



ICAR-CIAE

NEWSLETTER

Sardar Patel Outstanding ICAR Institution 2020

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<https://ciae.icar.gov.in>

From the Director's Desk



Soybean has potential to be transformed into a number of healthy foods suiting to each individual requirement, across the globe. Soybean is not only a good source of high quality oil (20%), but it is also rich in protein (40%) and carbohydrates (35%). Soybean has more than two times the amount of most of the minerals, especially calcium, iron, phosphorus and zinc, than any other legume and have very low sodium content. In addition to high-quality protein, soybean contains high levels of unsaturated fatty acids that possess numerous health benefits. Soybeans are well known for their health-promoting benefits which include anti-oxidant, anti-obesity and anti-diabetes properties and help in prevention of osteoporosis and cancers such as breast and prostate cancer.

Among the non-fermented soy foods, tofu is the most popular, followed by soymilk and soy sprouts. Proper entrepreneurship development training is necessary to produce quality soy products. Thus, realizing the importance of entrepreneurship on soybean processing, the Centre of Excellence on Soybean Processing and Utilization was established in April, 1985 at this Institute. The focussed R & D efforts of the centre resulted in development of process technology and equipment for more than 40 soy based food products suiting to Indian tastes and plates. The centre started 6 days hands-on practical training on soybean processing to upcoming entrepreneurs since 1995. It has provided entrepreneurship development training to more than 3000 upcoming entrepreneurs, out of which about 220 have established their enterprises in 17 states and are running successfully. The annual production of Tofu and soy milk is 2700 ton and 3400 kilolitres, respectively. Annual working days of these units are 203 while labour employment is about 4.73/unit. These entrepreneurs are generating employment to the tune of 1.90 lakh mandays/annum and provide the monetary benefits of Rs.5.70 crore to 936 workers engaged to run established soybean processing units. Thus, annual net return realized is to the extent of Rs.11.20 lakh/entrepreneur with a BCR of 1.66. The establishment of these enterprises for production of various soy products are not only providing the livelihood opportunities to many but also making the nutritious products available to masses for combating malnutrition in the catchment area.

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This issue of the newsletter focuses on research and development of farm equipment and machinery like unmanned aerial vehicle (UAV) simulation platform, solar assisted e-prime mover for field operations, sensor based hand control system for tractor foot controls for operators having lower limb disability, cleaner for multiplier onion, plant byproducts based prebiotic preparation for food applications, etc.

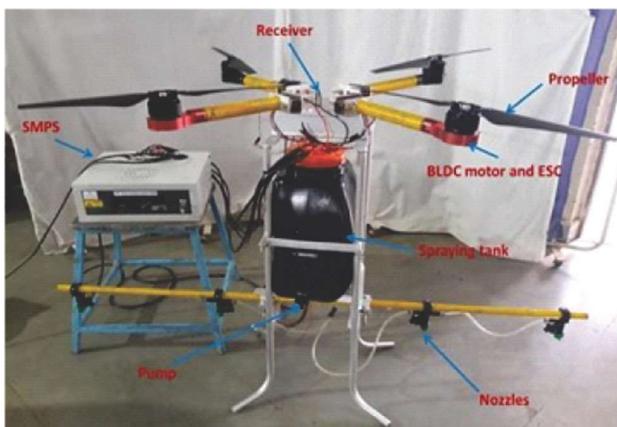
The prestigious Sardar Patel Outstanding ICAR Institution Award 2020 for large institutes was conferred jointly to ICAR-Central Institute of Agricultural Engineering, Bhopal and ICAR-Central Inland Fisheries Research Institute, Barrackpore during 93rd Foundation Day and Award Ceremony of the Indian Council of Agricultural Research (ICAR) held on 16 July, 2021. Technologies like Banana Pseudo-stem Injector, Aonla deseeding/segmentation unit and processing technology of "Soya Chaap" were commercialized through licensing. An MoU was also signed with M/s National Remote Sensing Centre (NRCS), ISRO Hyderabad for 'Establishment of field station for measuring ET and soil moisture'. The 26th meeting of ICAR Regional Committee No. VII was organized by ICAR-CIAE, Bhopal. In this quarter, seven staff members were promoted and three colleagues superannuated.

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

RESEARCH & DEVELOPMENT

Unmanned aerial vehicle (UAV) simulation platform

An UAV simulation platform has been developed at the institute to evaluate the deposition characteristics of spray droplets of UAVs at various operating parameters. The quadcopter UAV system consists of propellers, BLDC motor, electronic speed controller (ESC), remote control, spraying system, SMPS, nozzles, tank, pump, etc. A quadcopter UAV has four propellers, two "normal" propellers spin counter-clockwise, and two "pusher" propellers spin clockwise. Propellers transduce the rotary motion to aerodynamic lift forces. The size of selected propeller is 572 mm in diameter and 140 mm in pitch. The propellers are rotated using BLDC motors. The maximum power and pulling force of BLDC motor is 600 W and 4 kg/motor, respectively. An electronic speed controller (ESC) has been used for the DC supply and converts into a three-phase supply. ESC is an electronic circuit to vary the speed and direction of motor and acts as a dynamic brake. The radio transmitter and receiver have been used to control the UAV's motion. The switch-mode power supply has been used to convert AC to DC and supply the DC power to individual BLDC motors. The spraying tank capacity of 15 litre and flat fan nozzles (4 units) have been used for pesticide spraying. The nozzles of the UAV are calibrated at different pressures. The discharge and coverage width of nozzles are from 35.2 to 53.4 l/h and from 0.525 to 0.575 m, respectively at working pressure from 200 to 500 kPa.

**Solar assisted e-prime mover for field operations**

The solar assisted e-prime mover (SAePM) is a simple and easy to use prime mover developed for weeding and spraying operation. The unit is equipped with independent power units for moving the vehicle (2 kW),

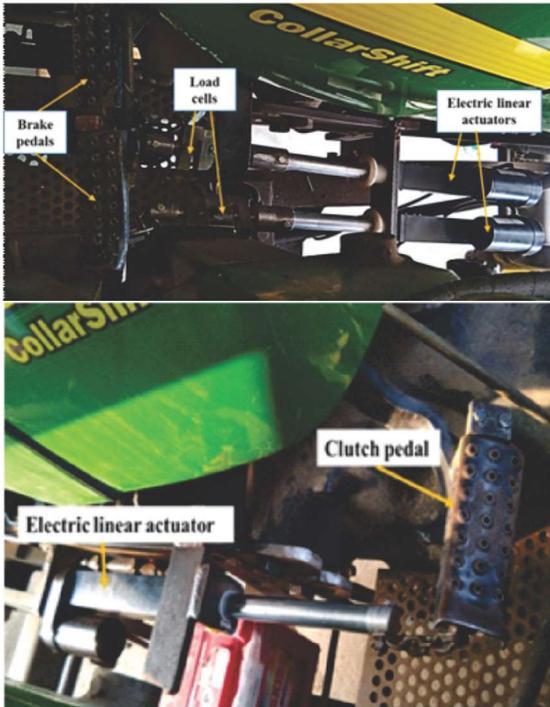


weeding (0.75 kW) and spraying operations (0.07 kW). The SAePM can be operated using both battery and solar energy. The battery bank capacity for SAePM and weeder is 4.8 kWh and 1.24 kWh, respectively. The SAePM has been evaluated for spraying and weeding (horizontal rotor) operations at the institute. The moisture content and cone index of soil (1.4 g/cm³ bulk density) during the test ranged 20-22% (db) and 216-393 kPa (upto 50 mm depth). The SAePM was operated at a forward speed of 1.3 and 2.6 km/h during weeding and spraying operations, respectively. The field capacity, field efficiency and weeding efficiency of the weeder are 0.06 ha/h, 82% and 70%, respectively. Similarly, the field efficiency, field capacity and power requirement for boom sprayer are 83%, 0.52 ha/h and 50 W, respectively. The wheel slip of the SAePM during the field operation is 9.3%. The power consumption by SAePM during the field operation has been found 932-1648 W and 229-593 W for spraying and weeding operations, respectively.

Sensor based hand control system for tractor foot controls for operators having lower limb disability

In India, 2.2% of total population is disabled among which 20% are having disability in movement. Persons having lower limb disability find them unsuitable for different agricultural activities including tractor driving, which leads to economic hardship. A sensor-based wireless hand control system has been developed by AICRP on ESA (IIT, Kharagpur centre) using micro-controller, relay switch, RF module, electric linear actuators and keyboard to make the tractor foot controls suitable for lower limb impaired persons. The system consists of a transmitter and a receiver to operate the

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brake and clutch pedals as per the need during the tractor operation. One electric linear actuator is connected with the clutch pedal and two actuators are connected with the brake pedals to operate the left and right brake pedals separately and also simultaneously as per the requirement. Electric linear actuators are mounted on tractor with the help of MS flat and connected to the pedals with chain linkage to facilitate them to operate freely and smoothly. Pedals are operated once the user sends a request and ends when the application states that the request has been completed. Response time of the developed sensor-based wireless hand control system was measured using the digital oscilloscope. The response time to completely engage brakes pedal has been measured as 2.02 s and clutch pedal as 2.84 s. The actuating force to operate the brake and clutch pedal has been kept considering the maximum force required to operate pedal in different operating conditions. The measured maximum actuating force required for clutch pedal has been found to be between 164-176 N while the force required to operate brake pedal was found to be between 173-204 N.

Cleaner for multiplier onion

Cleaning of the stored onions prior to marketing is an essential unit operation in the processing of multiplier onion. At present, cleaning is carried out in the fields involving human labour. The operation is, hence, considered labour intensive and time consuming. Thus, an attempt has been made to develop engine operated cleaning equipment for onions. The developed multiplier onion cleaner consists of main frame, material flow bed, air distributor, engine operated blower, feeding inlet and collecting tray.

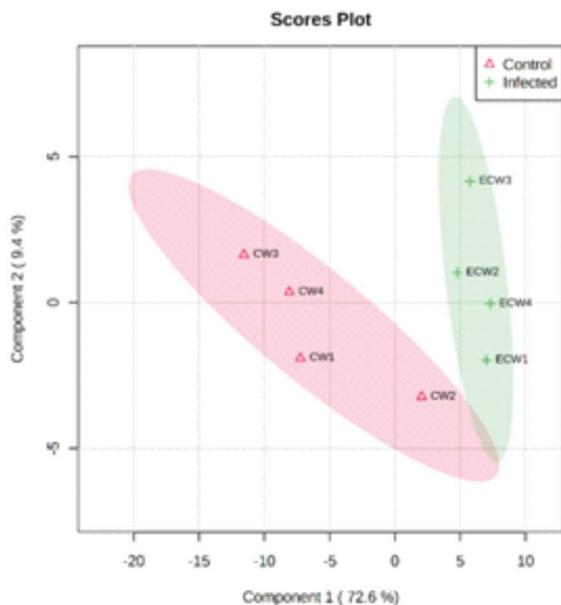


The material flow bed is made up of mild steel lined with rubber sheet. A 3.75 kW engine operated blower supplies air for cleaning. The air from the blower passes to onions falling in the material flow bed during the process of cleaning. The feed inlet is mounted on the main frame to feed the onions to the cleaning unit. An outlet chute has been provided at the side for collecting dried skin and other impurities of onion. The collection tray is provided at the bottom of the equipment for collecting the cleaned onions. The overall dimension of the equipment is 800 x 300x 1200 mm. The capacity of the cleaner is 800 kg/h with 98% cleaning efficiency. The operating cost for cleaning multiplier onions is Rs. 0.2/kg with a saving in labour cost of 88%.

Volatile Organic Compounds based distinction of infected and non-infected onions from pectobacter

The early detection of the spoilage of onions during bulk storage is very critical to control the losses. About 20-30% of stored lot gets spoiled due to the microbial infection based spoilage of onion bulbs. Keeping in view, the volatile organic compounds (VOCs) generated during storage of onions have been used as a bio-markers for early stage identification of infection and metabolisms which can help in the development of bio-sensors for monitoring the instantaneous health of

RESEARCH & DEVELOPMENT



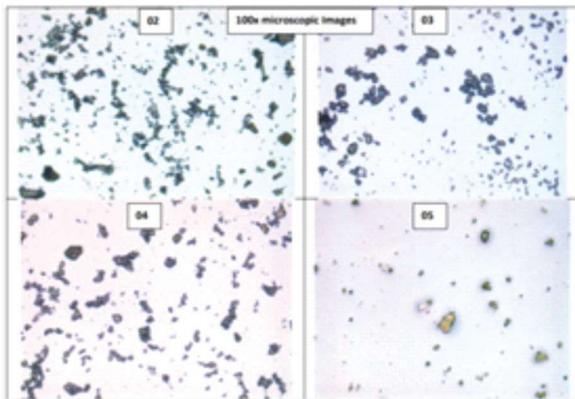
stored onions. During the study, healthy onions and samples infected with pectobacter (*Erwinia carotovora*) were stored at different temperature and relative humidity conditions (4°C with 60%; 8°C with 65%; 15°C with 75%; 25°C with 60-80%) for 4 weeks and the VOCs were mapped using SPME-GC-MS. The data were analyzed using multivariate data analysis techniques like Principal Component Analysis (PCA), and Partial Least-Squares Discriminant Analysis (PLS-DA), and visualized using a cluster heat map. The study revealed that the number of VOCs was higher in the infected samples, which increased over the storage duration. The predominant class of VOCs at 25°C are mostly ester and sulfur; while at 15°C, alkane and ketone groups contributed more, especially during the initial phase of infection. At a lower temperature of 8°C, bacterial metabolic VOCs belonging to alcohol or aldehyde groups were observed. On the other hand at 4°C, since the microbial activity is retarded, no such compounds were found. With storage and extent of spoilage, the predominant VOCs belonged to acids and multi-functional group varied for lower temperatures. Except for 4°C storage temperature, PCA could distinguish and separate the infected and non-infected samples. However, PLS-DA performed better separation and distinction of VOCs among the groups for all the storage conditions.

Plant by-products based prebiotic preparation for food applications

Prebiotics are non-digestible or of low digestibility food ingredients that beneficially affect the host by selectively stimulating the growth of beneficial bacteria in the colon. In combination prebiotics and beneficial bacteria can provide more health benefits than probiotics and prebiotics alone. Prebiotics are naturally present in fruits, vegetables, honey and milk and can be produced from food processing wastes. Active research on converting agricultural by-products into value-added products has been undertaken to produce different biomolecules of economic significance. Value-added products have potential applications in food, pharmaceuticals, feed formulations, and agricultural purposes. The study covers the way to utilize the food by-product derived prebiotics for incorporation into suitable functional food products. The hydrolysed by-products based solid mixtures have been prepared using tofu whey, okra (soya by-products) and cabbage by-products. Fresh tofu whey, okra, and cabbage by-products have been autoclaved at 121°C for 15 min. After cooling down to room temperature, yeast was inoculated and kept for solid state fermentation (SSF). The hydrolysed solid mixtures have been used for evaluation of their prebiotic characteristics. The identification and quantification of sugars present in the mixture has been carried out by HPLC and TLC. The bacterial strain used for performance as prebiotic in soymilk was *Lactobacillus* spp. Microscopic image (100X and 500X) observations have also been performed for determination of degree of hydrolysis. Developed hydrolysed mixture shown to be an effective substrate for microbial growth was evident from the increase in the absorbance and dry cell mass with decrease in pH. The results support the fact that food by-products



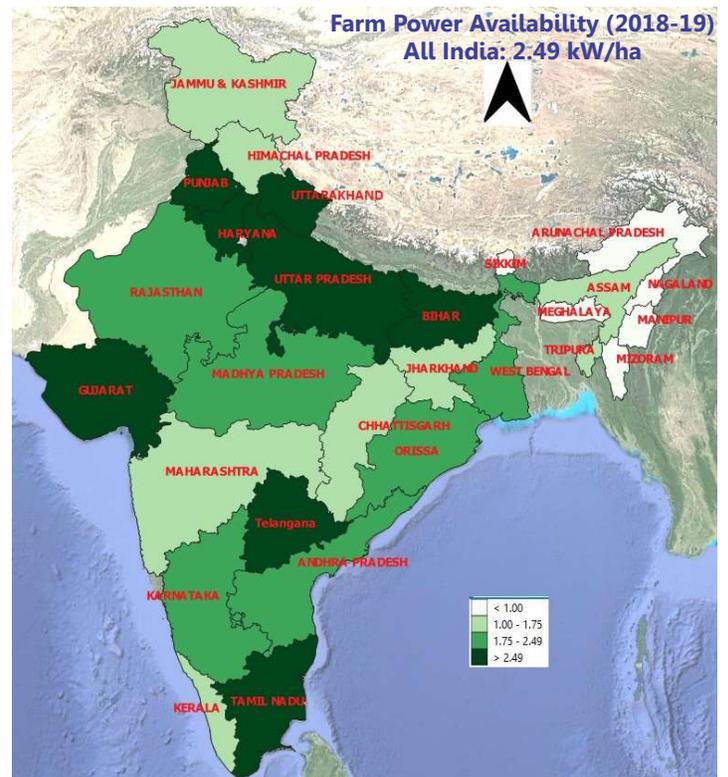
RESEARCH & DEVELOPMENT



based hydrolysed mixture stimulates the growth of microbial strain. Derived mixture proved to be an effective substrate for enhancing the growth rate and cell mass of *Lactobacillus* spp, similar to commercial prebiotic mixture.

Thematic map of farm power availability in India

ICAR-CIAE has developed state wise thematic map of Farm Power Availability (FPA) in India using QGIS software. The average farm power availability of Indian agriculture has increased 8-fold since 1960-1961. The farm power constitutes of tractors, power tillers, combine harvesters, diesel engines, electric motors, human resource and draught animals. The states having FPA more than the national average of 2.5 kW/ha are shown in dark green colour and include Punjab having highest farm power availability (6.0 kW/ha) followed by Haryana (5.5 kW/ha), Bihar (3.5 kW/ha), Uttar Pradesh (3.5 kW/ha), Tamil Nadu (3.5 kW/ha), Telangana (3.4 kW/ha), Uttarakhand (3.1 kW/ha) and Gujarat (3.0 kW/ha). States where special attention is required in enhancing the FPA ranging from 1.8 kW/ha to 2.5 kW/ha are shown in light green colour and include states like Andhra Pradesh, Karnataka, West Bengal, Madhya Pradesh, Odisha, Rajasthan. The states which require in-depth studies for FPA enhancement and which are below 1.8 kW/ha are depicted in very light green colour and include the North Eastern states of India including Chhattisgarh, Maharashtra, Jharkhand, Himachal Pradesh, Jammu and Kashmir, Kerala and Arunachal Pradesh. The developed thematic map is very useful for quick and easy access and helps in decision making for establishment of technically feasible and economically



viable model for various policy decisions. The thematic map is hosted on the Institute's web portal for public access (<https://ciae.icar.gov.in/storage/app/public/mapwork/>).

Externally Funded Project

The project entitled 'Development of FCV tobacco leaves stringing machine' has been sanctioned by Tobacco Board, Guntur with a total budget of Rs. 11.055 lakh. Scientists associated with the project are Dr Sadvatha R.H. and Dr S.K. Aleksha Kudos, ICAR-CIAE and Dr. T. Kiran Kumar, ICAR-CTRI, Rajahmundry.

Technologies Licensed

A license agreement has been signed with M/s Magnificent Engineers, Coimbatore and M/s Sri Balaji Industries, Singanullur, Coimbatore for commercial manufacturing of Banana Pseudo-stem Injector and Aonla deseeding/segmentation unit, respectively.

Processing technology of "Soya Chaap", an innovative soya based food product with high protein quality was licensed to Ms. Neha Kumari of Patna.

TECHNOLOGY TRANSFER/ SUCCESS STORY**MoU signed**

An MoU with M/s National Remote Sensing Centre (NRCS), ISRO Hyderabad was signed on 27 July, 2021 for 'Establishment of field station for measuring ET and soil moisture' under National Hydrology Project.

Copyright Application

Copyright application for "ICAR-CIAE software for relative chlorophyll measurement system" was e-filed on 31 August, 2021.

Success Story**Mechanization package for rope making from outer sheath of banana pseudo-stem**

The package of equipment i.e. banana pseudo-stem splitting machine and outer sheath rope twisting & winding machine has been developed to convert the outer sheath of banana pseudo-stem to get the twisted ropes. The developed package of equipment has potential for generation of wealth from the waste. By using this method, the better end product in terms of rope from outer sheath of banana pseudo stem can be obtained. The package of equipment is having higher efficiency and higher output compared to traditional method with a capacity of 800-1000 m/h. The drudgery involved in traditional method is significantly reduced by the developed equipment. The number of twists per unit length can be varied based on the value added product being made. Moreover, the twisted rope is wound in the bobbin which enables easy handling and transportation. The twisted rope obtained is used for production of various eco-friendly handicraft materials like bags, window curtains, table mat etc. which have huge demand both in local and international market.

Manufacturer based at Coimbatore M/s Trytex Machine Company has signed an MoA with Agri innovate, New Delhi for commercial production. The technology has been identified under ABI of ICAR CIAE, Bhopal and ICAR NRCB, Trichy. The licensed manufacture has sold 10 units to various stakeholders.



TRAINING/ TECHNOLOGY TRANSFER

Trainings organized by KVK

KVK of the Institute organized following programmes during the quarter, attended by 292 participants.

- Formation of FPO in organic field and mobilization training with farmer and Swami Vivekanand Siksha Samiti, Bhopal
- Midterm examination and educational visit for second batch DASEI Diploma for fertilizers dealers of Bhopal district
- Training on Mushroom production technology
- Farmer-Scientist interaction program with the collaboration of ATMA, Bhopal
- Climate resilient agriculture technologies for doubling farmers' income
- Campaign and training on "Nutri-garden and tree plantation"



On Farm Testing (OFT) and Cluster Frontline Demonstration (CFLD)

On Farm Testing and CFLD of following technologies were conducted by KVK during kharif season 2021. The brief details are given below.

Sl. No.	Crop / Technology	Villages	No of farmers	Area (ha)	Yield (q/ha)
1.	Assess the performance of Broad Bed and Ridge Furrow machine for sowing soybean crop	Sagonia	04	1.3	14.0
2.	Integrated disease management in soybean crop under climate smart agriculture	Kachhi Barkheda & Sagonia	04	1.3	22.7
3.	CFLD on Soybean JS-2034	Sukaliya, Kacchi Barkheda, Sagonia	31	15.6	12.4

Frontline Demonstration at Farmers Field with ATMA, Bhopal

Technology	Villages	No of farmers	Area (ha)	Yield (q/ha)
Broad bed machine in maize crop	Daamkheda, Barkheda Baramad, Harrakheda, Dillod (Block Berasia)	05	3.2	45.6
	Raipur, Binapur, Chappar, Devpur, Sagoniya, Kuthar (Block Phanda)	06	3.6	50.2

TRAINING/ TECHNOLOGY TRANSFER

ICAR Sponsored Training

A 3-day ICAR sponsored training programme on "Repair & Maintenance of office, residential buildings including Guest House" was organized during 10-12 August, 2021 in virtual mode for Technical Staff of ICAR institutes. It was participated by 45 technical staff of ICAR institutes associated with works/estate/building maintenance. The aim of the programme was to make the participants acquainted with preparation of work proposals, estimates, planning & design of building including safety measures, Annual Repair Maintenance of Operations (ARMO) – Electrical & Civil etc. Dr. Kanchan K Singh, ADG (FE), ICAR and Dr. A.K. Vyas ADG (HRM) & Training Manager, ICAR, New Delhi were the Chief Guests during the inaugural and valedictory sessions, respectively of the training programme.



Soy-food training

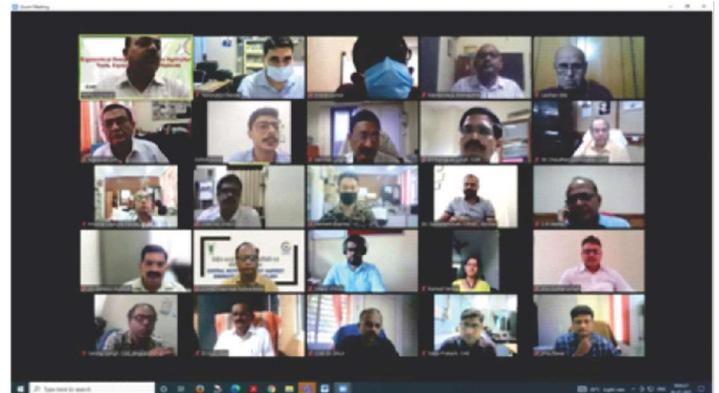
Soy-food training programme was organized during 2-7 August, 2021, which was attended by 10 upcoming entrepreneurs from different parts of the country. The training covered various aspects of soybean processing that included information of different soy-based food products, preparation of soy milk and tofu, introduction to soy processing equipment, project planning, storage



and packaging, marketing aspects of soy products and health benefits of soybean.

Training on Ergonomical Design Guidelines

An online training programme on 'Ergonomical design guidelines for agricultural tool, equipment and work places' was organized during 26-30 July, 2021. It was attended by 28 participants from ICAR institutes, SAUs and National Institute. The training comprised of exposure to holistic approach of designing agricultural implements, and workplaces of tractors and self-propelled implements. The special emphasis was given on ergonomical considerations during the design process with due consideration to anthropometric body dimensions and strength values of Indian workers, safe limits of environmental aspect such as vibration, noise, dust, chemical and ambient conditions. The participants were provided first-hand experience through examples of designing the machinery or workplace using ergonomic principles through participatory learning.



Demonstration of climate resilient agriculture machinery in selected villages of Madhya Pradesh

It is necessary to promote climate smart agricultural machinery to overcome the prevailing adverse effect of climate change. Efforts have been made to promote climate resilient agriculture using no-tillage or minimum tillage practices through demonstrations. The climate smart machinery and technology like BBF, ridge-furrow seeder and herbicide strip applicator-cum-planter have been demonstrated in kharif season 2021 for cultivation of soybean. A total of 6 demonstrations have been conducted in 4 villages (Kachhi Barkheda, Raipur, Sagoniya and Mudia Kheda). The soybean variety

TECHNOLOGY TRANSFER/ HRD



used was JS-2069. The weed count is significantly less in plots sown using herbicide strip applicator-cum-planter (40 weeds/m²) in comparison to sowing with seeder (65 weeds/m²). In addition, average number of pods per plant are significantly higher in plots sown using herbicide strip applicator-cum-planter (127 pods/plant) in comparison to sowing with seeder (46 pods/plant).

Technology Outreach under SCSP

Six training programmes of 3 days duration were organized in the month of September, 2021, which were attended by 120 participants of Raipur and Kanera villages of Bhopal district. The participants were provided practical training on agricultural machinery, renewable energy, soya processing, irrigation water management and skill development in repair, maintenance and operation of agricultural equipment and machinery. Two field days cum distribution programme were also organized benefiting 53 beneficiaries. Under the SCSP component of CRP on Conservation Agriculture Project, 39 units of single row vegetable transplanters, 20 units of multi-fuel cook stoves, 21 units of manual twin wheel hoe and manual peg type dry land weeder, 40 units of manual hand ridger for women and 40 units of manual dibbler were distributed in seven villages of the Sehore district.

Human Resource Development

Name and Designation	Course Title	Duration	Organized by
Dr. Bikram Jyoti Scientist	Machine learning and AI	19-30 July, 2021	IIT Hyderabad and Exulabs
Dr. D. A. Pawar Scientist	Ergonomic Design Guidelines for Agricultural Tools and Equipment	26-30 July, 2021	AICRP on ESA ICAR-CIAE, Bhopal
Dr. P.C. Jena Scientist	Artificial intelligence in the energy sector: opportunities and challenge	9-13 August, 2021	Gyan Ganga Institute of Technology and Science, Jabalpur
Dr. S.K. Giri Principal Scientist	Training Workshop for Vigilance Officers of ICAR Institutes	16-18 August, 2021	NAARM, Hyderabad
Er. Pravitha Scientist	Response Surface Methodology	24-28 August, 2021	NAARM, Hyderabad
Ajesh Kumar V Scientist	Response Surface Methodology	24-28 August, 2021	NAARM, Hyderabad
Dr. P.C. Jena Scientist	Electric Vehicles: Design to Product Development	1-5 September, 2021	A. P. Shah Institute of Technology, Thane
Er. D.K. Dwivedi CTO	E-Governance in ICAR	6-10 September, 2021	ICAR

AWARD/ MEDIA ACTIVITIES

ICAR-CIAE conferred with Sardar Patel Outstanding ICAR Institution Award 2020

The prestigious Sardar Patel Outstanding ICAR Institution Award 2020 for large institutes has been conferred jointly to ICAR-Central Institute of Agricultural Engineering, Bhopal and ICAR- Central Inland Fisheries Research Institute, Barrackpore during 93rd Foundation Day and Award Ceremony of the Indian Council of Agricultural Research (ICAR) held on 16 July, 2021 through Video Conferencing. Dr. C.R. Mehta, Director of the institute received the award virtually from honourable Hon'ble Union Minister of Agriculture and Farmers Welfare Shri Narendra Singh Tomar ji. The award carries a cash prize of Rs. 5 lakh, citation and certificate. Shri Narendra Singh Tomar ji was the Chief Guest and Shri Ashwini Vaishnav ji, Ministry of Railways & Ministry of Electronics and Information Technology and Shri Parshottam Rupala ji Ministry of Fisheries, Animal Husbandry and Dairying were the Guests of Honour. The program was presided over by Dr. Trilochan Mohapatra, Secretary, DARE & Director General, ICAR.

The institute is bestowed with the award for the first time during its history of 45 years, taking into consideration its significant contribution towards the research and development in the fields of agricultural mechanization, post-harvest food processing, irrigation and drainage engineering and energy management in agriculture.

**Media Activities**

Date	Topic	Programme/Channel	Presenter
31 August, 2021	Tractor operated two row settling transplanter for sugarcane seedlings raised in portraits	Makkal TV (Tamil TV channel)	Dr. T. Senthilkumar Principal Scientist
20 September, 2021	कटाई गहाई के उन्नत कृषि यंत्र	Krishi Darshan program of Doordarshan, MP	Dr. Dilip Jat Scientist

AWARDS & RECOGNITIONS/ PUBLICATIONS

Awards and Recognitions

- Dr. S. Mandal, Senior Scientist and Prof. T. K. Bhattacharya have been conferred as winner of the NTPC Green Charcoal Hackathon in Category -1 (Team name: Green Lantern) on 3 September, 2021.
- Dr. Manoj Kumar, Scientist (Agril. Stats) has been awarded with a certificate of excellence in Reviewing from "International Journal of Soil and Plant Science".
- Er. H.S. Pandey, Scientist received best oral presentation award on "Design and development of seed metering mechanism for ginger rhizome" in the International Web Conference on Innovative and Current Advances in Agriculture & Allied Sciences (ICAAAS 2021) held during 19-21 July, 2021.
- Society for Agriculture & Allied Research (SAAR), India felicitated Dr. M. K. Tripathi, Principal Scientist with Life Member.
- Dr. M. K. Tripathi, Principal Scientist received "Certificate of Excellence" by Scientific Planet Society, Dehradun for presentation on "Utilization and Management of Food Wastes" in national webinar held on 15 August, 2021.
- Dr. Chirag Maheshwari, Scientist received Best poster award at international symposium on "Advances in Plant Biotechnology and Genome Editing" & 42nd meeting of Plant Tissue Culture Association.
- Dr. T. Senthilkumar, Principal Scientist has been awarded with a Special appreciation award 2021 'The Tech Samaritans (Covid Warriors (Engineers))' by Institution of Engineers - Coimbatore chapter on 15 September, 2021 during Engineers day Celebration for development and commercialization of touch free hand wash system and automatic sanitizer unit.

Ph.D. Awarded



Er. Satya Prakash Kumar, Scientist has been awarded Ph.D. degree in Farm Machinery and Power for his thesis entitled 'Design and development of a tractor operated sensor based inter and intra row weeder for wider row crops' from IIT Kharagpur under the guidance of Prof. V. K. Tewari, Director, IIT Kharagpur.

Publications

Research Papers

Anasare DA, Chakraborty SK, Mahanti NK and Kotwaliwale N. 2021. Non-destructive assessment of quality parameters of white button mushrooms (*Agaricus bisporus*) using image processing techniques. *Journal of Food Science and Technology*, doi: 10.1007/s13197-021-05219-w.

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Khadatkar A and Kot LS. 2021. Risk estimates of agricultural injuries and fatalities in Central India. *Annals of Work Exposure & Health*, 1-8, doi:10.1093/annweh/wxab059.

Khadatkar A, Mathur SM, Dubey K and Bhushana BV. 2021. Development of embedded automatic transplanting system in seedling transplanters for precision agriculture. *Artificial Intelligence in Agriculture*, 5:175-184, <https://doi.org/10.1016/j.aiaa.2021.08.001>.

Kumar AV, Pravitha M, Srivastav PP, Mangaraj S, Pandiselvam R and Hasan M. 2021. Development of soy-based nanocomposite film: Modeling for barrier and mechanical properties and its application as cheese slice separator. *Journal of Texture Studies*, <https://doi.org/10.1111/jtxs.12636>.

Kumar N, Sawant CP, Sharma RK, Chhokar RS, Tiwari PS, Singh D, Roul AK, Tripathi S C, Gill SC and Singh GP. 2021. Combined effect of disc coulters and operational speeds on soil disturbance and crop residue cutting under no-tillage system in soil bin. *Journal of Scientific and Industrial Research*, 80(9): 739-749.

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Kumar SP, Roul AK, Nandede BM, Jyoti B and Chethan CR. 2021. Development of small tractor operated boom sprayer for effective control of weeds in maize. *Indian Journal of Weed Science*, 53(2): 173-178.

Kumari S, Kumar AV and Dixit A. 2020. Application of nanomaterials in edible packaging for food applications. *Indian Journal of Dairy and Bioscience*, 31 (1-5).

Kumari S and Rani R. 2021. Development of valorized food products from paneer whey. *Indian Journal of Dairy and Biosciences*, 31: 6-12.

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National Conference

As a part of the Azadi Ka Amrit Mahotsav (75th anniversary of India's Independence), ICAR-CIAE, Bhopal organized a National conference on "कोविड-जनित 19 परिस्थितियों में देश के आर्थिक विकास एवं आत्मनिर्भरता में



कृषि अभियांत्रिकी की भूमिका" in online mode during 28-29 July, 2021. Dr. Suresh Kumar Chaudhari, Deputy Director General (NRM & Agricultural Engineering), ICAR, New Delhi chaired the opening ceremony. Dr. Kanchan K. Singh, ADG (Farm Engineering) and Dr. S.N. Jha, ADG (Process Engineering) co-chaired the function. Dr. S.K. Chaudhari in his address, highlighted the contribution of ICAR in the most difficult times caused due to Covid-19 pandemic. He reiterated that modernization of agricultural through engineering interventions provided self-sufficiency in food and helped India in maintaining economic growth under covid-19 situation. Dr. C.R. Mehta, Director, ICAR-CIAE, Bhopal highlighted the objectives of the conference and described it as an important forum to discuss and explore the practical challenges that would emerge post Covid-19 scenarios in the field of agriculture engineering. He added that the role of engineering and technological interventions would play a very important role in achieving the concept of "Aatma Nirbhar Bharat" in agriculture. Dr. Kanchan K. Singh highlighted the importance of agricultural engineering intervention for increasing resource use efficiency. Dr. S.N. Jha told that the conference would certainly provide a big ground to academia, scientists, researchers and research scholars by sharing their experiences and results on various aspects of agricultural engineering technologies for building up the sustainable solutions. The conference had five technical sessions in the different theme areas. Total 58 oral papers and 12 posters presentations were presented in the conference while more than 150 officials having academic and scientific backgrounds from different regions of the country participated in the conference. Dr. R.K. Singh, ADG (Commercial Crops), presided over the valedictory function and Dr. Nawab Ali, Former DDG (Engg), ICAR, was the Chief Guest for the occasion.

EVENTS

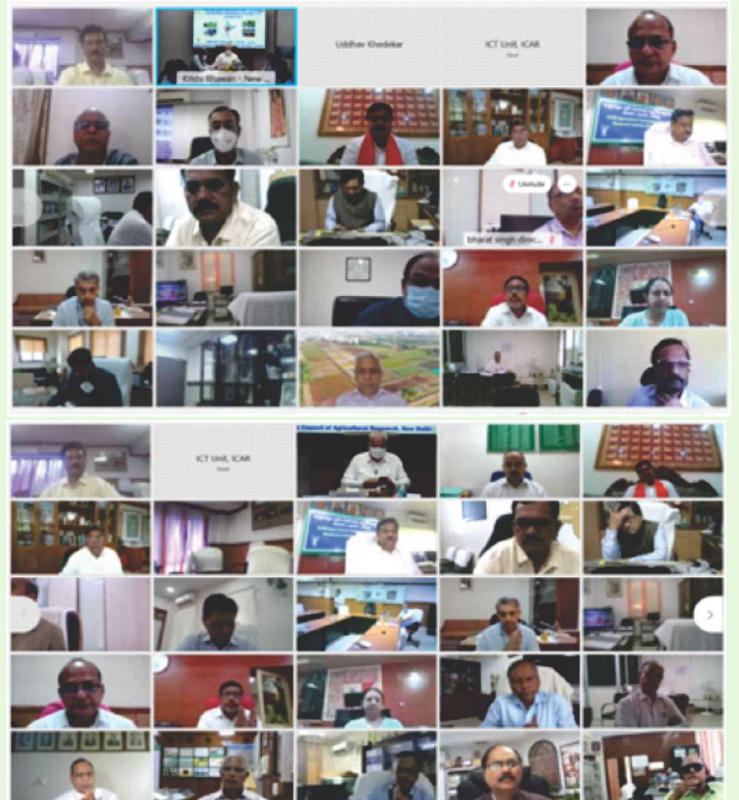
26th Meeting of ICAR Regional Committee No. VII

The 26th meeting of ICAR Regional Committee No. VII was organized by ICAR-CIAE, Bhopal on 25 August, 2021 through Video Conferencing to identify issues related to agriculture, horticulture, animal husbandry and fisheries sector in the states of Madhya Pradesh, Maharashtra, Chhattisgarh and Goa and to provide solutions for those issues.

Hon'ble Union Minister of Fisheries, Animal Husbandry and Dairying Shri Parshottam Rupala inaugurated the meeting in the presence of Hon'ble Union Ministers of State for Agriculture and Farmers Welfare Shri. Kailash Choudhary and Ms. Shobha Karandlaje, and Minister for Farmer Welfare and Agriculture Development, Govt. of Madhya Pradesh, Shri Kamal Patel, Departmental Secretaries and other senior officers of Agriculture, Horticulture, Animal Husbandry & Fisheries Departments from the States of Chhattisgarh, Goa, Madhya Pradesh and Maharashtra. The meeting was also attended by the Vice-chancellors of State Agricultural Universities, Governing Body Members of ICAR, dignitaries from ICAR (DDGs, ADGs and others), Directors of ICAR Institutes and ATARIs of the region.

Dr. Trilochan Mohapatra, Secretary, DARE, GoI & DG, ICAR, New Delhi in his address, briefed about the genesis of the regional committees. He lauded the states of the region for their achievements in agriculture and allied sector in last two years and highlighted some key analysis regarding cropping intensities, farm income, seed replacement rates, livestock populations and yield gaps with reference to four states.

Shri Kailash Choudhary talked about the present challenges encountered by the agricultural sector like reducing availability of water, nutrient deficiency in soils, climate change etc. Shri Parshottam Rupala informed that agriculture research and technology development enabled the country to increase the production of food grains, horticultural crops, fish, milk, eggs etc. by many folds during last 70 years, thus making a visible impact on the national food and nutritional security. Dr. C.R. Mehta, Director, ICAR-CIAE, Bhopal and Member-Secretary of the ICAR Regional Committee-VII proposed the vote of thanks during the inaugural session. Dr. S.P. Kimothi, ADG (Technical Coordination), ICAR proposed the vote of thanks at the end of technical session.



EVENTS

National Webinar on “Roadmap on Agricultural Mechanization in state of Madhya Pradesh”

A national webinar on “Roadmap on Agricultural Mechanization in State of Madhya Pradesh” was jointly organized by Indian Society of Agricultural Engineers (ISAE) Bhopal chapter, ICAR-CIAE and Directorate of Agricultural Engineering, Madhya Pradesh on 21 September, 2021 to celebrate Azadi ka Amrit Mahotsav. The program was graced by 182 participants from research institutes of ICAR, tractor and farm machinery manufacturers, MP state department officials, students and entrepreneurs. Dr. Shrikant Patil, Chairman, CRISP and advisor to the Chief Minister, Govt. of Madhya Pradesh graced the occasion as Chief Guest of the function. The event was chaired by Dr. Kanchan K. Singh, ADG (FE), ICAR, New Delhi and co-chaired by Dr. Indra Mani Mishra, President ISAE.

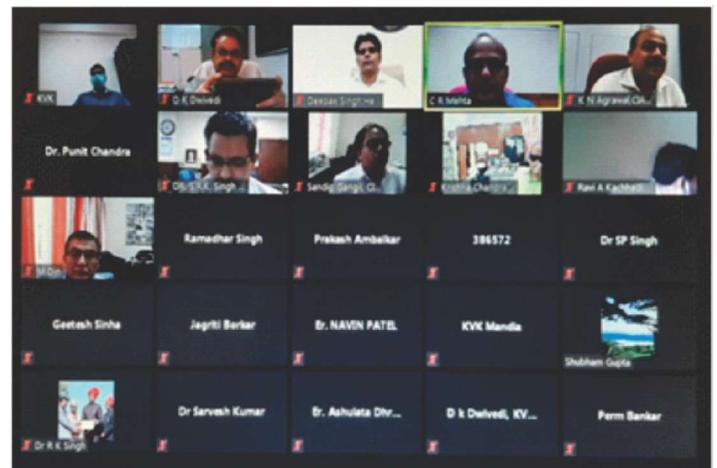


Dr. Shrikant Patil in his inaugural address emphasized the need of skill development in agriculture especially in the field of mechanization. Dr. Kanchan K. Singh, Chairman of the session stressed the need to prepare a road map to enhance farm productivity and to reduce regional disparity in farm power availability and crop burning activities in the state. Dr. C.R. Mehta, Director and Patron, ISAE Bhopal chapter, appreciated the contribution of MP in farm mechanization and emphasized the scope of accelerating farm mechanization in MP due to better average land holding size, availability of workforce in agriculture, presence of R&D institutes and Directorate of Agril. Engg. in the state.

Five presentations on different aspects of agricultural mechanization in MP were made in two technical sessions. During the interaction session, many aspects and issues related to agricultural mechanization and quality issues in the farm machinery manufacturing along with ground level issues were discussed. The programme ended with the vote of thanks proposed by Dr. K. N. Agrawal, Vice President, ISAE, Bhopal Chapter and PC, ESA.

Interface Meeting with KVK Scientists

ICAR-CIAE, Bhopal in collaboration with ICAR-ATARI, Zone-IX, Jabalpur organized an online interface meeting as a part of the “Azadi Ka Amrit Mahotsav” to commemorate 75 Years of India's Independence with KVK Scientists on “Recent Advances in Farm Mechanization and Value Addition in Agriculture” on 18 August, 2021. A total of 130 participants participated in this programme from KVKs including officials from Madhya Pradesh and Chhattisgarh State, NGOs and FPOs. The inaugural programme was held under the chairmanship of Dr. C.R. Mehta, Director, ICAR-CIAE. Distinguished dignitaries included Dr. S.R.K Singh, Director ATARI, Jabalpur, Dr. R. P. Tiwari, DES, CGKV, Durg, Dr. D. P. Sharma, DES, JNKVV, Jabalpur and Dr. S.C Mukherjee, DES, IGKV, Raipur. It was emphasized that cost-effective farm machineries, developed by ICAR-CIAE need to be popularized among the farming community through custom hiring basis in Madhya Pradesh and Chhattisgarh states to reduce the cost of cultivation and increase the farm income.



EVENTS

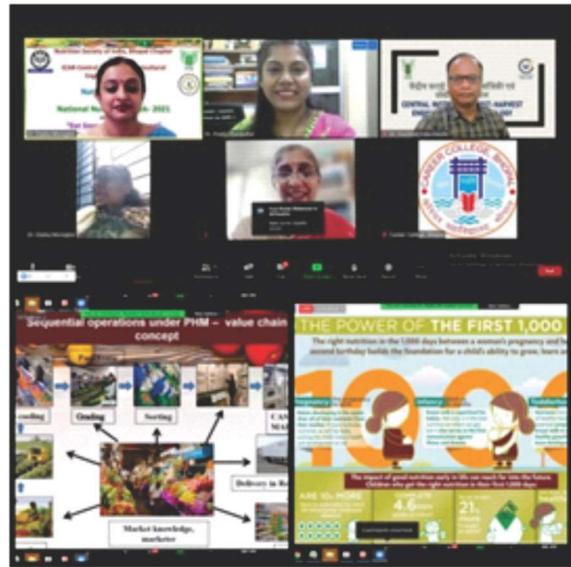
Technical sessions were divided into two parts. Technical Session I covered the deliberations on recent farm machineries/technologies, efficient agricultural water management practices, CIAE Technologies for post-production in agriculture and energy generation and value addition from crop residue. Technical Session II covered the lectures on the role of soybean processing in doubling farmers' income, women friendly farm technologies and use of animal power in agriculture.

Dr. S.R.K Singh emphasized that interface programme should be organized quarterly to minimize the technological gap. He also urged that KVKs should adopt the technologies and promote the CIAE developed technologies among the farmers for their benefits according to their need. Director, ICAR- CIAE urged the participants specially KVKs, State and District level officials to adopt and disseminate the CIAE technologies for the benefit of the farmers and also advised KVK scientists to promote the technologies through custom hiring mode besides encouraging farmers for entrepreneurship development and to promote the straw combine harvester, straw mulcher and straw bailer implements for proper crop residue management.

National Webinar on "Eat Smart Right from Start"

To mark the National Nutrition Week (1-7 September) and Azaadi ka Amrut Mahotsav, ICAR-CIAE in association with Nutrition Society of India- Bhopal Chapter organized a National Webinar on 7 September, 2021. The webinar began with a brief introduction and welcome by Dr. Dipika Agrahar Murugkar, Principal Scientist, ICAR- CIAE, Bhopal followed by Dr Preeti Chandurkar, Convenor, NSI-Bhopal Chapter who explained the role and working of the chapter in Bhopal. This was followed by talks by eminent speakers, Dr Meenakshi Bakshi Mehan, Head, Food and Nutrition Department, MS University Baroda and Dr Nachiket Kotwaliwale, Director, ICAR- CIPHET, Ludhiana.

Dr. Mehan in her talk emphasized key issues related to nutrition in India and gave insightful solutions to the India's biggest problem of mal-nutrition. She said that if the nutrition fraternity works together then it would be a



great step ahead towards eradication of malnutrition. Dr. Kotwaliwale spoke on the role of food processing in improving nutrition. He showcased many technologies and useful equipment for food processing developed by ICAR-CIAE and ICAR-CIPHET. More than 500 participants joined this webinar from all over India.

Webinar for ITI trade holders

A Webinar on "ICAR-CIAE Regional Centre: A Boon for ITI-TATP" was organized for ITI trade holder at CIAE-RC, Coimbatore on 24 August, 2021. The programme was inaugurated by Dr. C. R. Mehta, Director, ICAR-CIAE, Bhopal. Dr. S. Balasubramanian, Principal Scientist & Head, ICAR-CIAE Regional Centre welcomed the participants and enumerated the importance of the webinar. The aim of the webinar was to showcase the opportunities for the ITI trade apprenticeship training programme at CIAE Regional Centre. The programme was attended by various stakeholders viz., Mr. T.V. Rajasekar, Deputy Director, Regional Directorate of Skill Development and Entrepreneurship (RDSD&E), Chennai, Mr. Selvarajan, Deputy Director, Regional Joint Director and Training (RJD&T), Coimbatore, Dr. K. N. Agarwal, Project Coordinator, AICRP on Ergonomics and Safety in Agriculture, ICAR-CIAE and Mr. A. Rajkumar, Vice President, Agricultural Machinery Manufacturer Association.

About 300 participants including ITI Principals, Placement Officers, Training Officers, students in Govt.

EVENTS



ITI's, Scientists, Technical Officers, Technicians, officials from ICAR-CIAE participated in this programme. The selected candidates of ITI-TATP for the year 2021 were also introduced.

हिन्दी पखवाड़ा

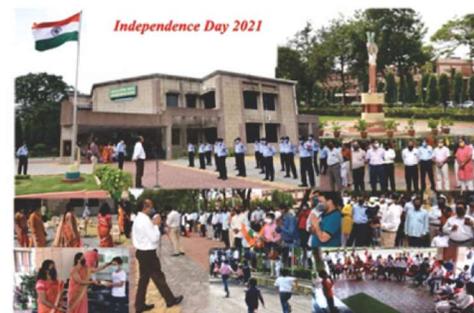
केन्द्रीय कृषि अभियांत्रिकी संस्थान, भोपाल में हिन्दी पखवाड़ा 2021 कार्यक्रम 14 से 28 सितम्बर 2021 तक आयोजित किया गया। दिनांक 14.09.2021 को संस्थान के कार्यवाहक निदेशक डॉ. के. एन. अग्रवाल द्वारा पखवाड़े का औपचारिक उद्घाटन किया गया। हिन्दी पखवाड़ा कार्यक्रम का समापन समारोह 04 अक्टूबर को सम्पन्न हुआ। हिन्दी पखवाड़े के दौरान आयोजित विभिन्न प्रतियोगिताओं जैसे— सामान्य हिन्दी प्रतियोगिता, हिन्दी कार्यक्रम (तकनीकी कर्मचारियों/अधिकारियों के लिए), महिलाओं के लिए हिन्दी प्रतियोगिता, निबंध लेखन प्रतियोगिता (सभी ऑफलाइन), वाद-विवाद प्रतियोगिता,, वैज्ञानिक शोध पत्र व पोस्टर प्रदर्शन तथा अहिन्दी भाषी कर्मचारियों/अधिकारियों के लिए (ऑनलाइन प्रतियोगिता) आयोजित की गईं एवं विजेताओं को पुरस्कार एवं प्रमाण पत्र प्रदान किये गये। इस अवसर पर संस्थान के निदेशक डॉ. सी. आर. मेहता ने हिन्दी को आगे बढ़ाने हेतु किये जा रहे प्रयासों पर प्रकाश डाला और भविष्य में लक्ष्य पूर्वक हिन्दी के विकास हेतु प्रयास करने का आह्वान किया। हिन्दी पखवाड़ा संयोजन समिति के अध्यक्ष डॉ. पी.एस. तिवारी ने हिन्दी के प्रचार प्रसार हेतु किये जा रहे प्रयासों पर चर्चा की तथा हिन्दी पखवाड़ा के दौरान आयोजित प्रतियोगिताओं का विवरण



दिया। संस्थान के निदेशक महोदय ने इस अवसर पर सभी से हिन्दी में अधिकाधिक कार्य करने का आह्वान किया तथा कहा कि सभी वैज्ञानिकगण हिन्दी में बुलेटिन प्रकाशित करें, दूरदर्शन, समाचार पत्र व अन्य ई-माध्यमों से कृषि यंत्रों की जानकारी किसान भाइयों तक पहुंचायें; जिससे किसान लाभान्वित हों तथा कृषि का उत्तरोत्तर विकास हो सके। इस अवसर पर मुख्य प्रशासनिक अधिकारी श्री कुमार राजेश ने भी अपने विचार व्यक्त किए। कार्यक्रम का संयोजन डॉ. पी.एस. तिवारी एवं संचालन डॉ. एस.पी. सिंह ने किया। धन्यवाद प्रस्ताव राजभाषा प्रकोष्ठ के श्री राजेश तिवारी द्वारा किया गया। पखवाड़े के उद्घाटन व समापन सहित अधिकांश कार्यक्रम ऑनलाइन आयोजित किए गए।

Independence Day Celebrated

The 75th Independence Day of the nation was celebrated with pride and enthusiasm. After the flag hoisting, Dr. C.R. Mehta, Director, remembered the martyrs who sacrificed their lives for the nation and called upon all to work sincerely to make the country of their dreams. Further, he highlighted the current issues and challenges before the country at present in context to Indian agriculture and effect of COVID-19 pandemic on agriculture, in particular. He also briefed about major achievements of the Institute during last one year. The SOPs related to COVID-19 were followed during the event.



NEWS FROM PERSONNEL

Staff Promoted



Smt Deepa Shinde
AAO
wef 1 July, 2021



Shri M. Sethi
Sr Technician (T-2)
wef 29 July, 2020



Shri S. Bagde
Sr Technician (T-2)
wef 29 July, 2020



Shri K.L. Barela
Sr Technician (T-2)
wef 29 July, 2020



Shri U.C. Mourya
Sr Technician (T-2)
wef 11 September, 2020



Smt Premlata Chandel
AAO
wef 1 September, 2021



Smt Kaveri Mondal
Personal Assistant
wef 1 September, 2021

Staff Superannuated



Shri M.K. Raut
AAO
31 August, 2021



Shri A.S. Barod
Personal Assistant
31 August, 2021



Shri R.S. Uikey
Technical Officer
30 September, 2021

Chief Editor: Dr. RK Singh, Principal Scientist **Editors:** Dr. Aleksha Kudos, Senior Scientist; Dr. PC Jena, Dr. Ashutosh Pandirwar, Dr. Adinath Kate and Dr. Mukesh Kumar, Scientists

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