multi-nutrient composite mix for biscuits (Patent number 383888 dated 08/12/2021; Inventor: Dr. Dipika Agrahar Murugkar)

Multi-nutrient biscuits are nutritionally enriched baked products developed using corn flour, whole wheat flour, sorghum flour, malted finger-millet, green-gram, sprouted soybean unsalted peanuts, dairy whitener and papaya. It is rich in nutrients like energy (500 Kcal), protein (14 g) valuable for combating protein deficiency and fibre (1 g) per 100g. The biscuits are rich in minerals, anti-oxidants, phenolics and flavonoids sourced from natural food materials. It contains no artificial flavouring or added preservatives with an adequate shelf-life (3 m). It has a high satiety value, appealing taste and is cost effective and has 21% more overall acceptability on a sensory scale over commercial biscuits. From 1 kg of dough, approximately 200 biscuits are obtained. These biscuits are a nutritionally rich and healthy snack for both young and old. Its USP is that it is totally free from maida (refined flour), thus providing a healthy substitute to commercially available biscuits. It is ideal for consumption as any-time snack. Cost of production is ₹ 143/kg (at an output of 250 kg/day) and expected price on sale is ₹ 200/ kg.

Patent application

Applications for patenting of following technologies have been filed:

- Abrasive peeling machine for medicinal root crops
- An orifice based hydrodynamic cavitation system for shelf stable sugarcane juice and process thereof

TECHNOLOGY TRANSFER/ TRAINING

Technology licensed

Modular backyard poultry cage developed under contract research has been licensed to M/s Burgeon Agri. Pvt., Ltd, Nasik, Maharashtra.

Media Activities

Dr. T. Senthilkumar, Principal Scientist, RC-Coimbatore delivered a talk on 'Tractor operated two row settling transplanter for sugarcane seedlings raised in portrays' in BBC News Tamil on 6 October, 2021.

Test Reports Released

During the quarter, total 56 test reports of commercial farm machinery/post-harvest machinery were released and generated revenue of Rs. 66 lakh.

Training organized

Regional Centre, Coimbatore organized following training programmes:

Programme details	Date	Venue	No. of beneficiaries
Advanced machinery for maize, onion and groundnut crops	01.10.2021	Melapuliyur and Navalur Village; Dist-Perambalur (Tamil Nadu)	100
Promotion of CIAE technologies for rural entrepreneurship	26.11.2021	Coimbatore (Tamil Nadu)	30
Women friendly technologies for maize, onion and groundnut crops	23.12.2021	Irumporai and Pethikuttai village; Dist-Coimbatore (Tamil Nadu)	34
Operation and maintenance of maize, onion and groundnut crop machineries	31.12.2021	Melapuliyur and Navalur Village Perambalur (Tamil Nadu)	66

KVK News

Events organized

- Special Swachhta Campaign at village Golkhedi, near Bhopal on 6 October, 2021, attended by 24 farmers.
- Special Swachhta Campaign on "Waste to Wealth" at Institute campus, attended by 117 participants on 12 October, 2021.
- Mahila Kisan Diwas at village Raipur, near Bhopal on 15 October, 2021, attended by 32 women farmers.
- Scientific Advisory Committee meeting for Rabi Season on 5 October, 2021.
- World Soil Day on 5 December, 2021, attended by 52 farmers.
- Total 287 farmers, rural youth and extension functionaries were trained on farm machinery technologies and soil health card during the quarter.

On Farm Testing (OFT)

Crop / Technology	Villages	No. of farmers	Area (ha)
OFT of Broad Bed and Ridge Furrow machine for sowing of soybean (JS-2034) variety	Sagonia	4	1.0
OFT of Integrated Diseases Management (IDM) in soybean crop	Kachhibarkeda and Sagonia	4	1.2

Frontline and Cluster Frontline Demonstration (CFLD) programme

Technology	Villages	No. of farmers	Area (ha)
Broad bed machine in maize crop	Daamkheda, Barkheda Baramad, Harrakheda, Dillod villages (Block Berasia), Raipur, Bina pur, Chappar, Devpur, Sagoniya, Kuthar villages (Block Phanda)	11	7
Semi-automatic potato planter	Fathehpur, Khejda, Murlikhedi villages (Block Phanda)	3	6
Broad Bed in Gram (RVG-202 variety)	Kachhi Barkheda and Sagoniya villages	3	1
CFLD on soybean (Var. JS-2034) with improved package of practices	Kacchi Barkheda, Sagoniya and Sukaliya	36	10

AWARDS & RECOGNITION

NAAS Recognition Award

Dr. CR Mehta, Director received Recognition Award 2019-20 from National Academy of Agricultural Sciences, New Delhi for making significant contribution to Agricultural Engineering and Technology during XV Agricultural Science Congress 2021 held at BHU, Varanasi during 13-16 November, 2021.

ISAE Awards

The Institute scientists received following awards during 55th Annual Convention of ISAE, organized by Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar during 23-25 November, 2021.

ISAE Fellow 2020	Dr. Ravindra Naik Dr. Sukhdev Mangaraj
ISAE Commendation Medal 2020	Dr. SK Giri Dr. KP Singh
ISAE Team Award 2020	Dr. SK Chakraborty, Dr. SK Giri, Dr. Adinath Kate, Dr. Dilip Pawar and Dr. MK Tripathi
ISAE JAE Best Paper Award 2020	Dr. Manish Kumar
ISAE JAE Best Reviewer Award 2020	Dr. Balaji M Nandede
Best paper presentation awards	
Development and evaluation of tractor drawn weeder for garlic crop	Dr. Dilip Jat
Development of thermal imager for predicting crop stress using canopy temperature and deep learning models	Dr. NS Chandel
Kinetics and modelling of grape drying with abrasive and chemical pre-treatments	Dr. Dilip Pawar
Mobile app on water balance simulation model for roof water harvesting	Dr. Mukesh Kumar
Canopy spectral reflectance for crop water stress assessment in wheat and okra	Dr. YA Rajwade

AWARDS & RECOGNITION/ HRD/ PUBLICATIONS

Dr Sandip Mandal, Senior Scientist received Second Prize for presentation of paper "Performance of a downdraft portable biomass gasifier with in-situ tar cracking using Ni-supported char" in Madya Pradesh Vigyan Sammelan, held at IIT Indore during 22-25 December, 2021.

Dr. Manish Kumar, Scientist has been awarded with a certificate of excellence for reviewing a paper by Journal of Engineering Research and Reports.

Dr. Manoj Kumar, Scientist (Agril. Stat.) has been awarded with "Excellence in reviewing" by Plant Cell Biotechnology and Molecular Biology Journal.

International Recognition

Dr. MK Tripathi, Principal Scientist has been recognized as among one of the top 2% scientists in the world-2021, published by Elsevier, data compiled by Stanford University (A178095). https://elsevier.digitalcommonsdata.com/ datasets/btchxktzyw/3

CIAE Scientists in ISAE Executive Council

Dr T Senthilkumar and Dr KP Singh, Principal Scientists were elected in ISAE Executive Council as Director (FMP) and Director (Awards), respectively for a period of three years (2021-2024). The results of the ISAE elections were declared on 25 November, 2021 during the concluding session of 55th ISAE convention.

Ph.D. Awarded

Er. Manish Kumar, Scientist has been awarded Ph.D degree in Farm Power & Machinery for his thesis entitled 'Studies on Spray Characteristics of Selected Nozzles with Bio-pesticides' from ICAR-Indian Agricultural Research Institute, New Delhi. He did his Ph.D research under the guidance of Dr. CR Mehta, Director, ICAR-CIAE, Bhopal.

Human Resource Development

Name and Designation	Course Title (online program)	Duration	Organizer
Er. Pravitha Scientist	Recent trends in non-thermal food processing: Prospects and Challenges	4-8 October, 2021	IIFPT, Thanjavur
	Training Programme on Internet of Things (IoT)	25-29 October, 2021	Ministry of Science & Technology, Govt of India
Er. Sweeti Kumari Scientist	Online training program on "Mechanized weed management in different field crops"	1-3 November, 2021	ICAR - Directorate of Weed Research, Jabalpur
Dr. S. Balasubramanian Principal Scientist	Advances in web and mobile application development	6-10 December, 2021	ICAR-National Academy of Agricultural Research Management, Hyderabad
Dr. Shashi Rawat Principal Scientist	Development Programme on Leadership Development	13-24 December, 2021	ICAR-National Academy of Agricultural Research Management, Hyderabad

PUBLICATIONS

Research Papers

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Events

Krishi Yantra Nirmata Diwas

"Krishi Yantra Nirmata Diwas" event was organised on 18 November, 2021 in which 40 agricultural machinery manufacturers of Madhya Pradesh and officials from ICAR-CIAE, Bhopal and Directorate of Agricultural

Engineering, Bhopal participated. Shri Om Prakash Chouksey, President, MP State Krishi Yantra Nirmata Sangh highlighted the issues and the difficulties faced by manufacturers of the state and submitted memorandum for suggestive support from the Government. Director, ICAR-CIAE, Dr. CR Mehta and Joint Director, Directorate of Agricultural Engineering, Govt. of MP, Er. PS Shyam, gave their suggestions and guidance and assured for solution and support to manufacturers on various issues raised during the event.

Swachhta Pakhwada

Swachhta Pakhwada was organized at main campus and regional station of the institute during 16-31 December, 2021. The programme was inaugurated by Dr. CR Mehta, Director ICAR-CIAE, Bhopal on 16 December by taking oath of cleanliness by the staff of the institute. Some of the programmes organized during the pakhwada were:

- Proper garbage disposal, water conservation and its recycling at a residential colony near CIAE campus
- Kisan Diwas
- Cleanliness campaign at market place near the institute
- Poster competition for school children of Jagriti Vidya Mandir, Higher Secondary School, Karond, Bhopal to create cleanliness awareness amongst them

On 30 December, 2021, Dr. Pradeep Dey, Project Coordinator, Soil Test Crop Response, ICAR-Indian Institute of Soil Science, Bhopal addressed the staff of the institute and informed the house on waste management, utilization of organic waste and converting it into wealth. The event was concluded on 31 December, 2021 under the chairmanship of Dr. CR Mehta, Director CIAE in which media personnel were

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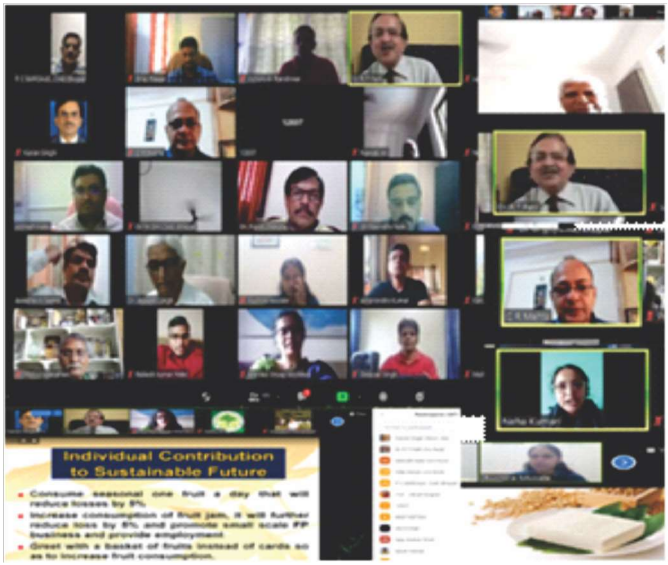
also invited to the institute. All the activities carried out by the institute during the pakhwada were briefed by Dr. RK Singh, Chairman of the event.



Programmes to Commemorate 'Azadi Ka Amrit Mahotsav'

Our actions are our future: Better production, better nutrition, a better environment and a better life

A programme was organized on 16 October, 2021 to commemorate the occasion of "World Food Day" and National Campaigns under Azadi Ka Amrit Mahotsav through online mode by ICAR-CIAE, Bhopal and Association of Food Science and Technology, India (AFSTI), Bhopal Chapter. The theme of the program was "Our actions are our future: Better production, better nutrition, a better environment and a better life". About 105 participants mainly the food processors, entrepreneurs, research/academic professionals and the rural youth attended the programme. Dr. RT Patil, Former Director, CIPHET, Ludhiana delivered the keynote talk on "Post-harvest operations for sustainable future". He highlighted the opportunities of processing of different agro-commodities for value addition, prevention of post-harvest losses and sustainable development. He also focussed on the importance of minimal processing and secondary agriculture with changing market demand. Two talks were delivered by successful entrepreneurs i.e. Ms. Ruchira Musale, Nirmal Soy Food Products, Nagpur, Maharashtra and Ms. Neha Kumari, Founder-Hello Smile NGO, Patna, Bihar. Both the entrepreneurs underwent training on soy processing at ICAR-CIAE, Bhopal and have established their own business. Dr. Nawab Ali, Former, DDG (Engg.), ICAR, New Delhi gave his valuable remarks on global food hunger, human health and strategies of food processing in India. There was an interaction between participants and the speakers on the business queries and future course of actions.

Webinar Series on Advances in Agricultural Engineering: Challenges and Opportunities @India 75

A webinar series on Advances in Agricultural Engineering: Challenges and Opportunities has been initiated by the institute to celebrate Azadi ka Amrit Mahotsav. The webinar series is aimed to discuss various challenges faced by researchers, manufacturers, Start-ups in the area of engineering interventions in agriculture. The series was started with webinar talks by Start-ups in the area of precision farming and smart storage. These webinars were attended by more than 250 scientists from ICAR-CIAE, Bhopal, ICAR-CIPHET, Ludhiana other ICAR institutes and different centres of AICRPs.

First webinar in the series was organized on 25 October, 2021 on 'Early diagnosis of crop issues using drone based hyper-spectral imaging'. A talk was delivered by Er. Rishabh Chaudhary, Partner, Start-up M/s Bharat Rohan. Mr. Chaudhary and his friend Mr. Amandeep Panwar started their start-up in the year 2016 after

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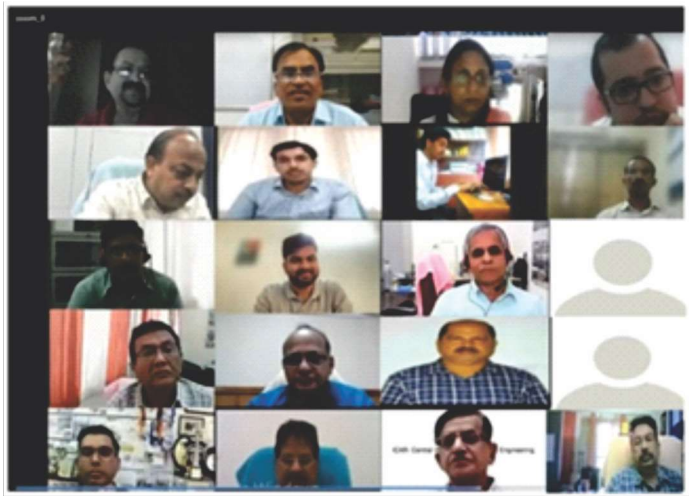
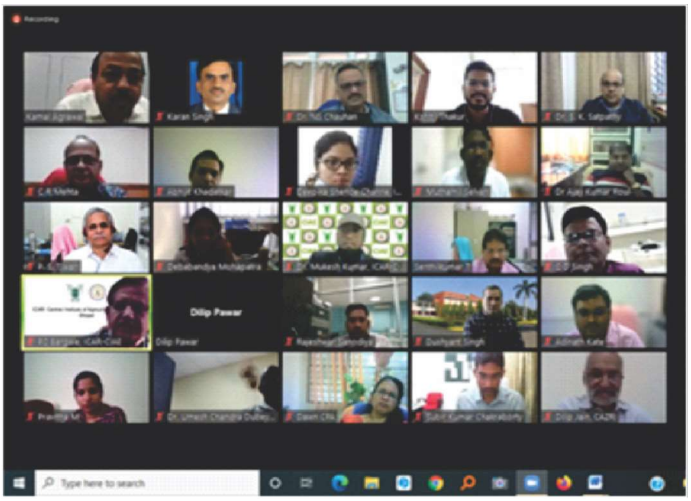


undergoing a training programme at ICAR-NAARM, Hyderabad. His team works in the Barabanki district of Uttar Pradesh and they offer early diagnosis solution to farmers using drone and hyperspectral imaging technologies. At present his start-up is working with farmers growing paddy, potato and mentha crops in about 4000 ha area. Various national and international agencies are collaborating with them especially ICAR institutes and CSIR-CIMAP, DBT, BIRAC, ICICI and HDFC Bank, dlabs, BatSpec, Samunati, etc.

Er. Kshitij Thakur, Partner, Start-up M/s Agro Grade, Nashik delivered the talk in a webinar on 'Post Harvest Quality Control and Value Addition' on November 1, 2021. Er. Kshitij and his colleague Mr. Rakesh started start-up in 2016 after completing his B. Tech in Mechanical Engineering. His team works in the Nasik district of Maharashtra and they offer solution about grading of farm produce to farmers and traders using AI based sorting technique. They also provide forward and backward linkages to farmers for marketing of different grade of produce. Their venture have developed an AI based farm produce sorting and grading machine which can be customized according to need of the customer. At present, their start-up is working on potato and tomato grading. The start-up has also linkages and collaboration with various agencies like IGKV, Raipur, INAIN (an initiative of Bill Gate Foundation), Govt. of Maharashtra, Tata Trust, Villgro, etc.



Dr. Rajul Patkar, CEO, M/S Proximal Soilsens Technologies delivered a talk in a webinar on 'Precision Farming: Impact through Innovations' on December 7, 2021. Dr. Patkar discussed different types of sensors suitable for agricultural applications. She shared her work in the field of sensor development for measurement of soil nutrients such as N, P and K, soil pH, EC and soil moisture. She discussed about many other sensors such as for VOC measurement, etc. She emphasized the need of a close collaboration with agriculture institute for development, calibration and testing of sensors.

Agriculture and Environment: the Citizen Face

A national campaign on the theme "Agriculture and Environment: the Citizen Face" was organised on 26 November, 2021 in the series of events under celebration of 75th year of Azadi ka Amrut Mahotsav. About 70 school children and 10 school teachers of Deepshikha Children Higher School, Nayapura, Bhopal participated in the event. The institute organized

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orientation of school children towards opportunities in agriculture sector for entrepreneurship and employment, visit to different demonstration plots at Institute campus and drawing competition on related theme.

Rooftop Solar Plant Installed

Rooftop Solar Plant of 381.9 kWp capacity has been installed at three buildings of the institute. It can produce 5,73,000 kWh electricity (5.73 lakh unit) in a year and can help to mitigate 1147 tonne of carbon emissions, which is equivalent to planting 18,794 full-grown teak trees.

Our New Colleagues

Shri Rajeshwar Sanodiya, Scientist (FMP) joined on 4 October, 2021, on transfer from ICAR-Central Institute of Arid Horticulture, Bikaner.

Shri Rajesh Dubey joined ICAR-CIAE, Bhopal as Finance & Accounts Officer on 5 November, 2021, on promotion . Previously, he was working at ICAR-Indian Institute of Soil Science, Bhopal.

Promotions

Ms. Swati Singh, Assistant promoted to the post of Assistant Administrative Officer wef 8 October, 2021.

Following technical personnel promoted to Technical Officer in their next grade (T-5) wef 29th June, 2021

Shri A.K. Pathak

Shri Umesh Kumar

Shri C.K. Patel

Shri A.P. Marko

Staff Transferred

Shri M.K. Mulani, FAO, ICAR-CIAE, Bhopal was promoted to the post of Senior Finance & Accounts Officer and joined ICAR-Indian Institute of Soil Science, Bhopal on 13 October, 2021.

Dr. Chirag Maheshwari, Scientist was relieved on 22 October, 2021 to join at ICAR-Indian Agricultural Research Institute, New Delhi.

STAFF SUPERANNUATED

Shri P.A. Kandulna
Technical Officer
31 October, 2021

Shri M.C. Katole
Technical Officer
31 October, 2021

Dr. P.C. Bargale
Principal Scientist
30 November, 2021

Shri Mukhtar Ali
SSS
30 November, 2021

Shri Mahendra Sethi
T-2
30 November, 2021

Shri R.C. Maheshwari
T-3
30 November, 2021

Dr. Ramadhar Singh
Principal Scientist
31 December, 2021

Shri S.K. Chouhan
SSS
31 December, 2021

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