



ICAR-CIAE

NEWSLETTER

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Modernizing agriculture through engineering interventions



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From the Director's Desk



Sustainable agriculture using precision farm machinery is a way forward, economically and technologically in uplifting Indian agriculture, which now employs 50% of the total workforce. With decreasing farm sizes and limited net cultivated area, intensive agriculture with higher input-use efficiency will give the much-needed boost to Indian agriculture.

Currently several farmers in India have already started using tractor operated laser guided land levellers and mobile phone based remote control flow pumps, significantly reducing water and overall costs. New and innovative spraying equipment like air assisted sprayers, ULV sprayers, ultrasonic sensor-based sprayers, canopy sprayers and electro-static sprayers are being developed to improve the efficacy of spray and will soon be used by farmers. These equipment will reduce number of sprays and application rate of chemicals on horticultural crops, reducing pesticide requirement and pollution of soil and ground water.

Precision agriculture using GIS/GPS techniques for region specific crop planning, controlled precision application of inputs, multi-functional farm equipment to conserve energy and reduce turnout time, drones for spraying and crop health scouting etc. are areas that need more focus to make a move towards sustainable farming. A step in that direction would be to make these processes and equipment simple and farmer friendly so that they can be used maximally making farming more remunerative.

The future of Indian agriculture is likely to be dominated by precision and cloud data, supported by advanced mechatronics-based technologies like smart tractors, unmanned aerial vehicles, robots for harvesting, agri-bot for covered cultivation, wireless technology etc.

This issue of the newsletter focuses on research and development of equipment like tractor operated rotary till drill with disc type furrow openers for direct sowing of wheat, tractor drawn pneumatic planter for pigeon pea crop, tractor operated garlic weeder for beds, infrared pre-treatment system for pulse milling, portable gasifier with inbuilt tar cracking system etc.

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ICAR-CIAE celebrated its 45th Foundation day which was commemorated by holding a Technology and Machinery Demonstration mela attended by 1500 farmers and 100 farm machinery manufacturers. An Academia-Industry interaction meet as well as an Agri-expo were also organized as a part of the event.

Nutri Fair was organized during the Women's week to create awareness for women empowerment through Nutrition and Livelihood with the theme Good farming - Good food. Around 2000 women farmers, officials and industry attended the event.

In this quarter, ICAR-CIAE has organized a Winter school, conducted Skill Development and Entrepreneurship Development programs besides a few short courses. A special training, orientation and capacity building program for 21 days was organised for newly recruited Assistant Directors (Agril. Engg.) of the Department of Agriculture (Govt. of Bihar). ICAR-CIAE Coimbatore centre also organized a Farmer's meet on Processing Techniques in millets and groundnuts.

We also held the very important Research Advisory Committee meeting, commercialized a few technologies and filed one patent. Several of our colleagues were promoted while some superannuated. I take this opportunity to congratulate them and wish them success in the future.

As Director, ICAR-CIAE, it is my proud privilege to present the first newsletter of this year.

RESEARCH & DEVELOPMENT

Tractor operated rotary till drill for direct sowing of wheat

Rice-wheat cropping system is prevalent in an area of 13.5 million ha across the Indo-Gangetic alluvial plains of North-West India. With the introduction of mechanization in Indian agriculture, mechanical harvesting of rice and wheat is being done by combine harvesters. Due to small window period of 2-3 weeks between rice harvest and wheat sowing, burning of rice straw has become a common practice to clear the fields for sowing of next crop. The burning of paddy straw results in air pollution and destroys living organisms of soil. It is also harmful to the organic matter and nutrients present in the straw. Incorporation of paddy straw in the soil with traditional implements like rotavator, disc harrow, cultivator etc. requires 6-8 operations. Therefore, a tractor (37.5 kW or above) operated rotary till drill with disc type furrow openers has been developed by PAU, Ludhiana centre of AICRP on Farm Implements and Machinery, for direct sowing of wheat in paddy field harvested by combine in a single operation. The machine consists of a disc type straw managing rotor for incorporation of paddy straw and a seeding unit for sowing wheat directly after harvesting by combine. The straw managing rotor consists of 12 toothed discs. These discs are fitted at an angle of 25.3 degree with vertical plane. These rotary discs cut and mix the paddy residue into the soil. The power to the straw managing rotor is provided from tractor PTO through gear box. The seeding unit consists of a seed and fertilizer box, seed tubes, 9 disc type furrow openers and furrow covering roller. The furrow opener discs are powered by a ground wheel. The diameter of

toothed disc, furrow opener disc and furrow covering roller are 560, 400 and 160 mm, respectively. The working width of the machinery is 1.80 m. The effective field capacity of the machinery is 0.26 – 0.30 ha/h at forward speed of 1.75 – 2.00 km/h. It costs Rs. 1,90,000 and cost of operation is Rs. 4230/ha.

Tractor drawn pneumatic planter for pigeon pea

Tractor drawn two row drum type pneumatic planter with fertilizer drill has been developed for sowing of single and multi-seeds at hills. It consists of an aspirator operated by petrol engine, cylindrical drum type metering device, seed ejector, seed delivery tube, shoe type furrow opener, a pair of ground wheels and chain sprocket type power transmission system. Metering device consists of PVC pipe of 90 mm diameter. Ten orifices of 4 mm diameter are drilled at a desired spacing, which operated at a pressure of 2 kPa. The planter can be adjusted for planting seeds on beds at 750, 900, 1200 mm row-to-row and adjustable plant-to-plant spacing. Fertilizer metering device is having vertical plate type with 10 slots of 15x15 mm size. The metering units of both seed as well as fertilizer have been powered by a ground wheel. The field capacity and field efficiency of the pneumatic planter are 0.26 ha/h and 70.90%, respectively during field test. The cost of machine and cost of operation for sowing of pigeon pea on beds are Rs.60,000/- and Rs.546/h, respectively.



RESEARCH & DEVELOPMENT

Tractor operated garlic weeder

Weed control is one of the most labour intensive and time consuming operation in garlic cultivation which is mostly done with manual hand tools. One-fourth of the cost of garlic cultivation is consumed on weeding alone. Hand weeding generally requires about 50-60 man-days/ha. Presently, no mechanical weeder is available for weeding in garlic crop sown on beds. Therefore, a tractor operated garlic weeder has been developed for weeding on beds. The overall dimensions of machine are 2000×1550×1130 mm. It consists of main frame, tyne frame, depth control wheels, link chain, spring tyne and three point hitching system. Tyne frame is connected to the main frame with the help of link chains. The link chain provides the lateral movement and maintains uniform depth to the spring tynes during operation. Depth control wheels are provided for adjustment of depth of weeding. The garlic weeder has been evaluated in the garlic crop sown at 100 mm × 100 mm spacing and at working depth of 45-60 mm. The effective field capacity and field efficiency of the weeder are 0.29 ha/h and 81.2%, respectively at 2 km/h forward speed of operation. The average weeding efficiency and plant damage by garlic weeder are 69.6% and 0.1%, respectively.

**Portable gasifier with inbuilt tar cracking system**

The portable gasifier has been found successful in delivering clean gas with an average tar content of 28 mg/Nm³. The gasifier unit mainly consists of the reactor with inbuilt tar cracking system. The catalysts bed has been made outside the periphery of the oxidation zone so as to maintain

the temperature of catalyst bed around 700° C, which is necessary for maximum cracking of tar. An electrical output of 15-20 kW can be maintained at the maximum air flow rate of 50 m³/h, depending on the composition of biomass and gas.

The unit has been equipped with two gas cleaning columns. In the first stage, gas is passed through a cyclone separator to separate large particles of char and then passed through a cooling column filled with steel sponges. The cooling tower has been jacketed and water is used for indirect cooling. By this method, gas temperature can be reduced to 55° C and major part of tar got condensed here. In the second stage, gas is passed through a column filled with wooden chips, saw dust and finally through a bag filter for separation of smaller char particles. The unit has been tested with 8 mm pellets made from chick pea stalks having average calorific value of 18 MJ/kg. The average gas composition is 19% CO, 8% H₂, 16% CH₄ and 9% CO₂. The char based catalysts made from pigeon pea stalks and loaded with 2% Ni have been used for tar cracking.

**Infrared pre-treatment system for pulse milling**

The removal of husk from the cotyledons is the foremost requirement to utilize any legume in the form of dal. The husk is tightly attached with cotyledons via natural gums and polysaccharides. The bonding strength of such joint is the highest in pigeon pea crop among common pulses. Therefore, proper pre-treatment is

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required for loosening of biological bonds prior to milling. Hydro-thermal treatment is the most common and commercially used for pigeon pea. But, it is time and energy consuming, expensive and have some other quality and safety issues. Therefore, a controlled infrared radiation based pre-treatment system has been developed to reduce time of milling and cost.

The infrared (IR) treatment system consists of infrared heating module with five mid-IR heaters of 2000 W each fastened in mirror polish concave reflector to maintain the appropriate flux. The material conveying deck is driven by vibrating motor fixed at bottom of the deck. The feed hopper maintains a single layer of grain during treatment. The exposure time of grains under infrared is controlled by controlling vibration of conveying deck with the help of a motor. The power density/heat flux can be maintained through upward and downward movement of IR heating module. The machine has an output capacity of 200 kg/h.

The treatment parameters have been optimized for milling of pigeon pea pre-treated with IR system for maximum dehulling efficiency and dal recovery. The optimum operating condition has been found at 10% moisture content (wb), 90 mm distance of IR heater from grain surface and 2 min of exposure time. The treatment has been given to the pre-scratched pigeon pea grains in two passes. This treatment yields dehulling efficiency of 97.20%, dal recovery of 80.64% with 2.12% broken and 13.86% mealy waste losses. The maximum surface temperature of the grain reaches up to 83° C with 0.13 % weight loss

due to moisture. It has been observed that binding force between husk and cotyledon decreased from 17.18 N to 1.23 N after suitable IR treatment.



Scratched pigeon pea IR treated pigeon pea dal

Omega 3 rich flax seed and chia seed fortified eggless chocolate cake



Essential polyunsaturated fatty acids cannot be produced by the human body and must be obtained from the diet. Flax seed (*Linum usitatissimum*) is an

important oilseed crop which is high in fiber and is a significant source of -linolenic acid (omega 3 fatty acid) in the diet of vegetarian people. Flaxseed consumption in the diet prevents serious diseases like coronary diseases, cancer, diabetes, obesity, gastrointestinal, renal and bone disorders. Chia (*Salvia hispanica*) seeds are rich in protein, dietary fiber, minerals, vitamins and antioxidants. Chia gum is also an important food ingredient due to its emulsifier and stabilizer potentials. To utilize nutrients in flax seed and chia especially -linolenic acid, chocolate cake was fortified with flaxseed meal and chia gel. Eggless cakes were developed using chia gel as egg replacer; whole wheat flour cake and wheat flour along with 5% flaxseed meal. The batters and cake were tested for physical, colour, rheological, textural, nutritional and organoleptic properties to study the effect of chia gel as egg replacer with wheat flour; combination of wheat flour, flaxseed meal and egg replacer in and comparison with whole wheat flour cakes with eggs. Texture analysis of the batter showed that the firmness, consistency, cohesiveness and index of viscosity of wheat flour cake along with 5% flaxseed meal

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were similar to the control cake. Wheat flour cake along with 5% flaxseed meal contained the highest σ -3 fatty acids (7.84% of total fatty acids present). Test cakes showed higher phenolics, flavonoids and anti-oxidants compared to the control cake. Sensory analysis showed that the acceptability of test cakes especially of wheat flour cake along with 5% flaxseed meal was high (8.2 on the 9 point hedonic scale). Therefore whole wheat eggless cakes with chia and flax seeds are a tasty and good way to boost the omega-3 fatty acid and antioxidants in the diet.

Technologies Licensed

The following 5 CIAE technologies were commercialized through licensing to M/s Manak Industries, Bhopal on 7 March, 2020:

- ICAR-CIAE Hand held Vegetable Transplanter (Single row)
- ICAR-CIAE Hand held Vegetable Transplanter (Two row)

- ICAR-CIAE manually operated Portray Type Nursery Seeder
- ICAR-CIAE manually operated Pull Type Three Row Planter for Millets- Multi-crops (Model I-Inclined Plate Type)
- ICAR-CIAE manually operated Pull Type Three Row Planter for Millets- Multi-crops

Agri-Business Incubation Unit

The Institute extended Institute's technology incubation facility to following three upcoming entrepreneurs:

Technologies	Incubatee/ Firm	From
Post harvest mechanization package for Banana central core	M/s Ponmani Agro Services, Coimbatore	31 Jan, 2020
Modern dal mill for nursery raising	Mr. S Khandelwal, Bhopal	10 Feb, 2020
Covered cultivation technology	Mr. Rahul Singh, Bhopal	27 Feb, 2020

SUCCESS STORY

Grading of fruits and vegetables is one of the most important post harvest operation. It adds value to the product and gives better economic return to the producer. Manual grading is an expensive and time consuming process due to non-availability of labours during peak season. Shri Madan Mohan Patidar, proprietor of M/s Sanwaria Herbal and Musli Farm, Misrod, Bhopal produces about 250 tonne of onion from 15 acres of land. Manually, 500 man-days will be required for grading 250 tonne of onion (@ 500 kg/ day/ person) at total labour cost of Rs. 2.0 lakhs (Rs. 400/man-days). Under the Mera Gaon Mera Gaurav (MGMG) programme, fruit-cum-vegetable grader of 2 t/h capacity developed by ICAR-CIAE, Bhopal was demonstrated to Shri Patidar for grading of onion, sweet lemon and guava etc. The grader was installed at M/s Sanwaria Herbal and Musli Farm, Misrod, and run for grading of 250 tonne of onions in the farm. The grader could grade 250 tonne of onion in 16 days considering 8 h of operation per day. This helped in saving time, labour and cost of grading. The cost of operation of the grader was Rs. 300/t and total cost was Rs. 75000/- for grading of 250 tonne of onion. Hence, Shri Patidar saved Rs.1,25,000/- (63%) by using the grader. He was highly satisfied and impressed with the performance of grader. The cost of onion without grading was Rs. 4000/t. Moreover, the price obtained for graded onion was Rs. 7000/t. Shri Patidar gained a net profit of Rs.7,50,000/- from 250 tonne of graded onion. The graded uniform size onions fetched more prices in the market and earned benefit. Thus, the overall benefit from marketing of graded onion using the ICAR-CIAE Fruit-cum-Vegetable Grader for the farmer was Rs.7,50,000/-.



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Patent Application

High speed planting mechanism for soybean and like (Inventors-Manoj Kumar and RK Sahni, Scientist). E-application No. 202021010795 dated 13 March, 2020.

Academia-Industry Interaction Meets and Demonstrations

Events	Date	No of Manufacturers
Manufacturers meet with Agricultural Machinery Manufacturers of MP at ICAR-CIAE Bhopal	25 Jan, 2020	60
Academia-Industry Interaction Meet on 45th Foundation Day of ICAR-CIAE	14 Feb, 2020	125
Academia-Industry Interaction Meet at Junagadh, Gujarat in collaboration with Junagadh Agriculture University	19 Feb, 2020	125



Participation in Exhibitions

ICAR-CIAE participated in following Agri-fairs / Exhibitions for promotion and creation of awareness on CIAE technologies among stakeholders.

- Krishi Mela, KVK, Murshidabad, West Bengal (10-13 Jan, 2020)
- Kisan Mela, ICAR-IIPR, Kanpur Regional Centre, Phanda, Madhya Pradesh (10 Feb, 2020)
- Kisan Mela 2020, Junagadh Agriculture University, Junagadh (19 Feb, 2020)
- Banana Expo/ Hort Expo, Kalaiaragam, Tiruchirapalli, Tamil Nadu (22-23 Feb, 2020)
- Krishi Mela, Namakkal, Tamil Nadu (23-24 Feb, 2020)
- Rashtriya Krishi Mela, IGKV, Raipur, Chhattisgarh (23-25 Feb, 2020)
- Krishi Vigyan Mela, ICAR-IARI, Pusa, New Delhi (1-3 March, 2020)



Media Activities

Date	Topic	Programme/Channel	Presenter
8 Jan, 2020	सिंचाई की उन्नत विधियाँ	Krishi Darshan, DDK, Bhopal	Dr. CK Saxena
14 Jan, 2020	कृषि विज्ञान केन्द्र की उपयोगिता एवं महत्व	Krishi Darshan, DDK, Bhopal	Er. DK Dwivedi
20 Jan, 2020	सोयाबीन प्रसंस्करण एवं लघु उद्योग की स्थापना	Krishi Darshan, DDK, Bhopal	Dr. LK Sinha
4 Feb, 2020	कृषि यंत्रों में सुविधा एवं सावधानी	Krishi Darshan, DDK, Bhopal	Dr. RR Potdar

TRAINING

Trainings Organized

CAFT Training

ICAR sponsored Advanced Faculty Training programme on "Rapid Detection Techniques for Quality Evaluation and Safety of Foods" was organized during 13-22 January, 2020. Dr. Punit Chandra, Principal Scientist was the Course Director and Mr. Muzaffar Hasan, Scientist, and Mr. Chirag Maheshwari, Scientist were Course Co-Directors of the programme. Eight participants from the National Agricultural Research System attended the programme. The aim of the training was to give an overview of recent progress in rapid detection methods and several nondestructive techniques involved in safety and quality evaluation of food products. The training curriculum included Electrophoretic technique in food quality, Hyperspectral imaging in quality assessment, Chromatography techniques in food analysis, Role of biosensors, Dye detection tests for food spoilage, Smart packaging and HACCP & FSSAI regulation. The trainees were exposed to different molecular techniques like SDS-PAGE and Dot immune assay during the visit to Bhopal Memorial Hospital Research and Center (BMHRC). During their visit to Indian Institute of Science Education and Research (IISER), trainees were explained about advanced instruments like Nuclear Magnetic Resonance (NMR), SC-XRD (Single-crystal- X-ray Diffraction), GC- MS (Gas Chromatography-Mass Spectrometry), UPLC (Ultra Pressure Liquid Chromatography), MALDI-TOF (Matrix-Assisted Laser Desorption/Ionization-Time of Flight), etc. The trainees got information about the process of checking the adulteration in raw milk, pasteurized milk, and milk-based products during their visit to Sanchi Milk Plant.



Winter School on Precision Agriculture

ICAR sponsored winter school on "Application of Sensors, Instrumentation, Artificial Intelligence and Machine Learning in Precision Agriculture" was organized during 14 February - 5 March, 2020. A total of 25 participants of 10 disciplines from 12 states attended the winter school. The programme was formally inaugurated by Dr. KN Agarwal, Director (In-charge), ICAR-CIAE and Dr. RC Maheshwari, Ex ADG (Technical Coordination and Zonal Committees), ICAR. Dr. NS Chandel and Dr. Bikram Jyoti, Training Co-coordinators of the program, coordinated the training programme. The trainees were exposed to sensors, advanced instrumentation system and different deep learning and machine learning algorithms used in agricultural production systems. The hands-on training sessions were also given on chip or embedded system boards like Arduino and Raspberry Pi. The applications of image based techniques and hyperspectral remote sensing technologies were also demonstrated in various field operations like seed bed preparation, sowing/ planting/ transplanting, spraying, weeding, harvesting and threshing. The trainees also visited the Eicher Tractors for industrial exposure.

During valedictory function on 5 March, 2020, Dr. PS Tiwari, Course Coordinator presented a brief report on the training programme. Dr. CR Mehta, Director, ICAR-CIAE released training manual of the programme and distributed certificates to the participants. Dr. Mehta in his valedictory speech urged the participants to share the knowledge gained by them during the training to other faculties and students and make an attempt to



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apply it to automate Indian agriculture with low cost smart technologies for doubling farmer's income.

Orientation Training for Assistant Directors (Agril. Engg.) of Govt. of Bihar

ICAR-CIAE organized orientation training cum capacity building programme for Assistant Directors (Agril. Engg.), Department of Agriculture, Govt. of Bihar during 15 January - 4 February, 2020. Fifty one Asst. Directors (Agril. Engg.) participated in the training. Dr. KP Singh, Dr. AK Roul and Dr. Bikram Jyoti were the training coordinators. The training program was designed to enrich the knowledge of participants in farm machinery, irrigation and drainage, agricultural processing and energy in agriculture. The lectures were supplemented by field visits and on-farm demonstrations. Demonstrations were arranged on implements required for seed bed preparation, sowing/ planting/ transplanting, spraying, interculture, harvesting and threshing operations. The participants also interacted with Mr Rajiv Choudhary, Director, Directorate of Agricultural Engineering, Govt. of MP. The participants were also given yoga training under guidance of Ms. Rita Chowdhary during the period. Moreover, women friendly tools/ implements, conservation agriculture machinery and bullock drawn machinery were also demonstrated. The participants were also briefed about renewable energy technologies, greenhouse cultivation and soybean processing.



Training on Protected Cultivation

A training program on "Entrepreneurship and leadership development program on protected

cultivation (vegetable)" was organized during 10-15 February, 2020. This was a self-sponsored training programme for nine progressive farmers interested in Protected Cultivation Techniques and to avail subsidy from the National Horticulture Board. The training schedule included class room lectures and practical classes on selection of protected cultivation practices, micro-irrigation systems in protected structures, crop management practices, quality nursery raising techniques, post harvest management of horticultural crops and Government Schemes in protected cultivation technology. Field visits to a few farmers' fields were also arranged where such techniques are in operation.



Refresher training programme for established agripreneurs

Refresher training programme on farm mechanization for established agripreneurs under AC & ABC scheme of MANAGE, Hyderabad was organized during 17-20 February, 2020. A total of 28 agripreneurs from Madhya Pradesh and Maharashtra participated in the training. Training programme formulated to impart the knowledge in the areas of farm machinery, irrigation and drainage, agricultural processing



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and energy in agriculture. Demonstration on women friendly tools/ implements, conservation agriculture machinery and bullock drawn machinery was also done for the participants. Visit to Precision Farming and Development Centre and Soybean Processing Plant was also arranged.

CIAE Regional Centre, Coimbatore also organized this training during 21-24, February 2020 and participated by 21 established agripreneurs. Dr. V Venakatasubramanian, Ex ADG, ICAR- SBI while delivering the inaugural address highlighted the "Skill India" concepts, and importance of entrepreneurship models for agricultural business for viable income generation and livelihood. The training programme included 16 lecture modules and mainly covered topics *viz.* the status of agril. mechanization; machinery for rice, banana, sugarcane, horticulture, millets and other field crops; agro-processing and value addition; demonstration of CIAE-RC marketable technologies; industry visits; protocols and cost economics and business promotion of custom hiring operations.



Entrepreneurship and Leadership Development Programme for Horticulture Entrepreneurs

ICAR-CIAE has been recognized as one of the training centre for training on post-harvest management of horticultural crops for prospective entrepreneurs of National Horticulture Board (NHB). The model of Entrepreneurship and Leadership Development Programme of NHB requires that farmers, entrepreneurs and applicants desirous of availing



benefit under its schemes have to undergo a 6-days training programme. The training titled "Entrepreneurship and Leadership Development Programme on PHM-Cold Room, Cold storage, Ripening Chamber and Reefer-van for Horticulture Entrepreneurs (NHB Schemes)" was organized during 17-22 February, 2020. Total 12 participants participated in the training from states of Maharashtra, Rajasthan and Jharkhand. The training programme included theory classes and demonstration/practical on cold storage, cold room, ripening chamber, reefer van and other processing aspects of horticultural commodities. Different schemes, guidelines of NHB and marketing aspects were also covered in the training programme.

Hands-on Training for Farmers

Two hands-on training on Improved Agricultural Implements and Machinery were organized for farmers under CRP on FM & PF during 13-15 February, 2020 and 18-20 February, 2020. About 184 farmers from Maharashtra, Madhya Pradesh and Tamil Nadu participated in the training. Participants were briefed on updates of technologies on farm mechanization and agro processing. The hands-on trainings and demonstrations of improved agricultural technologies were conducted. Visits to different laboratories were also arranged to get an exposure of different available agricultural technologies. Demonstration of implements for seed bed preparation, sowing/ planting/ transplanting, spraying, interculture, harvesting and threshing operations were arranged.

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Entrepreneurship Development Programme on Custom Hiring

Three Entrepreneurship Development Programmes on 'Custom hiring of agricultural machinery as a business enterprise', sponsored by Govt. of MP were organized during 1-7 January, 2-8 February and 1-7 March, 2020. A total of 91 participants including 14 women participants participated in this training programme. Of these, 71 custom hiring centres have been established in different districts of Madhya Pradesh.



Demonstration of technology package for raisins production

A package of technology developed at institute for the production of raisins without use of any chemical in the pre-treatment and entire process of raisin making has been tested and demonstrated at NRC on Grapes, Pune during 2-5 March, 2020 in the presence of Director, NRCG, scientists and other staff. The technology package consists of grape de-bunching machine and abrasive pre-treatment equipment. The demonstration included de-bunching of grapes, sorting and washing, abrasive pre-treatment to berries and drying of treated berries. The package of technology was also demonstrated to 16 farmers from Maharashtra and Karnataka states at NRCG, Pune.



Demonstration of Mobile Food Processing Unit of IIFPT

Demonstration of "Mobile Food Processing Unit for Farmers" was organized on 2 March, 2020 at village Khurchani, Ratibad, Bhopal in collaboration with Indian Institute of Food Processing Technology (MoFPI), Thanjavur (Tamil Nadu) and M/s. Solidaridad. More than 200 participants including farmers, entrepreneurs and undergraduate students of local agriculture college participated in the demonstration. The main objective of this event was to demonstrate onsite processing and value addition to locally grown fruits & vegetables such as tomato, onion, ginger, garlic etc. The processing of tomatoes for making tomato ketchup was demonstrated using the equipment installed on the mobile van costing about Rs. 40 lakhs. Such units are likely to provide more income to the farmers at their villages enabling them to get better price of their agro-produce.



ICAR sponsored HRD programme

ICAR sponsored HRD programme on "Repair and Maintenance of Office/ Residential Building including Guest houses" was organized during 21-23 January, 2020 for Technical/ Administrative staff members of ICAR institutes/ HQ associated with works/ estate management. A total of 29 staff members from 27 different ICAR institutes participated in the training. The major topics covered in the training were administrative procedures for works proposals; introduction and process for work proposals, preparation of estimate, selection of agency, monitoring of ongoing works; annual repair maintenance of operations - electrical and substation etc.; green building concept and design; development, commissioning and maintenance of roof top solar system and planning and design of building including safety measures.

KVK NEWS

KVK News

KVK, Bhopal organized following training programmes:

Training Title	Dates	No. of farmers/ beneficiaries
Stitching and Tailoring for SC-BPL women under SCSP programme	20 Jan - 5 Feb, 2020	45
Greenhouse Operators under PMKVY	27 Jan - 20 Feb, 2020	20
Harvester Machine Operators under PMKVY	27 Jan - 20 Feb, 2020	20
Integrated Horticulture Development Mission	27 Feb, 2020	20
	Total	105



Celebration of Rastriya Kishori Diwas

Rastriya Kishori Diwas programme was celebrated at Panchayat Bhavan, village- Nipaniya Jat on January 24, 2020 and participated by 35 beneficiaries. A lecture on 'Utilization of soybean in daily life' was delivered by SK Bharti (ACTO).

Visit of the QRT

The Quinquennial Review Team (QRT) of KVKs under ATARI, Jabalpur (Zone-IX) visited KVK of the institute on 4 February, 2020. The team was headed by Dr. Gaya Prasad, former Vice Chancellor, SVP UA&T Meerut. The team visited custom hiring centre at Kachhibarkheda and Nutri-smart village at Prempura.



SCSP ACTIVITIES

Activities organized under SCSP Programme

Following programmes/ activities were organized under SCSP programme:

Programme	Date	Place	No. of beneficiaries
Distribution of agricultural equipment (total 584 equipment)	2 and 4 Jan, 2020	Kurana and Barodi	154 farmers
Food processing and nutrition mela, demonstration of implements and distribution of agricultural equipment (hand operated/ pedal operated, total 162 equipment)	17 Jan, 2020	Balampur	100 farmers
Training programme on Sewing & Embroidery	20 Jan - 5 Feb, 2020	ICAR-CIAE	46 women from Sukaliya and Kurana villages
Beauty parlour training	10-20 Feb, 2020	ICAR-CIAE	36 women from different villages
Farmers' meet on processing techniques in millets and groundnut	20 Feb, 2020	ICAR-CIAE RC, Coimbatore	50 farmers
Training on food processing and value addition for nutritional and food security	24-29 Feb, 2020	ICAR-CIAE	68 women from different villages
Sewing machine distribution (total 43 sewing machines)	9 March, 2020	ICAR-CIAE	43 women from different villages



REPORT/ PUBLICATIONS

Human Resource Development

Dr Ajesh Kumar V, Scientist and Er. Ajita Gupta, Scientist attended 10-days CAFT training programme on "Rapid detection techniques for quality evaluation and safety of foods" organized at ICAR-CIAE, Bhopal during 13-22 January, 2020.

Dr SP Singh, Chief Technical Officer and Shri DK Jain, Chief Technical Officer attended training on "Repair and Maintenance of Office, Residential Building including Guest Houses" at ICAR-CIAE during 21-23 January, 2020.

Shri PV Sahare, LDC & Member, IJSC attended Capacity Building Training Programme for CJSC Members at NAARM, Hyderabad during 27-31 January, 2020.

Shri Mustafa Kamal, AAO; Shri Sanjay Kumar Singh, AFAO; Ms Swati Singh, Assistant; Shri Kumar Gaurav and Shri CP Mishra attended training on "Administrative and Financial Management" at ICAR-CIFT, Kochi during 5-11 February, 2020.

Mrs Jessy Joy, Personal Assistant; Ms Kaveri Mondal, Stenographer (Grade-III) and Shri K Shankar, Stenographer (Grade-III) attended Training on "Enhancing Efficiency and Behavioural Skills" at ICAR-NAARM, Hyderabad during 24-29 February, 2020.

Awards & Recognitions**ISAE Awards**

The following scientists of ICAR-CIAE, Bhopal were awarded by Indian Society of Agricultural Engineers for their contribution in the professional field during the 54th Annual Convention and International Symposium on "Artificial Intelligence based Future Technologies in Agriculture" held at Pune during 7-9 January, 2020.

Scientist	ISAE Award
Dr. Nachiket Kotwaliwale, Head, APPD	ISAE Fellow
Dr. KVR Rao, Principal Scientist	ISAE Fellow
Dr. KN Agrawal, PC, AICRP on ESA	ISAE Commendation Medal
Dr. S Mangaraj, Principal Scientist	Best Book Award
Dr. PC Jena, Scientist	ISAE-Distinguished Service Certificate
Dr. NS Chandel, Scientist	JAE Best Paper Award 2019

Other Awards

Dr. RK Singh, Principal Scientist conferred with Fellow of the Indian Water Resources Society (IWRS), Roorkee, Uttarakhand.

Dr. Adinath Kate, Scientist received "Governors Research Award-2019" by Hon. Governor Uttarakhand state for his work "Development and Performance Evaluation of Apricot Pit Decorticator" carried out at GBPUAT Pantnagar during M.Tech degree.

Er. Swapnaja K Jadhav, Scientist received "Young Scientist Award" in Agriculture Discipline in the 35th MP Young scientist Congress held at Bhopal during 28-29 February, 2020

Recognitions

Dr. Nachiket Kotwaliwale has been nominated as member of Scientific Panel on Labelling & Claims/ Advertisement by the FSSAI.

Dr. PC Jena has been honoured with Quarterly Franklin Membership (Membership ID#IE67957) by London Journals Press for the paper entitled "Tar and Particulate Matters Removal from Producer Gas by Using Oily Organic Filter Media".

PUBLICATIONS**Research Papers**

Agrahar-Murugkar D, Dixit-Bajpai P and Kotwaliwale N. 2019. Rheological, nutritional, functional and sensory properties of millets and sprouted legume based beverages. *Journal of Food Science and Technology*, <https://doi.org/10.1007/s13197-019-04200>

PUBLICATIONS

Chakraborty SK, Kotwaliwale N, Navale SA. 2020. Selection and incorporation of hydrocolloid for gluten-free leavened millet breads and optimization of the baking process thereof. *LWT-Food Science and Technology*, <https://doi.org/10.1016/j.lwt.2019.108878>.

Hasan M, Ajesh KV, Maheshwari C and Mangraj S. 2020. Biodegradable and edible film: A counter to plastic pollution. *International Journal of Chemical Studies*, 8(1), 2242-2245.

Jadhav ML, Din M, Nandede BM and Kumar M. 2020. Engineering Properties of Paddy and Wheat Seeds in Context to Design of Pneumatic Metering Devices. *Journal of the Institution of Engineers (India) : Series A*, <https://doi.org/10.1007/s40030-019-00430-7>.

Kate AE, Sutar PP. 2020. Effluent free infrared radiation assisted dry-peeling of ginger rhizome. A feasibility and quality attributes. *Journal of Food Science*, 85(2), 432-441.

Kumar M and Sahni RK. 2019. Flow accuracy of existing 10 mm flute diameter feed roller for high speed sowing of soybean. *Pantnagar Journal of Research*, 17(3), 246-249.

Kumar M, Sarangi A, Singh DK, Sudhishri S, Rao A R and Kumar M. 2020. Water productivity of wheat cultivars under saline irrigation and foliar potassium fertigation. *International Journal of Chemical Studies*, 8 (1), 764-768.

Muthamil Selvan M and Mani I. 2020. Development of power-operated continuous-feed green-pea sheller. *Indian Journal of Agricultural Sciences*, 90(2), 396-400

Books

Santra P, Singh RK, Poonia S and Jain D. 2020. *Solar Energy in Agriculture: Principles and Applications*. New India Publishing Agency, New Delhi. ISBN. 9789387973848, 247 p.

Kumar V, Kumar P, Hasan M, Mangaraj S, Sahani RK, Chandel NS and Imarn S. 2019. *Objective type questions on Farm Machinery & Power and General Agriculture*. Jain Brothers, New Delhi. ISBN 978-81-944137-0-7.

Technical bulletins/manuals

Jena PC, Pandey KC, Gangil S, Bhargav VK, Mandal S and Jadhav S. 2020. Annual Progress Report, ICAR-CIAE, Bhopal Centre of AICRP on EAAI. Technical Report No. CIAE/AEP/2020/509.

Singh D, Kumar M, Magar AP and Din M. 2020. *Malwa pathaar shetra me pashu chalit upyogi yantra*. Technical Bulletin No. CIAE/AMD/2019/288.

Tiwari PS, Sawant CP and Gautam M. 2020. Research Highlights. CRP on FM & PF. Technical Bulletin No. CIAE/CRP on FM & PF/ 2020/292.

Tiwari PS, Sawant CP and Gautam M. 2020. Progress Report. CRP on FM & PF and MIS, ICAR-CIAE, Bhopal. Technical Report No. CIAE/CRP on FM & PF/ 2020/508.

Popular articles

Kate A, Hasan M and Maheshwari C. 2020. Post-harvest processing and value addition of peas. *Scientific India*, 8(1), 31-33.

Hasan M, Hamad R, Wahid A and Maheshwari C. 2020. Nutritional profiling: connecting science to consumer. *Acta Scientific Nutritional and Health*. 4(1). ISSN: 2582-1423.

Singh RK. 2019. *Varsha jal sanrakshan evam prabandhan*. *Ikshu*, 2, 32-33.

Tripathi MK. 2020. Diet, gut microbiota and human health, *Scientific India*, 8(1), 36-38.

Yumnam J, Tiwari RK, Chauhan SK and Din M. 2019. Application of composite materials for manufacturing components of improved equipments – A review. *CAU Farm Magazine*, 9 (3), 24-25.

PUBLICATIONS/ REPORT

Yumnam J, Tiwari RK, Satpathy SK, Din M and Chauhan SK. 2019. Potential improved equipment for adoption in north eastern region. CAU Farm Magazine 9 (3), 11-13.

Leaflets published

Kumar M, Singh D, Magar AP and Din M. 2020. *Malwa pathaar me pashu chalet upyogi yantra*. Ext. Bulletin No. CIAE/AMD/2019/106.

Sawant CP and Pandey HS. 2020. Tractor operated ginger planter. Extension Bulletin No. CIAE/AMD/2019/105.

Sawant CP, Pandey HS and Patel Anurag. 2020. Tractor *chalit adarak buwai yantra*. Extension Bulletin No. CIAE/AMD/107.

Participation in Conferences

Name	Conference/ Workshop	Date	Place
AE Kate; Ajesh V; AK Roul; Bikram Jyoti; CD Singh; DA Pawar; Dilip Jat; LK Sinha; Mukesh Kumar; NS Chandel; PC Jena; Ramadhar Singh; Ravindra Naik; RS Singh; Sandip Gangil; Sandip Mandal; SK Giri; Subir Kumar Chakraborty; Swapnaja Jadhav; Sweeti Kumari; Syed Imran S; T Senthil Kumar; YA Rajwade	54 th annual convention of ISAE and International symposium on Artificial Intelligence based future technologies in Agriculture	7-9 Jan, 2020	Pune, Maharashtra
CP Sawant Ajita Gupta RK Singh	Resource Conservation for Soil Security and Jalshakti: Farmers perspective in Bundelkhand (RCSSJ-2020)	3-5 Feb, 2020	ICAR-IISWC RC, Datia, Madhya Pradesh
N Kotwaliwale	International conference on Pulses as the Climate Smart crops: Challenges and Opportunities	10-12 Feb, 2020	Bhopal
MK Tripathi	National Conference on Omics for Food, Health and Environment (OFHE-2020)	14-15 Feb, 2020	DDU, Gorakhpur
Ravindra Naik	Rural India Business Conclave – Road Map for Rural Innovation	27 Feb - 3 March, 2020	ICAR-CPCRI, Kasargod, Kerala
VK Bhargav MK Tripathi Manish Kumar	2 nd National seminar on Advances in Chemical Engineering and Science (ACES-2020)	28-29 Feb, 2020	IISER, Bhopal
Swapnaja K Jadhav AE Kate	35 th MP Young Scientist Congress	28-29 Feb, 2020	Indore
LK Sinha	Workshop on Geological Indicator under One District One Crop	6 March, 2020	RCVP, Bhopal
Ravindra Naik	National Conference on Role of Agricultural Engineering Innovations in Doubling Farmer Income	12-14 March, 2020	CAE, UAS, Raichur

EVENTS

Institute Celebrates 45th Foundation Day

The Institute celebrated its 45th foundation day on 15 February, 2020. On this occasion, institute initiated the tradition of organizing **Prof. AC Pandya Memorial Lecture** in the memory of its founder Director to recognize his contribution for laying the foundation of ICAR-CIAE as a pioneering agricultural engineering institute at national and international level. The scientists, officials and staff of the Institute participated in the celebration.

Chief Guest of the function, Dr. RC Maheshwari, Former Vice-Chancellor, Sardarkrushinagar Dantiwada Agricultural University (SDAU), Gujarat delivered the first Prof AC Pandya memorial lecture. He stated that Prof. Pandya was a visionary and had great leadership skills, professional ethics and values. He was highly disciplined and inculcated same values among young scientists. Dr Maheshwari also applauded the Institute's accomplishments during its journey of 44 years and stated that the Institute has successfully developed many useful agricultural engineering technologies which have helped farming community in reducing drudgery, increasing productivity and enhancing income. Dr. AK Patra, Director, IISS, Bhopal & the Guest of Honour of the function appreciated the research accomplishments of the ICAR-CIAE and its efforts to reach the stakeholders. He also congratulated the entire team of CIAE on this occasion.

Dr. P S Tiwari, Acting Director, ICAR-CIAE chaired the function and briefed about the achievements of the institute during last one year. As per the tradition, nine institute officials who completed 25 years of their glorious services to the institute were felicitated. The officials and staff members who brought laurels to the institute by winning national and international awards/recognitions for their contribution in research, teaching and sports during the year were also felicitated in the programme. The awards were also distributed to winners of best research paper, poster competition etc. organized on the occasion.

Earlier, in the day, statuette of Prof AC Pandey, Ex-Director of the Institute was inaugurated, a souvenir to Institute from Dr RC Maheshwari, former Vice-Chancellor, SDAU, Gujarat.

On 14 February, 2020 to commemorate the Foundation Day, the Institute organized *Kisan Sanghoshti* and Technology & Machinery Demonstration Mela in association with Directorate of Agricultural Engineering, Govt. of MP at institute premises. Dr. RC Maheshwari, Ex Vice Chancellor, SDAU, Gujarat and Chief guest on the occasion emphasized on adoption of farm mechanization by small and marginal farmers to double the farmer's income. Shri Rajeev Choudhari, Director, DAE, Govt of Madhya Pradesh, Bhopal, briefed on custom hiring model for small and marginal farmers. Dr VP Singh, Director, ICAR-NIHSAD, Bhopal, Shri OP Chouksey, President, MP Farm Machinery Manufacturing Association were also present on the occasion. Field demonstrations of successful ICAR-CIAE developed technologies were conducted and farmer's interaction meet was also held. About 1500 farmers, 100 agricultural machinery manufacturers and officials of the line departments participated in the event. About 10 farmers and successful entrepreneurs were felicitated on this occasion for their significant achievements in adopting the ICAR-CIAE Agricultural Engineering Technologies as well as setting up of enterprises based on training and incubation provided by CIAE, Bhopal. The poster competitions were also organized for the Young Scientists on the theme "Climate resilience with engineering technologies in reference to Indian agriculture" and for the PhD Research Scholars on the theme "Interventions of artificial intelligence for profitable agriculture".



EVENTS

RAC Meeting

The 25th meeting of the Research Advisory Committee (RAC) of ICAR-CIAE, Bhopal was held during 25-26 February, 2020. The Heads of the Divisions, Project Coordinators of AICRPs and Scientists of the Institute attended the meeting. Dr. PS Tiwari, Director (Acting) welcomed the Chairman and the members of the Research Advisory Committee. In his welcome address, Dr. Tiwari highlighted some of the major achievements of the Institute during 2019-20. Dr. V M Mayande, Chairman RAC, in his opening remarks stated that ICAR-CIAE has made a significant impact on agricultural mechanization of the country. He also highlighted the areas requiring urgent CIAE interventions through focussed and time bound R&D programmes. Dr. KK Singh, ADG (FE), ICAR stated that CIAE may review progress and relevance of the ongoing projects and should prioritize ongoing R&D programmes vis-à-vis available resources. He stated that CIAE should focus on mega projects with team of scientists to address major national issues. He further indicated that CIAE has a good number of PhD students and their R&D may address some basic and strategic



research in line with CIAE R&D programmes. The other expert members of RAC who provided valuable advice to CIAE scientists included Dr Divaker Durairaj, Former Dean, College of Agricultural Engg., TNAU, Coimbatore; Dr Man Singh, Director, WTC, ICAR-IARI, New Delhi; Dr. Debraj Behera, Prof & Head, Deptt of Farm Machinery & Power, Odisha University of Agriculture & Technology, (OUAT), Bhubaneswar; and Dr JIX Antony, Vice President, Olam, Bengaluru. The RAC members also witnessed demonstration of several new technologies developed by institute. Dr PC Bargale, Head TTD and Member Secretary proposed vote of thanks to the members.

Nutri Fair

Nutri Fair was organized in association with Solidaridad Network on 6 March, 2020 to commemorate the International Women's Day. The event witnessed participation by more than 1200 rural women across the state and provided a platform for cross learning, encouraging rural women in agriculture and recognizing the efforts of women leaders and entrepreneurs. The event started with an inaugural ceremony and followed by four panel sessions. The first session was an interactive knowledge sharing on the "Role of Women in agriculture and how women friendly tools help her for ease of work". It was followed by sessions on the "Role of Women entrepreneurship in agriculture sector", "Nutrition and food security issues in India and how these can be addressed" and experience sharing by progressive farmers. The women farmers who had made strides in nutrition and entrepreneurship were felicitated in the event. An exhibition of stalls by the participating organizations and rural entrepreneurs on agricultural technologies focused on women was displayed including nutritional products developed under National Fellow project.



EVENTS

International Women's Day

The Women's Cell of the Institute celebrated International Women's week during 5-6 March, 2020. On 5 March, talk on "I am Generation Equality: Realizing Women's Rights" was delivered by Dr Mona Purohit, Dean and Head, Faculty of Law, Barkatullah University, Bhopal. The talk was attended by all the women staff (including from ICAR-IISS and ICAR-NIHSAD, Bhopal), students, spouses of the staff residing in the campus. This was followed by a cultural programme by the Institute staff and students.

**Academia-Industry-Interaction meet**

Academia-Industry-Interaction meet was organized in collaboration with Junagadh Agricultural University at Junagadh on 19 February, 2020. In this meet, over 200 participants mostly farm machinery manufacturers from Rajkot, Ahmedabad, Vadodara and nearby vicinity of Junagadh participated. A presentation was made by Dr. PC Bargale, Head, TTD highlighting CIAE technologies suitable and relevant for commercialization in the state of Gujarat. Several manufacturers indicated their interest in CIAE technologies and enquired for possible joint collaboration for R&D projects.

**Annual Workshop of CRPs**

ICAR-CIAE, Bhopal and AEC&RI, TNAU, Coimbatore jointly organized the 5th Annual Workshop of CRPs (FMPF, MIS, EA, SA and NF) under Agricultural Engineering Division of ICAR during 28-30 January, 2020 at Agricultural Engineering College and Research Institute, TNAU, Coimbatore. About 70 scientists from various participating centres of CRPs on Farm Mechanization and Precision Farming including Micro Irrigation Systems, Energy in Agriculture,



Secondary Agriculture and Natural Fibers presented their annual progress reports and discussed the future programmes. Dr K Alagusundaram, DDG (Agril. Engg), ICAR was the Chairman and Dr Kanchan K Singh, ADG (FE) and Dr SN Jha, Co-chaired different technical sessions of the workshop. It was suggested that innovative and unique research proposals are expected from various centres of CRPs and a brainstorming session may be organized for deciding future programmes of various CRPs. The possibility of energy generation from agricultural residue may be explored under CRP on EA.

Workshop of AICRP on EAAI

XXIII annual workshop of AICRP on EAAI was organized during 18-20 February, 2020 at MPUA&T, Udaipur. Dr AK Mehta, Director Research, MPUA&T, Udaipur welcomed the Chief Guest, Dr. NS Rathore, Vice-Chancellor MPUA&T, Udaipur, the Guest of Honour Prof. BS Pathak, Ex-Director, SPRERI, Vallabh Vidyanagar and other dignitaries Dr. S. Kamaraj, Ex-Prof. & Head, CAE&RI, TNAU, Coimbatore, Dr. AK Dubey, Ex-LCPC- CRP on EA, ICAR-CIAE, Bhopal . Dr KC Pandey, PC, AICRP on EAAI presented the Project Coordinator's Report, highlighting achievements made by the centres during 2019-20. PC Report cum highlights 2019-20, technical bulletins from MPUAT Udaipur, PAU Ludhiana and ICAR-CIAE Bhopal were released on the occasion. Various technical sessions were also organized.



NEWS FROM PERSONNEL

Dr Kudos Promoted

Dr SK Aleksha Kudos, Scientist (SS) was promoted to Senior Scientist wef 1 December, 2013.

Mr Hasan Proceeded on Study Leave

Mr Muzaffar Hasan, Scientist was granted study leave for three years for pursuing Ph.D in Plant Biochemistry at ICAR-IARI, New Delhi wef 11 March, 2020.

Dr Rao joins SERB

Dr KVR Rao, Principal Scientist was relieved from the Institute on 2 March, 2020 so as to join the post of Scientist 'G' at Science & Engineering Research Board, Department of Science & Technology, Govt. of India, on deputation.

Staff Superannuated

Following staff superannuated from the Council's service during this quarter.



Shri Krishna Kumar
Skilled Supporting Staff
on 31 January, 2020



Shri G Mohabe
Technical Officer
on 29 February, 2020



Shri Krishna Mairade
Technical Officer
on 31 March, 2020



Shri AK Bhardwaj
Technical Officer
on 31 March, 2020

NEWS FROM PERSONNEL

Dr. CR Mehta joins as Director, ICAR-CIAE

Dr. CR Mehta joined to the post of Director, ICAR-Central Institute of Agricultural Engineering, Bhopal on 28th February, 2020. He obtained Ph.D. degree from IIT, Kharagpur in 2000. He has worked in different scientific positions at ICAR-CIAE, Bhopal during last 30 years on his selection to the Agricultural Research Service of ICAR in 1989. He held the positions of Head, Agricultural Mechanization Division (Aug. 25, 2010 to Nov. 29, 2012) and Project Coordinator, AICRP on Farm Implements and Machinery (Nov. 30, 2012 to Feb. 28, 2020) at the institute. The AICRP on FIM received Chaudhary Devi Lal Outstanding All India Coordinated Research Project Award-2018 under his leadership.

He has specialization in Farm Machinery and Power, Ergonomics, Conservation Agriculture and Instrumentation. His important R&D achievements include optimization of seat design and tractor workplace layout, control of noise and vibration, decision support system for farm machinery management, biomass based decentralized power generation system, instrumentation systems such as tractor three-point linkage dynamometer, seed drill choke indicator, electronic timer, reaction timer etc. The findings of tractor workplace layout have already been adopted by two leading tractor manufacturers through consultancy projects. He has guided/co-guided five Ph.D. and two M. Tech. students. He has published over 250 papers including 34 in referred International journals, 18 in referred Indian journals, 3 policy papers, 38 books/book chapters, 40 technical bulletins and presented more than 100 papers in conferences/workshops.

He is a chair/ member of Technical Working Group on Power Tillers of Asian and Pacific Network for Testing of Agricultural Machinery (ANTAM), and sectional committees *viz.*, Agricultural Tractors & Power Tillers (FAD 11) and Ergonomics (PGD 15) of Bureau of Indian Standards, New Delhi. He received Distinguished Service Certificate (2002-03), Commendation Medal (2005-06), Team Award (2006-07) and ISAE Fellow (2012-13) from Indian Society of Agricultural Engineers for research and development in the field of Farm Machinery & Power. He is Cooperating Editor of Agricultural Mechanization in Asia, Africa and Latin America (AMA) and Editor, Indian Journal of Dryland Agriculture Research & Development.

He is the Vice President (Technical Council) of the Indian Society of Agricultural Engineers (ISAE) and Executive Member of Indian Society of Ergonomics (ISE).

On 28 February, 2020, the Institute fraternity felicitated Dr Mehta for his new inning.



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