



From Director Desk...



Two major activities of the institutes were organized during these 3 months. The 59th Convocation of the PG school was held on February 12, 2021 and Pusa Krishi Vigyan Mela 2021, themed "Atmanirbhar kisan" from February 25-27, 2021. Our major research highlights include development of cauliflower hybrids based on self-incompatibility system for commercial cultivation, recommendations of sprays of muriate of potash (KCl @0.2%) at the anthesis to ameliorate the impact of heat damage in wheat, development of hyperspectral remote sensing programme for assessing ageing of rice through spectral modelling and a technology for extraction of gluten from wheat dough and its regeneration in bajra and maize flour. Inoculation protocols for artificial transmission of sesame phyllody phytoplasma has been established and standardized. Nine technologies developed at ICAR-IARI were commercialized and transferred to four industry partners. Agri India Hackathon incubation program was launched to promote innovation and entrepreneurship of India's agri-startups ecosystem. World Water Day, International Women's Day and National Science Day were also organized. In addition, the capacity building program for the extension personnel and farmers through training program, field days and visits were organized.

I am sure that the information included in newsletter would be useful to farmers and stakeholders. I wish to congratulate all the scientists and staff of publication unit for bringing out the newsletter in time.

Dr. A.K. Singh
Director, IARI

59th IARI Convocation

The 59th Convocation of the PG school of the Institute, was held on February 12, 2021. The important activities held during the convocation week include presentation of significant post graduate students research, presentation of significant educational achievements by the professors of different disciplines, lectures by the recipients of institute awards and Lal Bahadur Shastri memorial lecture. The main convocation function of presentation of degrees and awards was held at Bharat Ratna C. Subramaniam auditorium, NAS Complex, Pusa, New Delhi. The convocation function also was live-streamed on online platforms. The ceremony was graced by the presence of Chief Guest Shri Kailash Choudhary, Hon'ble Union Minister of State for Agriculture and Farmers' Welfare, Govt. of India along with Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR, and Shri Sanjay Kumar Singh, Additional Secretary, DARE and Secretary, ICAR.

The convocation was declared open by Dr. Ashok Kumar Singh, Director and Vice-Chancellor, ICAR-IARI, followed by the presentation of Welcome Address and Director's Report on the significant research achievements of the Institute during 2020.

He shared that two bio-fortified wheat varieties namely HD 3298 with 43.1% iron content and 12.1% protein and HI 1633 with 41.6 ppm iron content, 41.1 ppm zinc and 12.4% protein were dedicated to the nation by the Hon'ble Prime Minister of India on the occasion of 75th anniversary of the Food and Agriculture Organization (FAO) of the United Nations.

Hon'ble Union Minister of State for Agriculture and Farmers' Welfare, Govt. of India presented the Doctor of Philosophy, Master of Science and Master of Technology degrees to the students. In the convocation address, Shri Kailash Choudhary exhorted to the students to dedicatedly engage themselves for socio-economic betterment of society through innovations. He applauded the efforts of the scientists for their commitment to sustain the pace of technology generation despite the global pandemic. He also appreciated the effort of the Institute for the

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development of new crop varieties and technologies in the field of agriculture for doubling the farmers' income.

A total of 15 varieties were released by the Chief Guest during the Convocation, which included Pusa Basmati 1692 of Rice; HD 3298, HD 3293, HI 1633 and HI 1634 of wheat; Pusa baby corn hybrid-1 of maize; Pusa chickpea 20211 of chickpea; PDL-1, PSL-9 and L 4729 of lentil; Pusa Mustard 32 of mustard; Pusa 1641 of mungbean; DS 3106 of soybean; Pusa Arhar 2017-1 and 2018-2 of pigeonpea.

Dr. Rashmi Aggarwal, Dean & Joint Director (Education) presented the Dean's Report containing brief about PG students research achievements. She congratulated the distinguished students for their hard-earned degrees.

In this Convocation, 252 students (138 M.Sc., 9 M.Tech. and 105 Ph.D.) including 9 International students (3 M.Sc. and 6 Ph.D.) received their degrees. The merit medals were presented to 5 students each of Ph.D. and M.Sc.; while one student each in M.Sc. (Mr. Pratheek H.P., Discipline of Plant Physiology) and Ph.D. (Mr. Saheb Pal, Discipline of Vegetable Science) were awarded the Best Students of the Year Awards for their outstanding postgraduate research, academic and extra-curricular activities.

During the Convocation, the scientists were honoured with Institute's awards for their outstanding contributions in agricultural research. Dr. Sharat Kumar Pradhan, Principal Scientist, ICAR-National Rice Research Institute, Cuttack received XXVI Hooker Award 2018-19 for his outstanding research contributions in the field of Crop Improvement. Dr. S.K. Jha, Professor, received XXI Shri Hari Krishna Shastri Memorial Award for the year 2020 for his outstanding research contribution in the field of Post-Harvest Technology. Dr. G.P. Singh, Director, ICAR-Indian Institute of Wheat and Barley Research, Karnal, Haryana received VIII Rao Bahadur B. Viswanath Award 2018-19 for his outstanding

research contribution in the field of Wheat improvement for abiotic stress tolerance and increasing profitability of wheat farmers. Dr. Anil Rai, Head & Professor (Bioinformatics), ICAR-Indian Agricultural Statistical Research Institute, New Delhi received the Best Teacher Award in Agricultural Higher Education 2020-21.

The degree of Doctorate of Science (*Honoris causa*) was conferred upon two eminent IARI alumni namely Prof. Sanjaya Rajaram and Prof. Rattan Lal, recipient of World Food Prize 2020, who have globally distinguished themselves in the field of science.



59th IARI Convocation



Chief Guest Shri Kailash Choudhary, Hon'ble Union Minister of State for Agriculture and Farmers' Welfare, Govt. of India awarding Best Student Year Awards

Pusa Krishi Vigyan Mela, 2021



Pusa Krishi Vigyan Mela 2021

Pusa Krishi Vigyan Mela 2021, themed “*Atmanirbhar kisan*” was organised at the IARI *mela* ground from February 25-27, 2021. The *mela* was inaugurated by Shri Narendra Singh Tomar, Hon'ble Union Minister of Agriculture and Farmers Welfare, Panchayati Raj and Rural Development, Government of India. The inaugural function was presided over by Hon'ble Minister of State for Agriculture and Farmers Welfare, Sh. Kailash Choudhary. Dr. Trilochan Mohapatra, Secretary, DARE & Director General, ICAR and Dr. Sanjay Singh, Additional Secretary (DARE) & Secretary (ICAR) were the Guest of Honours. Dr. A.K. Singh, Director IARI; Dr. Indramani Mishra, Head, Division of Agricultural Engineering and Dr. J.P.S. Dabas, In-charge, CATAT also graced the occasion. IARI Fellow Awards were bestowed to 5 farmers on the occasion.

Hon'ble Union Minister Sh. Narendra Singh Tomar appreciated the *mela* for providing unique platform for interaction among farmers and the experts from all over the country. He reiterated on the Government's efforts to implement programme for benefit of the farmers and urged all the farmers to reap maximum benefits from the new developed varieties and new technologies. He also emphasized that the credit and flow of private investment in agricultural sector and formation of FPOs will help in realizing the long-cherished dream of Hon'ble Prime Minister in developing the *Atmanirbhar Bharat*. Sh. Kailash Chaudhary also appreciated the Pusa Krishi Vigyan Mela and lauded the farmers as well as agricultural scientists for realizing 6 percent growth in annual agricultural production, even in Covid-19 pandemic. He appreciated the IARI fellow farmers and the *Padam shri awardee* farmers present on the occasion for their progressive outlook towards agriculture. He congratulated IARI for developing the Pusa Farm SunFridge for reducing spoilage of the horticultural produce. He stressed on the importance of timely availability of market facilities for the farmers, for which Government has increased the spending on infrastructure.

Farm technologies developed by the Institute for sustainable agricultural development were displayed in a huge thematic *pandal*. Besides, live demonstrations on improved crop varieties, vegetables production technology, IFS models, farm machineries, Pusa Farm SunFridge were laid out to provide first-hand experience to farmers. Farmers were provided free 'farm consultancy services' including soil and water testing at the *mela* site by the agricultural scientists. IARI agro-advisory services, display of new technologies in the thematic *pandal*, farmer-scientist interactions, free distribution of farm literature, flower show, vegetable cultivation and kitchen gardening demonstrations, residue recycling technology, Pusa farm sun fridge were the major attractions of *mela*.

A total of 120 stalls, put up by ICAR Institutes, public and private sector organizations, NGOs, farm entrepreneurs and flower show, displayed their technologies and products. The *mela* also provided a platform to many organizations, agro-entrepreneurs and progressive farmers to directly sell their agri-products to the consumers. More than 40,000 visitors from different parts of the country including farmers, farm women, extension workers, entrepreneurs, students and others visited the *mela*. Also, for the first time many stakeholders could take benefit from the live webcasting of the *mela* in different parts of the country.

Five technical sessions on “Agricultural Reforms and Entrepreneurship Development” (Session 1); “Improved Agricultural Technologies for Higher Production and Profitability” (Session 2); “Women Empowerment” (Session 3); “Technologies for NRM and Value Addition” (Session 4) and 'Innovative Farmers Meet' (Session 5) were organised on different themes of agricultural importance and the farmers' queries were also addressed by scientists of different disciplines during three days of *mela*. On the last day (27th February), in the forenoon, session 5 on 'Innovative Farmers Meet' was chaired by Dr. K.V. Prabhu, Chairperson, PPV & FRA as Chief Guest. In this session, the IARI Innovative farmers of 2021 were awarded and the awardee Innovative and Fellow Farmers shared their rich experiences of farming and innovations practiced by them.

Seeds of high yielding varieties of different crops worth ₹ 32.31 lakhs were sold through both Pusa Seed Sale Counter and through online orders. Besides, Rice worth ₹ 1.00 lakhs, pearl millet flour (Hullur), corn flour (Makai), microgreen kits worth ₹ 14.8 thousand and bio-fertilizers worth ₹ 1.35 lakh were also sold during the *mela*. 25 STFR meters were also purchased/booked during *mela* time. Four publications useful for farmers and agri-entrepreneurs including *Prasar Doot*, *Fellow and Innovative Farmers: 2021*, crop cultivars for farmers' prosperity and *Kisano ke labharth: Phaslon ki unnat kisme* were released.



Hon'ble Minister of State for Agriculture and Farmers Welfare awarding IARI Innovative Farmers' Awards

The valedictory function was graced by Sh. Kailash Choudhary, Hon'ble Minister of State for Agriculture and Farmers Welfare and Dr. Trilochan Mohapatra, Secretary, DARE and Director General-ICAR and Dr. D. K. Yadav, ADG (Seed), ICAR were the Guests of Honour. IARI Innovative Farmers' Awards were bestowed to 35 farmers belonged to 21 States/UTs of the country. Shri Kailash Chaudhary emphasized on the government priorities in the field of agricultural research and farmers' welfare. He also appreciated the effort of institute for the development of new varieties and agriculture technologies. He briefed about the various measures taken by government of India in current year's budget for the welfare of farmers, farming and agricultural sector as a whole. He assured that new “Farmers bills” are planned only for the benefit of the farmers. Dr. T. Mohapatra in his speech expressed that the scientific interventions in agriculture have potential to improve the farmers' income by four-folds. He also assured that, ICAR scientists are ready to work with farmers to achieve the goal of doubling the farmers' income. He emphasized on the use of digital platforms for the better dissemination of varieties and technologies in agriculture.

RESEARCH

Cauliflower Hybrid Seed Production

Cauliflower hybrids have been developed based on self-incompatibility system for commercial cultivation but instability of SI system and problems associated with parental line multiplication paved way for use of Cytoplasmic Male Sterility (CMS) system for development of commercial hybrids. *Ogura* cytoplasm-based CMS lines were developed for hybrid development in early, mid and late maturity groups of cauliflower. Division of Seed Science and Technology has standardized seed production technology of CMS based mid maturity cauliflower hybrid, Pusa cauliflower hybrid -3 for commercial seed production. The parental lines of hybrid showed uniformity for days to curd formation, bolting, flowering and distinctiveness for leaf shape and flower morphology. The CMS parent remained male sterile throughout the flowering period. Both the male fertile and maintainer lines showed very high pollen load and its viability (above 95%). In CMS parent, stigma receptivity was the highest on the day of anthesis and pollination was found very effective from one day before to 2 days after anthesis of flowers for higher pod setting (78-89%). The non-synchronization of flowering between the parental lines ranged from 10-12 days between the CMS and male fertile parent. This gap in days to flowering between the parental lines could be bridged by spray of GA₃ @ 100 ppm twice at bolting and 7 days after first spray to the late flowering parent. A planting ratio of 3:1 (female: male) was found optimum for obtaining higher hybrid seed yield.

Cross pollination is essential for hybrid seed production. Our observations showed that parental lines were visited by *Apis florea*, *A. dorsata*, *A. mellifera*, *Campsomeris sp.*, dipterans and syrphid flies. Honey bees (*A. mellifera*) were the most common and effective pollinators for obtaining higher hybrid seed yield. The hybrid seeds showed high seed quality (germination above 95%) and storability (upto one year). The study showed the feasibility of successful and economic hybrid seed production in CMS based cauliflower hybrids under North Indian conditions.

Pusa Decomposer-Microbial Consortium for Accelerated Decomposition of Paddy Straw

The Institute has developed a technology called Pusa Decomposer (both in liquid and capsule forms) for rapid decomposition of paddy straw. Four capsules of this product can be scaled up to 25 lit. liquid formulation over a period of 10-12 days with

addition of jaggery and chickpea flour. The 25 lit. liquid is mixed with 500 lit. water and sprayed on paddy straw in one hectare field (or 10 lit. per acre). It accelerates process of paddy straw decomposition and the stubble/straw gets converted into manure in the field and good for potato, peas and wheat sowing in 20-25 days following conventional tilling (CT) practices. Pusa Decomposer is a long-term sustainable solution for management of paddy straw in conjunction with CT, Happy Seeder and Super Seeder options. Under CT, the general practice to be followed for effective in-situ decomposition is spraying by Pusa Decomposer, followed by rotavator operation for proper mixing of residue in soil and then a light irrigation to ensure moisture in the field. This practice has given very good results. Pusa Decomposer can be used with an additional cost of only ₹ 300 per acre, all other operations being same. The added advantage of soil health improvement

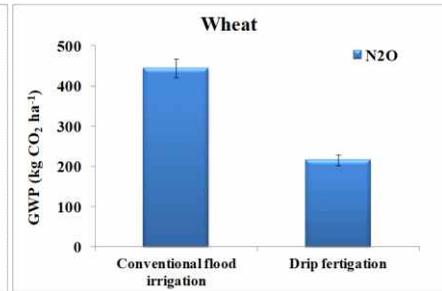
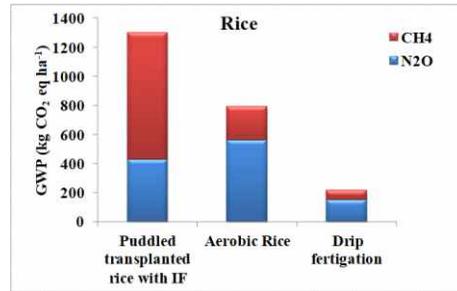


Upscaling of four capsules into 25 lt of liquid formulation and application on paddy straw for *in situ* degradation

and increase in crop stand and yield makes application of Pusa Decomposer an attractive, viable and eco-friendly option. Soil enzyme activities, microbial biomass C, %organic C and available N estimates showed a higher trend in the Pusa Decomposer applied sample over the non-applied field sample. Thus, Pusa Decomposer is a sustainable solution in conjunction with mechanical intervention to address the problem of paddy straw burning.

Water Management for GHGs Mitigation in Rice-wheat System

Field experiment was conducted with growing rice (PB 1637) and wheat (HD 2967) under different water management practices to assess their GHG mitigation potential. The treatments for rice crop were conventional transplanted rice, aerobic rice and subsurface drip fertigation and for wheat crop conventional flood irrigation and subsurface drip fertigation. In aerobic rice methane (CH_4) emission was reduced by 70% but due to aerobic and anaerobic cycle the N_2O emission was increased by 31.7%. However, with subsurface drip fertigation the emission of both CH_4 and N_2O could be reduced by 70-



Global warming potential of different water management practices in rice and wheat

72%. Aerobic rice reduced the GWP by 30% with 15% water saving and yield loss of 3.8% compared to puddled transplanted rice with intermittent flooding (PTR-IF) whereas drip fertigation in rice reduced GWP by 84% with 37% water saving and yield loss of 6.5% compared to PTR-IF. The irrigation water use efficiency (0.5 kg grain/m³water) and field water use efficiency (0.32 kg grain/m³water) were found to be highest in aerobic method with SDI drip. In wheat crop subsurface drip fertigation was reduced GWP by ~51% and 48% water saving.

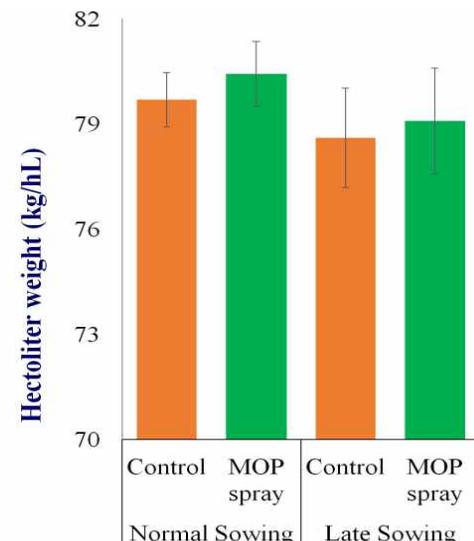
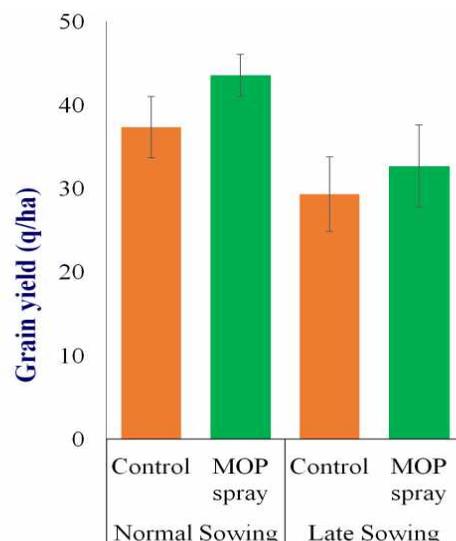
Foliar Application of Muriate of Potash (MOP) Mitigates Adverse Effect of Terminal Heat Stress in Wheat

Heat stress during grain development adversely affects

wheat production in India especially under late sown conditions in Indo-Gangetic plains and even under normal sown conditions in central and peninsular India. All India coordinated wheat improvement project (AICWIP) recommended two sprays of laboratory grade potassium chloride (KCl) @ 0.2% at onset of anthesis and seven days after anthesis to ameliorate the impact of heat damage in wheat. Due to the difficulty in availability of laboratory grade KCl and cost of two times spray, adaption of this technology is low. The fertiliser MOP is a cheaper source of potassium chloride and is readily available with the farmers. Hence, experiments were conducted on popular wheat varieties at division of plant physiology to analyse the efficacy of one-time spray of MOP as compared with two sprays of



Ear & developing grain at 7 DAA



MOP spray (0.2%) at 7 days after anthesis (DAA) enhances grain yield and hectolitre weight under normal and heat stress conditions in wheat

laboratory grade KCl. MOP solution (0.2%) was sprayed at seven days after anthesis in both normal sown and late sown crop and was found quite effective in increasing grain yield on an average by around 6% (2-13%), number of grains/ears by 5.3% (2-10%) and hectolitre weight by 1.5% (0.3 - 3%). A single spray of MOP after about seven of anthesis was almost as effective as the two recommended sprays of KCl. Thus, spray of MOP (0.2%) at early grain filling is a cost-effective solution for minimizing the adverse impact of high temperature on wheat grain yield.

Identification of Clover Proliferation Phytoplasma Associated with *Matthiola incana* Flower Virescence Symptom

Flower virescence symptom was observed in *Matthiola incana* (hoary stock) at Indian Institute of Sugarcane Research campus, Lucknow. Amplicons of ~1.2 kb were consistently amplified in all the infected *M. incana* plant samples using universal phytoplasma specific nested primer pairs P1/P7 and R16F2n/R2. Pair wise sequence comparison, phylogeny and virtual RFLP analysis of 16S rRNA gene sequences assigned a novel phytoplasma subgroup strain under 16SrVI group, since its *Hpa*II restriction profile was different to earlier classified 16SrVI subgroups but was very close to 16SrVI-E subgroup. Similar results were



Symptoms of flower virescence in *Matthiola incana*



Transmission of sesame phyllody phytoplasma through dodder and grafting methods: a & b: dodder inoculation; c: patch grafting; d & e: wedge grafting; f & g: leaf disc grafting

further established and validated by amplifying phytoplasma specific multi-locus candidate genes in all the symptomatic *M. incana* isolates by utilizing specific primers of *secA*, *rp*, and *secY* genes.

Transmission Efficiency of a Peanut Witches' Broom Phytoplasma Strain Associated with Sesame Phyllody by Seed, Dodder, Grafting and Leafhoppers

Various transmission methods were tested to check the transmission efficiency of peanut witches' broom phytoplasma (PWBP) strain (16SrII-D) associated with sesame phyllody through seed, grafting (wedge, patch, leaf disc and plugging), dodder and insects. The transmission studies revealed that PWBP strain was not seed transmitted. However, the sesame PWBP strain was efficiently transmitted by dodder (90%), insect (65%) and by various grafting methods (wedge and leaf disc grafting) (66.67%). One major leaf hopper species *Orosius albicinctus* was identified as natural

carrier of PWBP strain in sesame fields at New Delhi and was found efficient in successful transmission of PWBP from sesame to brinjal and sesame to sesame plants under glasshouse condition. These methods will be helpful in maintaining the phytoplasma strain in glasshouse and suitably used for indexing of sesame germplasm accessions against sesame phyllody. This experiment was done in joint collaboration with NBPGR, New Delhi under a DBT sanctioned project.

Improved Index Insurance Product for Wheat Using Satellite Remote Sensing Inputs

Satellite remote sensing derived indices could explain higher variability in wheat yield as compared to the weather indices. Among the remote sensing indices, vegetation health index (VHI) of sensitive crop stage showed the best performance. The relationship between yield loss and pay-out ($r=0.7$ to 0.9) improved in all the

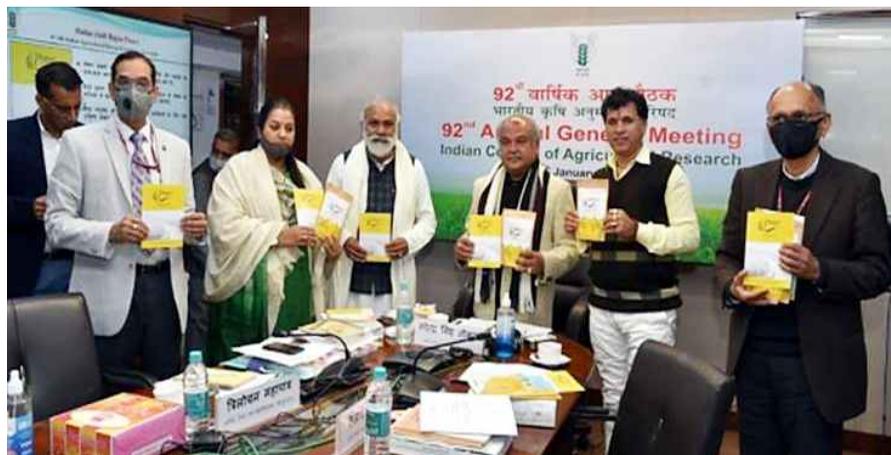
districts for remote sensing-based index insurance as compared to the weather-based index insurance. Satellite remote sensing-based index insurance products lowered the basis risk *i.e.*, the mismatch between index and crop yield significantly and VHI based product showed the lowest basis risk. The study provides a robust methodology for designing of scientific index-based crop insurance product.

Hyperspectral Remote Sensing for Assessing Ageing of Rice through Spectral Modelling

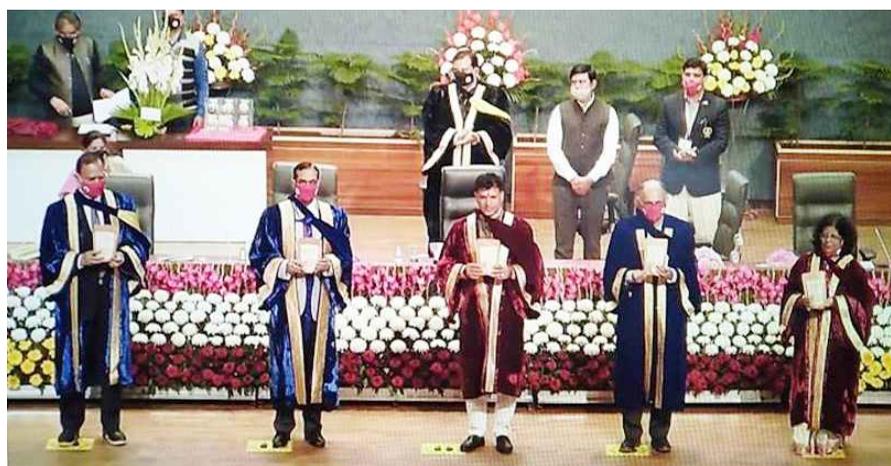
Ageing process of rice for 4 varieties of basmati (PB 1121, PB 1509, PB 1637 & PB 1718) and 1 variety of non-basmati (Pusa Sugandh) was characterized through spectral reflectance data collected from 350 to 2500 nm at different days of accelerated aging for a period of 30 days. Changes in the four physio-chemical properties amylose content, volume expansion ratio (VER), water absorption ratio (WAR) and kernel elongation ratio (KER) were well captured through spectral signatures and modeled to estimate them better in spectral VNIR spectral range of 550 to 1350 nm. Spectral reflectance signatures clearly differentiated the varieties as well as the accelerated storage period. Multivariate spectral model also could predict ageing of rice.

Wheat Gluten Based Soft Bajra Cereal Atta

An attempt of regeneration of vital wheat gluten in gluten free pearl millet and maize flour to improve its dough quality as good as wheat dough is first of its kind is intensively studied at IARI in order to solve the problem of poor dough quality of these nutrition-rich cereals. A technology for extraction of gluten from wheat dough and its



Release of Soft Bajra Atta: Hallur



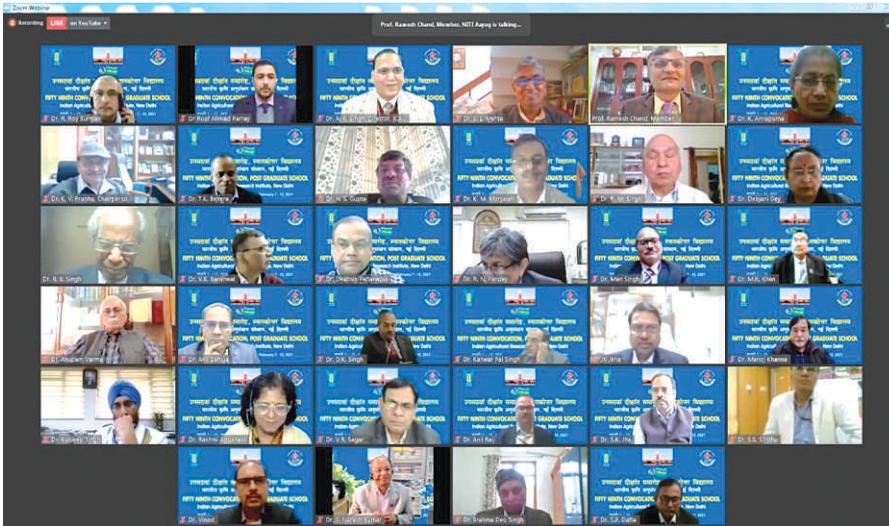
Release of Soft Makka Atta: Makai

regeneration in bajra (pearl-millet) and *makka* (maize) flour, was developed which can be easily kneaded to yield soft *rotis*, pooris and a variety of bakery products. MOU has been signed with a private company - Arpan Nutrition Pvt. Ltd., New Delhi. This technology of “Soft Bajra Atta: Hallur” and “Soft Makka Atta: Makai” were also officially released by the Minister of Agriculture & Farmers Welfare, Minister of Rural Development and & Minister of Food Processing Industries, Shree Narendra Singh Tomar on January 27, 2021 and by Union Minister of State for Agriculture and Farmer Welfare of Government of India, Shree Kailash Chaudhary on 59th IARI Convocation held on February 12, 2021.

EDUCATION

51st Lal Bahadur Shastri Memorial Lecture

As a part of the Convocation week programme, the 51st Lal Bahadur Shastri Memorial Lecture on Feb.11, 2021 given by Prof. Ramesh Chand, Member, NITI Aayog, Govt. of India through virtual mode. Prof. R.B. Singh, Former Director, ICAR-IARI, New Delhi and Former Chancellor, CAU, Imphal chaired the session. Prof. Ramesh Chand delivered highly informative and educative lecture on "Reimagining Agriculture for Transformational Change". He emphasised on crop sciences sector growth required for better agriculture output and it should be produce



51st Lal Bahadur Shastri Memorial Lecture delivered by Prof. Ramesh Chand, Member, NITI Aayog

centric (demand) than product centric for sustainable production.

Hindi Workshop

To achieve the targets set by the Department of Official Language, Government of India in the Annual Programme on Implementation of Official Language and to fulfil the assurances given to the Committee of Parliament on Official Language, a one-day online workshop was organized on "Management of Official Language" in virtual mode through zoom app on February 23, 2021 at 11.00 a.m. This workshop was organized for all the Rajbhasha Nodal officers from IARI and its regional centres. The objective of the workshop was to try to overcome the difficulties faced by all the Rajbhasha nodal officers in implementation of rules related to official language. A total of 32 Rajbhasha nodal officers participated in the workshop. Dr. Vijay Narayan Tiwari, former Joint Director (Rajbhasha), Central Institute of Pharmaceutical Research, Lucknow, U.P. was invited as guest speaker. The speaker explained how the language of any country plays an important role in its development.

Visit of the Peer Review Team (PRT) of National Agricultural Education Accreditation Board for the accreditation of IARI, New Delhi

A PRT constituted by the ICAR for the re-accreditation of Institute (IARI, New Delhi) for a period of five years (2020-25) consisting Dr. Tej Pratap, Vice Chancellor, GBPUAT, Pantnagar as its Chairman, and Dr. S. Rajendra Prasad, Vice Chancellor, UAS, Bengaluru; Dr. Nazeer Ahmed, Former Vice Chancellor, SKUAST, Srinagar; and Dr. B.L. Jalali, Former Director of Research, CCSHAU,



Peer Review Team visit to IARI for the accreditation

Hisar as its Members. A full day virtual meeting was held with the PRT on January 23, 2021 followed by full day visits by the PRT in physical mode to various Divisions/Units of the Institute on January 28, 2021 and February 6, 2021.

Based on the LoI, IEA, Statement of Compliance and Self Study Reports submitted by the Institute and subsequent report of PRT, the National Agricultural Education Accreditation Board (NAEAB) of ICAR approved the accreditation of ICAR-IARI, New Delhi for a period of five years *i.e.* from March 16, 2020 to March 15, 2025.

Visit of Zonal Monitoring Team

Zonal Monitoring team was visited IARI, New Delhi for the monitoring of Coordinated trials of Wheat on March 16, 2021. The team comprised of three scientists from ICAR-IIWBR, Karnal and one Scientist from IARI, New Delhi. The team monitored 9 breeding trials *viz.*, high yield potential trial (HYPT)-Early sown, CI-HYT, AVT-IR- TS (Irrigated, timely sown), AVT-IR-LS (Irrigated, Late sown), AVT-RI-TS (Timely sown, restricted irrigated



Zonal Monitoring team visit at IARI, New Delhi

trial), NIVT 1A (Irrigated, timely sown), NIVT 1B (Irrigated, timely sown), NIVT-3A (Irrigated, late sown), NIVT-5A (Timely sown, restricted irrigation) and one agronomic trial. Observations on incidence of stripe and leaf rust, plant type and overall conductance of the trails were noted. Scientists from wheat improvement program from Division of Genetics and Division of Plant Pathology also accompanied the monitoring team.

EXTENSION

World Water Day-2021

The Institute was celebrated World Water Day on March 22, 2021 through online mode. The programme was started with the welcome address by Dr. A.K. Singh, Director, ICAR-IARI, New Delhi.

Dr. S.K. Chaudhari, Deputy Director General (Natural Resource Management), Chairman emphasized the significance of the World Water Day and introduce the speaker of the function. The speaker, Dr. M.K. Sinha, Chief Engineer (Project Monitoring Organization), Central Water Commission & Former, Executive Member, Narmada Canal Authority, Ministry of Jal Shakti, Government of India, New Delhi, delivered the lecture on the topic “Valuing water prerequisite for achieving Sustainable Development Goals”. Dr. Sinha introduced the valuing water and growth of perceptions on water in India with the Moslow's hierarchy of needs. He emphasized the role of water in development and economic growth, pricing water, five principles of valuing water and central

approach for achieving sustainable development goals. He also discussed in detail about the programmes/schemes of Ministry of Jal Shakti, GOI for ensuring valuing water for the society such as Jal Jeevan mission, river rejuvenation, dam safety and rehabilitation, water and food security and national water awards. In the last, he has highlighted the Jal Shakti Abhiyan and dream of Hon'ble Prime Minister of India on *Jal Andolan*.

Institute's KVK, Shikohpur organized World Water Day on 22 March, 2021, at KVK campus, where in a total of 53 school students and 5 farmers had participated. Joint Director (Extension) of IARI (New Delhi), Dr. B.S. Tomar was present as Chief Guest in this program. Head, KVK, Dr. Anamika Sharma informed the participants why world water day is celebrated. The Chief Guest while emphasizing the importance of water in our life, has given unique and important ways of saving water by common people.

Celebration of International Women's Day

The Institute celebrated the International Women's Day in collaboration with Pusa Institute Ladies Association (PILA) in March 8, 2021. This year's United Nation's theme for the International Women's day was “Women in leadership: Achieving an equal future in a COVID-19 World”, so the theme of the event at institute was “Women Leadership in COVID-19”.

Smt. ShaziaIImi, chief guest of function and a reputed journalist congratulated all women for their role in their respective fields. Dr. Shelly Praveen, Head, Division of Biochemistry, IARI, highlighted the importance of millets in fulfilling the mineral nutrition requirement and immunity development of human body. Dr. Sangeeta Chopra,



World Water Day-2021 virtual meeting



International women's day celebration

Principal Scientist, Division of Agricultural Engineering talked about the utility of the “Sunfridge” technology in storing the horticultural produce. Guest of Honour, Smt. Kalpana Mohapatra stressed on the need of local foods to boost immunity. Dr. Rajulben L. Desai, Member, National Commission for Women highlighted on the role of Commission towards sensitising the officers for empowerment of women at workplace. She spoke about the crucial aspects of “Digital discipline”, the Do's and Don'ts of the social media.

ICAR-IARI Regional Station, Pune was also celebrated the International Women's Day with a special and memorable one, the, “Bhumi puja” ceremony for the sanctioned glasshouses with the hands of women staff (scientists, supporting and contractual).

Institute's KVK shikohpur also celebrated International women's day in which 46 women and 20 KVK Staff have participated. Dr. Jaya Niranjane Surya, Principal Scientist, NBSSLUP, New Delhi was the chief guest. She shared her experience as women scientist and inspired the women participants to face the difficult situation to achieve their dreams and move forward.

National Science Day

Institute's KVK Shikohpur was celebrated National Science day on February 28, 2021 to remember the Raman effect a landmark in discoveries of science. The Nobel Prize in Physics 1930 was awarded to Sir Chandrasekhara Venkata Raman for his work on the scattering of light and for the discovery of the effect named after him. Dr. Anamika Sharma, Head KVK appealed the students that they should come forward and take part in extracurricular activities. Dr Pargat Singh has told about Raman effect. A debate was also organized on “Science is a boon or curse”.

Field Day on Seed Production of Improved Varieties

Seed production unit organized a field day programmes on “*Beej Utpadaan ek Kadam Atmanirbharta ki Ore*” under ICAR-Seed Project, “*Beej Divas*” and seed distribution Programme under SC Sub-Plan on March 13, 2021 at Jalalpur village of Shikarpur block in Bulandshahr district of Uttar Pradesh. Quality seed of IARI improved paddy varieties PB-1509, PB-1121, PB-6, PS-5, PB 1718 and vegetable seed kits were distributed to 200 farmers. Agricultural implements like Kasola were distributed to 200 landless farm

labourers. Dr. A.K. Singh, Director & Vice-Chancellor, IARI highlighted the importance of storage capabilities of vegetables at village level with the help of natural, renewable and low-cost resources and narrated the success of the new Pusa Farm Sunfridge run by solar power. He urged the farmers to test and adopt new crop varieties and uniformity of crop in village. He told the ongoing participatory programmes with farmers. He urged the farmers to watch Pusa Samachar episodes every week on IARI YouTube Channel. Dr. D.K. Yadav, ADG (Seed) highlighted the importance of quality seed which can increase the yield up to 15-20 per cent and with optimum crop management quality seeds can ensure up to 40-45 per cent increased yield highlighted. Dr. Indramani Mishra, Nodal officer, MGMG programme highlighted the importance and achievements of MGMG programme.

Field Day under NFSM Pulses

Two-day field day cum farmers' training programme was organized for chickpea on March 25 and 27, 2021 at Tajnagar and Jataula village block Farukhnagar for CFLDs under NFSM on improved variety (CSJ-515) with package and practices of cultivation. The total area under CFLDs under NFSM was 10 ha with 25 farmers. A total of 95 male farmers and 28 female farmers have participated during field day programme. During production technology of chickpea, soil health improvement and use of bio-fertilizers, water saving technology, problems faced farmers during crop season and method, soil sampling methodology for next crop was discussed.

Field Day under NFSM oil seeds

Six-day programme was organized as field day cum farmers' training for mustard on January 27-



Training on Mushroom cultivation, bee keeping, value addition and protected cultivation

30, 2021, February 1-2, and February 5, 2021 at Goyla, Lokra, Tajnagar, Tirpadi, Akhnaka and Dadola village of Gurugram and Nuh district for CFLDs under NFSM on improved variety of mustard (PM-31, RH-0749 and RH-0725) with package and practices of cultivation. The total area under CFLDs under NFSM was 125 ha with 273 farmers. A total of 285 male farmers and 63 female farmers have participated during field day programme. During production technology of mustard, soil health improvement and use of bio-fertilizers, water saving technology, problems faced farmers during crop season and method, soil sampling methodology for next crop was discussed.

Field day under OFT and FLD in wheat

Two field days were organized under OFT on Integrated Nutrient Management and FLD on weed management in wheat at Tirpadi and Lokra village on March 4, 2021 and March 6, 2021 respectively where in 51 male and 11 female farmers have participated. During the programme farmers were taken to field and were shown the difference between treatment and farmers practice to convince them.

Ex-Trainee Meet under ARYA project

Ex training meet was organized on February 9, 2021 at KVK Shikohpur, where the trainees of ARYA project had participated and shared their experiences about Mushroom cultivation, bee keeping, value addition, protected cultivation etc. A total of 53 rural youth and 38 rural women had participated in the meeting.

CAPACITY BUILDING

Trainings

Training under ARYA Project

The Institutes KVK, Shikohpur organized two training programmes

on Protected Cultivation in two Phases (February 16-26, 2021, Phase-I and March 2-12, 2021, Phase-II), Food processing, preservation and value Addition (February 16-25, 2021, Phase-I and March 2-12, 2021, Phase-II) in which 41 rural youths and women from Gurugram district had participated. Under these training programmes the youths and women were given hands on training along with practical knowledge related to these vocations to make them efficient in these skills and take up it as entrepreneurial activity. The technology of growing off-season vegetables in poly house/net houses, preservation of seasonal fruits and vegetables and value addition of soya bean and bajra was discussed.

Training Programme on Motor Rewinding

The Institutes KVK, Shikohpur organized one vocational training course on Motor Rewinding during February 18 to March 01, 2021 at KVK campus. In this training programme 10 rural youth from Gurugram district participated. During the training, the method of opening of defective and rewinding motor was demonstrated. The trainees learnt the complete process and they themselves opened and bind the defective motors. A set of tools was also provided to the



Training on balanced diet, nutria-thali and nutria- garden

participants for smooth functioning of training and to start the vocation.

Virtual Training Programme on Scientific Bee keeping

The Institutes KVK, Shikohpur organized 01 virtual training on scientific bee keeping during March 24-26, 2021, in which a total of 25 farmers including youth from Nuh and Gurugram district had participated. During the training, the scientific rearing and management of Apiaries, management of bee boxes during different seasons, extraction and processing of honey, packaging labeling and marketing of honey, all the practical aspects were also covered during the training programme.

In-service Training for Extension Functionaries

The Institutes KVK, Shikohpur organized one training on balanced diet, nutria-thali and nutria- garden was organized on March 15, 2021 in which 11 Anganwadi workers participated and were made aware about various nutrients, their role in our body and their deficiency symptoms and motivated to establish nutria garden in their Anganwadi centers. One training programme on soil health cards on January 27, 2021 and one training programme on INM in field crops on March 5, 2021 were organized which benefitted 74 extension functionaries of Agriculture department of Gurugram and Nuh district.

Farmers Training

The Institutes KVK, Shikohpur were organized 9 day-long trainings on IDM in cucurbits and tomato, IPM in onion and termite management in wheat, drudgery reduction technologies income generation activities for women empowerment, minimization of nutrient loss in processing and preservation of seasonal fruits and

vegetables and benefitted 168 farmers and farm women in different villages of Gurugram district.

CATAT unit organized three days training programme on 'Organic farming and crop residue management' for the officials and farmers of Hoshiarpur District, Punjab from March 16-18, 2021. Twenty farmers and officials attended the training programme.

CATAT unit organized four training programmes of one day each on 'Peri-urban agricultural' for farmers and farm women of four blocks of Delhi. These trainings were organised on March 8 for North, south west and west block, on March 10 for Alipur block, on March 12 for Alipur and Najafgarh and on March 17, 2021 for Najafgarh and Nangloi blocks. These trainings were sponsored by ATMA, Development Department of Delhi Government. Each training was attended by 50 participants.

The Division of Agricultural Extension was organized five, three days training programmes for farm women in the villages of *Sunehra* and *Bassi* in the Baghpat district of Uttar Pradesh and Jagdishpur, and Hasankala in the Sonipat district of Haryana during the periods of (January 05-07, 11-13 and 19-21, 2021 and February 3-5 and 22-24, 2021) with 50 trainees in each training, a total of 250 farm women were benefitted with skill development in making value added products of bajra (bajra cookies, hallur soft bajra, bajra *laddoo* and bajra muffins) and maize (soft makka cake) under the DBT sponsored project of Skill building in NSA for empowerment of rural women. Pusa "Nutri vegetable kits" were distributed to all women participants for demonstration purposes.

Division of Agricultural Extension was organized two training programmes on the occasion of International Women's Day (March 8, 2021), for the farm women of the villages Atta in the Nuh district and village Dhadota in Palwal district of Haryana under ICAR-DBT's Biotech Kisan Hub and ICAR - Farmers' First programmes, respectively. Besides, training programme on Bajra *laddu* preparations and value addition, deliberations on women empowerment, nutritional security, health and ergonomics in agriculture were discussed. Live demonstrations of value-added products of Amla were also conducted. Ninety-five women from all the adopted villages *viz*; Atta, Katesara, Dhadota and Amarpur were participated in the training programmes.

Division of Agricultural Extension was organized two days training programme during March 19-20, 2021 in Bahraich district of Uttar Pradesh with the collaboration of KVK, Bahraich in areas of the seed production, vegetable cultivation, plant protection, bio-fertilizer application and use of Pusa decomposer for effective crop residue management.

Training Programme on Management of Soil Health for Sustainable Production

Division of Soil Science and Agricultural Chemistry organized a virtual training programme on "Management of soil health for sustainable production" from March 22-27, 2021 under SERB, DST funded project entitled "Identification of key indicators and establishment of their critical limits in assessing soil health under different agro-ecological regions of India". Dr. S.K. Chaudhari, DDG,



IPS national e-conference on plant health

NRM, ICAR was the chief guest and delivered the inaugural lecture on 'Soil health management in India: Research and Development Programme'. This training was designed on soil health assessment protocol, identification of key indicators with their critical limits and generation of soil health cards with recommendation measures for the farmers.

IPS National e-Conference on Plant Health and Food Security: Challenges and Opportunities

The Indian Phytopathological Society, New Delhi organized three days virtual National e-Conference on "Plant Health and Food Security: Challenges and Opportunities" at Division of Plant Pathology, ICAR-IARI, New Delhi was held during March 25-27, 2021. Souvenir & Abstract of the conference, and technical bulletin on "Stewardship for Safe Use and Handling of Pesticides" were released in the inaugural function by the Chief Guest Dr. T. Mohapatra, Secretary (DARE) & Director General (ICAR) and Guest of Honours Dr. T.R. Sharma, DDG (Crop Science) and Dr. A.K. Singh, Director, ICAR-IARI, New Delhi. Altogether more than 450 delegates from 13 countries

participated in this mega-event. During the 3 days' conference, 10 technical sessions on different themes were conducted.

Demonstration of Live Model on "Water-secure Atmanirbhar Bharat"

An integrated watershed management model depicting the concept of water secure *Atmanirbhar Bharat* for making the country self-reliant was created during *Krishi Mela* held on February 25-27, 2021. It was estimated that due to scientific interventions on watersheds can reduce runoff approximately by 40-60% and soil loss 70-85% and will help to enhance water savings, availability and

productivity. Hon'ble Union MoS Sh. Kailash Choudhary, Dr. T. Mohapatra, Secretary (DARE) and DG (ICAR), Dr. A.K. Singh, Director, ICAR-IARI, Dr. K.V. Prabhu, Chairperson, PPVFRA, New Delhi, and Head of different divisions of IARI and approximately 250 farmers visited the model.

MISCELLANEOUS

Technology Commercialization

During Jan- March, under lab to land Initiative, nine technologies of ICAR-IARI were transferred to 4 industry partners resulting in total revenue generation of ₹ 6,50,000. These technologies were wheat gluten based soft nutri-cereal atta-bajra, wheat gluten based soft nutri-cereal atta-maize, mango varieties, Pusa Shrestha, Pusa Lalima, Pusa Arunima and vegetable varieties Okra: Pusa Bhindi-5, Okra-DOH and basmati rice variety PB 1692 and rice variety Pusa samba 1850.

Incubation Activities

Agri India Hackathon

Agri India Hackathon incubation program was launched to promote innovation and entrepreneurship of India's agri-startups ecosystem. This is a program to scale-up agri-startups



Demonstration of live model on "Water-secure Atmanirbhar Bharat"

that have passed the stage of Ideation and have developed or have a ready prototype. The last date for applications was January 20, 2021. Under this programme more than 6000 applications were received online. Out of these 300 applications were selected for 3 days mentoring and evaluation session. During three days of Hackathon (Feb 3-5, 2021), 900 one-on-one mentoring sessions with 75 mentors across 5 focus areas

final 24 winners were announced. These 24 best innovations from different focus areas were awarded a cash prize of ₹ 1,00,000 each.

Center of Excellence Incubation Committee Meeting for Incubator under RKVY-RAFTAAR

As a leading Knowledge Partner, Pusa Krishi extended its continuous support to twelve (12) RABIs in organizing their CIC meeting for

Center of Excellence Incubation Committee Meeting for Incubators

S.No.	RABIs	CIC Date
1	Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh	13-Jan-21
2	Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu & Kashmir	14-Jan-21
3	CSK Himachal Pradesh Krishi Vishwavidyalaya, Palampur, Himachal Pradesh	22-Feb-21
4	College of Veterinary Sciences & Animal Husbandry, Mizoram	23-Feb-21
5	College of horticulture and forestry, Arunachal Pradesh	23-Feb-21
6	Punjab Agricultural University, Ludhiana, Punjab	04-Mar-21
7	Chaudhary Charan Singh University, Hisar, Haryana	06-Mar-21
8	IIT-BHU, Varanasi, Uttar Pradesh	12-Mar-21
9	Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur, Madhya Pradesh	15-Mar-21
10	College of Fisheries, Lembucherra, Tripura	15-Mar-21
11	ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh	16-Mar-21
12	IIM, Kashipur, Uttarakhand	19-Mar-21

namely Precision Farming, Farm Mechanization, Post-Harvest Technology, Supply Chain and Waste to Wealth were organized.

On Feb 5, 2021 after completing mentoring sessions, each startup presented their innovation in front of panel for evaluation. The startups/applications were evaluated on 5 basic parameters like need, novelty, feasibility and scalability, commercialization potential and impact. On February 8, 2021 result was announced in which 60 startups entered Final Jury round. Final Jury Round was organised on 17 Feb 2021 on Virtual platform from where

selection and recommendation of startups for funding to Ministry through online virtual meeting and monitoring session:

Samarth 7

As a leading Knowledge Partner, Pusa Krishi extends its continuous support to 12 RABIs through online virtual meeting and monitoring session. Samarth workshop was organised on 22nd March 2021 at 10:30 AM. This workshop intends to understand the accomplishments and challenges that RABIs have experienced during the implementation of the project so far.

Agri India Meets

Six Agri India Meets with More than 40 speakers in these power-packed sessions discussing the today & tomorrow of agriculture were organized by Pusa Krishi. Agri India Meets created meaningful conversations & connections with the most important people in agriculture from businesses, startups, industry to policy, education, media and others. These virtual events are free and open-for-public. More than 3000 participant have enrolled and joined these meets.

Awards

Dr. Susama Sudhishri, Principal Scientist, WTC received "Women Achievers' of Odisha-2021" in a function organized by Prameya, News 7 and PPRACHIN of SOA at Bhubaneswar.

Dr. Susama Sudhishri, Principal Scientist, WTC received best scientist award from Agri Vision during its 5th National Conference held during March 6-7, 2021 held at NASC Complex New Delhi.

Dr. Kalidindi Usha and Dr Manoj Shrivastava, Principal Scientist's at CESCRA received the International Scientist Award-2021 sponsored by the VDGOD Professional Association, India.

Dr M S Saharan, Principal Scientist, Division of Plant Pathology was elected Fellow of National Academy of Agricultural Sciences (NAAS), New Delhi.

Corporate Membership

In the said quarter, unit enrolled new membership of 06 industry partners and membership of 06 existing members were renewed thereby generating revenue of ₹ 60,000.

National & International Visits at IARI

- The delegation from GBPU&AT led by Dr. Tej Pratap, Vice-Chancellor, visited IARI on February 22, 2021 to discuss the issues of Commercialization of Agricultural Technology



GBPU&AT Delegation with IARI Team

- ISO certification team from the Equalitas Certifications Limited, New Delhi, visited IARI on March 8, 2021 with regard to issue of ISO 9001:2015 Certification



ISO team interacting with Director, IARI

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