



RESEARCH HIGHLIGHTS

- Three medium maturity field corn hybrids, *viz.*, IMH 222, IMH 223, and IMH 224 were released and notified by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops (CSS on CSN&R VAC) in the 88th meeting held on June 17, 2022 and notified vide Govt of India Gazette notification No. S.O. 4065 (E) Dated: 31st August 2022.
- To develop CMS (Cytoplasmic Male Sterility) based baby corn hybrid, a total of nine lines, *viz.*, CMS 117, CMS 116, CMS 284, CMS 323, CMS 323-I, CMS 323-II, CMS 140, CMS 1105, CMS 1105-1 were converted into CMS lines. These converted lines and their maintainers, *viz.*, M 117, M 116, M 284, M 323, M 410, and M 1105 were evaluated at three locations (Ludhiana, Hyderabad, and Pantnagar). The tassel morphology and anther exertion percent reported at the time of flowering indicate that all the CMS lines showed 100% sterility and maintainers 100% fertility. It showed that sterility is not affected by the environment and can be used to develop the CMS-based baby corn hybrids. Further, the sterility of the tested lines has been confirmed through molecular markers (400 bp size) and their type (CMS -C).
- Candidate gene identification, validation, and constitutive gene-network analysis of identified Meta-QTL regions for fungal disease resistance in maize were performed. A total of 1910 candidate genes were identified for all the MQTL regions, with protein kinase gene families, TFs, pathogene
- sis-related, and disease-responsive proteins directly or indirectly associated with FDR. The comparison of physical positions of marker-traits association (MTAs) from genome-wide association studies with genes underlying MQTL interval verified the presence of QTL/candidate genes for particular diseases. The constitutive candidate genes were found to be involved in the tricarboxylic acid cycle, cofactor synthesis, amino acid, and secondary metabolism, along with the methylerythritol phosphate pathway, kievitone, and leucine biosynthesis.
- Seven nitrogen-fixing microbial strains were identified from conservation agriculture plots, which have the potential as biofertilizers. The sequences of the seven sequences were submitted to NCBI: SUB11639422 1_1382 OP249498, SUB11945177 2 OP247564, SUB11945177 3 OP247565, SUB11945177 4 OP247566, SUB11945177 5 OP247567, SUB11945177 6 OP247568 and SUB11945177 7 OP247569 by Alla Singh, Aundy Kumar, Sumit Aggarwal, K Charishma, Neelam Sheoran, Sunil Kumar, Diksha Verma, AK Singh, Deep Mohan, SL Jat, Shanti Devi Bamboriya and Sujay Rakshit.
- Application of pyroxasulfone PE at 0.12 kg/ha fb topamezone POE at 0.025 kg/ha or tembotrione 0.12 kg/ha was found to record higher weed control efficiency (91.1%) compared to atrazine PE at 0.5 kg/ha fb tembotrione POE at 0.12 kg/ha or topamezone POE at 0.025 kg/ha (83.8%). A higher grain yield (7.15 tha⁻¹) and net returns

- (81.5 X 103 Rs ha⁻¹) were recorded with pyroxasulfone PE at 0.12 kg/ha fb topramezone POE at 0.025 kg/ha in maize.
- Quality Protein Maize and white maize hybrids and landraces were used for *chapatti* making to identify maize genotypes with high nutritional value coupled with good chapatti-making qualities. The genotypes were assessed for their physical

characteristics, proximate composition, and *chapatti*-making quality. In addition, the rapid protocol designed for maize protein quality differentiation was deployed on the chapattis made from normal and QPM genotypes. The rapid protocol was found to successfully differentiate the *chapattis* based on their protein quality.

IMPORTANT EVENTS

Visit of a delegation from Nepal

A delegation from the Government of Nepal led by Sh. Bijay Kumar Yadav, Honb'le Minister, Ministry of Land Management, Agriculture and Co-operative, Govt. of Nepal, visited ICAR-Indian Institute of Maize Research, Ludhiana. Dr. Sujay Rakshit, Director, briefed the team about the maize research and development activities in the country. He highlighted that the institute has released 12 maize hybrids under

various categories in the last 5 years. which are gaining much popularity among farmers. The institute is also in the process of release of the first low-phytic acid maize hybrid in the country. The benefits of conservation agriculture were also briefed to the delegation. The delegation appreciated the activities of the institute more so the ready-to-eat product developed by the institute, which has immense potential to create rural entrepreneurship in the region and beyond.



Glimpse of the delegation from Nepal visited ICAR-IIMR

Har Ghar Tiranga Campaign

#HarGharTiranga campaign was launched at ICAR-IIMR to encourage people to hoist the Tiranga at home to mark the 75th year of India's independence.

Independence Day Celebration

ICAR- Indian Institute of Maize Research celebrates 76th Independence Day at Ladhowal and regional centers. Dr. Sujay Rakshit, Director, ICAR-IIMR hoisted the national flag and addressed the gathering on the

occasion. Staff and their family members participated in cultural and sports events. The director facilitated children of the staff for their performance in academics and in the special events organized to celebrate the Azadi Ka Amrit Mahotsav. A special program for the plantation of 75 Golden Rain tree plants in the memory of 75 years of independence was also organized. Regional centers also organized different events on the occasion.



A glimpse of the campaign



Independence Day Celebration at ICAR-IIMR Ladhawal farm

Rashtriya Ekta Diwas

On the occasion of Rashtriya Ekta Diwas and Vigilance Awareness Week, staff of the ICAR-IIMR took the integrity pledge to promote integrity, transparency, and accountability in public life along with Rashtriya Ekta Diwas pledge to observe National Unity Day on October 31, 2022.



ICAR-IIMR staff undertaking the integrity pledge

Signing MOUs for commercializing technologies and research collaboration

During this period, the institute has signed four Memorandum of Understanding (MoUs) for its three hybrids with private partners through *Agrinnovate* for commercializing the same for next five years. The MoU for commercialization of LQMH1, maize hybrids was signed with Invita Agritech India Pvt. Ltd. and Ramnagar Seed Farms Pvt. Ltd. while with Padamati-1 watershed Association for DMRH1308 and with Ramnagar Seed Farms Pvt. Ltd for DMRH 1301. Further, four MOUs have been signed for research and teaching activities. In brief, one MOU was signed between ICAR-IIMR and PJTSAU for Research and teaching on 19th October 2022. The second MOU with CSIR-IMTECH, Chandigarh to conduct collaborative research on various aspects of Maize.

The third MOU was signed with Agri solution private limited. Another MOU was exchanged with UpjaoAgritech LLP, an Ahmedabad-based startup on the use of AI and ML on the application of image processing in maize grain characteristics. UpjaoAgritech LLP has joined as an Incubatee under the Agri-Business incubation center of ICAR-IIMR, Ludhiana. The collaboration aims at empowering each node of the agri-

commodity supply chain of maize with a technology-led quality assessment, which is easy, affordable, and accurate without human bias. The smartphone-based technology will be based on artificial intelligence and machine learning and will strengthen the maize supply chain enabling the stakeholders in realizing better prices of maize.



Exchange of MOUs

Swachhta Pakhwada

ICAR-IIMR, Ludhiana, and its regional centers organized the “Swachhta Pakhwada” from 16-31st December 2022. The staff of the institute took the Swachhta pledge on 16th December. The Banner of ‘Swachhta Pakhwada’ was displayed across the center. Various cleanliness and beautification drives involving the collection of single-use plastic, cleaning of debris, farm waste, and cutting of weeds, etc in the office premises and farm were

also undertaken during the pakhwada. The threshing unit is also cleaned and the marigold seedling is planted near the threshing floor to increase the aesthetic value. Further, the institute conducted social media campaign on resource conservation through the recycling of used water. The themes of the campaign were on recycling grey water. Posters on these themes were shared on the institute’s Facebook and Twitter pages for wider awareness using different tags.



Glimpses of the Swachhta Pakhwada activities

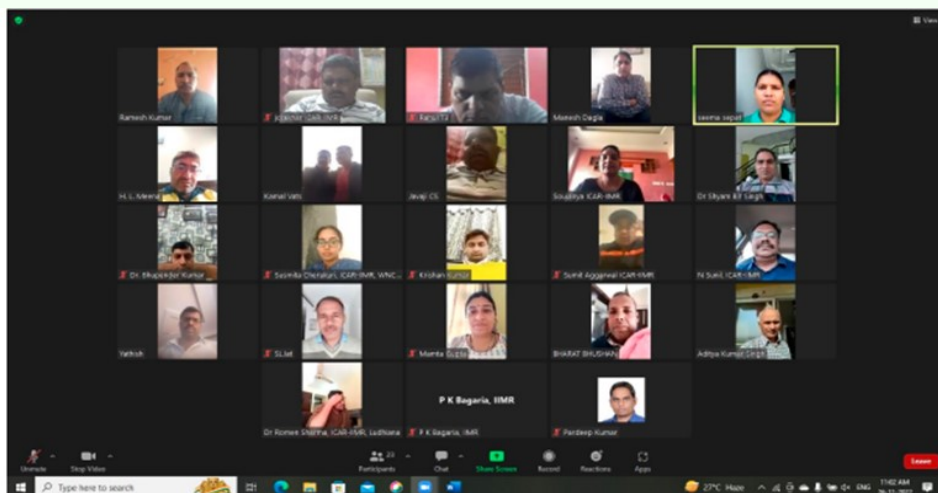
Constitution Day Observation

ICAR-IIMR, Ludhiana celebrated Constitution Day also known as 'Samvidhan Divas', on 26th November 2022 to commemorate the adoption of the Constitution of India. The staff of the institute read the Preamble of the Constitution. The online pledge was also taken by the staff. Dr. A K Singh, Principal Scientist, ICAR-IIMR asked to reaffirm our pledge to protect our constitutional values.

Other Important events

ICAR-IIMR also celebrated important national events like Constitution Day, Hindi Diwas, and World Soil Day with great zeal and enthusiasm. Dr. A K Singh, Director, ICAR-IARI, New Delhi visited the research field of ICAR-IIMR, Ladhawal Farm on August 18, 2022. He interacted with the Scientific staff and appreciated them for their hard work in the development and commercialization of different maize hybrids. Dr S K Chaudhari, DDG-NRM, ICAR visited ICAR-IIMR, Ludhiana on August 18, 2022. He visited research Labs and interacted with the scientists and admin staff. Later, he visited the institute's research farm and new institute building at Ladhawal, Ludhiana. He was apprised of the ongoing research activities. He appreciated the ICAR-IIMR team and

Director for their hard work and achievement despite limited resources. Besides, ICAR-IIMR in collaboration with Regional Remote Sensing Centre (RRSC) - North, ISRO organized a one-day online training programme on "Geo-database creation of Maize Fields: Demonstration of Ground Truth information collection using MAPAD App" on 12 September 2022. The training programme will be helpful in the estimation of maize area using Remote sensing. Further, it will also be helpful in monitoring different Front Line Demonstrations (FLDs) under different outreach programmes. In the other training and capacity building, 15 Assam government officials (ADOs) led by Mr. Madhuram Patiri, Joint Director visited ICAR-IIMR Ludhiana in collaboration with IRRI Associate Scientist Dr. Suryakanta Khandai on 24th September 2022. ICAR-IIMR, Ludhiana also exhibited its Technologies during the Punjab Agricultural University Kisan Mela held on 23-24 September 2022. Furthermore, the institute exhibited its Technologies during the ICAR-CIPHET industry interface Fair on Agro-processing & Kisan Mela-2022 held on 3rd October 2022. Other than that, ICAR-IIMR, Ludhiana, took part in the live telecast of 'Mission LiFE Launch' event on October 20, 2022, by the Hon'ble Prime Minister Shri Narendra Modi.



ICAR-IIMR staff undertaking the pledge

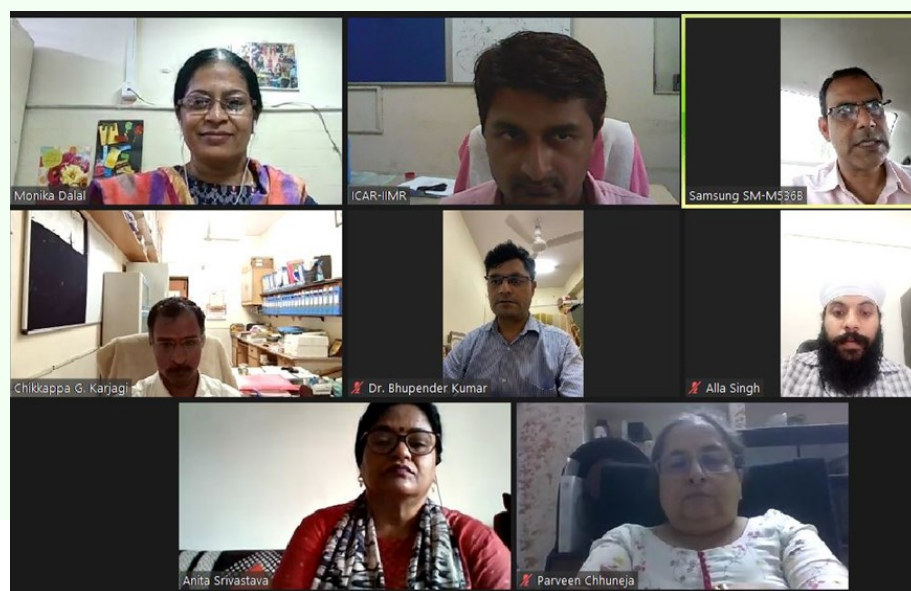
IMPORTANT MEETINGS

Institutional Biosafety Committee (IBSC) meeting

The Institutional Biosafety Committee (IBSC) meeting of ICAR-Indian Institute of Maize Research (IIMR), was held online via video conferencing on 8th July 2022 under the Chairmanship of Director ICAR-IIMR. The following members – Dr. Sujay Rakshit (Director & Chairman), Dr. Parveen Chhuneja, (Principal Molecular Geneticist, PAU, Ludhiana & DBT nominee), Dr. Anita Srivastava (Medical Officer IARI dispensary & Biosafety Officer), Dr. Monika Dalal (Principal Scientist, NIPB & outside expert), Dr. Chikkappa G. Karjagi (Sr. Scientist, ICAR-IIMR Delhi Unit & member), Dr. Bhupender Kumar (Scientist, ICAR-IIMR Delhi Unit & member), Dr. Alla Singh (Scientist, ICAR-IIMR Ludhiana & member) and Dr. Krishan Kumar (Scientist, ICAR-IIMR Delhi Unit & Member Secretary) attended the online IBSC meeting. The committee reviewed the biosafety aspects of ongoing in-house project that involves the use of rDNA technology/ Genetically Modified Organisms (GMOs) and found them to be satisfactory.

Quinquennial Review Team Meeting

Under the Chairmanship of Padma Shri Dr. BS Dhillon and members Drs. I S Singh, C R Ballal, S S Punia and R Ramakumar, two meetings of QRT were held to review the work done by ICAR-IIMR and AICRP on Maize during the five years from 2017 to 2021. The meeting was organized on 4-7th November 2022 at Hyderabad to Review of Peninsular Zone centres namely Hyderabad, Coimbatore, Dharwad, Kolhapur, Vagarai, Peddapuram, Mandya, Rahuri and Karimnagar. From Nov 14-16, 2022 the QRT team reviewed the Northern Hill Zone centres (Srinagar, Almora, Bajaura), North Western Plain Zone centres (Ludhiana, Karnal, Pantnagar) and Central Western Zone centres (Udaipur, Banswara, Chhindwara and Godhra). The QRT team visited major AICRP centres representing each zone and ICAR-IIMR stations including commercial seed production areas. The research programme of each station was reviewed based on their presentation and field visit. The farmer-scientist-industry interface meetings were held to know the stakeholders' needs and develop better perceptions for fine-tuning the research programme as per their requirements.



Members discussing agenda items during the IBSC meeting



Few glimpses of the QRT meeting

EXTENSION AND OUTREACH

District-Level Maize Day

On Sep 17, 2022, district-level 'Maize Day' was organized at village Ucha Sumana, Karnal District Haryana, jointly by ICAR-IIMR, CIMMYT, CSSRI, CCS HAU, and the State Department of Agriculture. All farmers who took up maize reiterated that they

could grow a good crop with 2-3 irrigation max and expect a minimum of 25 q/ac. Marketing is a challenge to realize the potential of maize in crop diversification. Dr. S.L. Jat, Sr. Scientist, explained farmer about the potential of maize for silage and other specialty corns.



Program glimpses of the District Maize Day

State-Level Maize Day

For creating awareness regarding the potential of maize for crop diversification in Haryana under “Participatory innovation platform on potential yield realization of maize-based cropping system in Punjab and Haryana”, ICAR-IIMR, Ludhiana and CIMMYT organized State level maize day on September 22, 2022 at Chhattan Village, Shahzadpur Block, Ambala in association with ICAR-CSSRI, Karnal; CCS HAU, Hisar, Haryana State Department of Agriculture & Farmers Welfare and Krishi Vigyan Kendras of Haryana. Haryana with the highest production of broilers has a demand of over 30 lakh tonnes of maize grains annually but produces only 20 thousand tonnes. Low yield realization in farmer’s fields and lower market price compared to rice are the stumbling blocks to popularizing maize. The platform has demonstrated up to 30 q/acre maize yield possible with the adoption of good production practices. The main purpose of the event was to create awareness among the farmers and policymakers on the potential of maize in crop diversification in the state. Practicing farmers shared their experiences and the event created much enthusiasm among the participating farmers. Chief Guest of the function, Shri JP Dalal, Hon’ble Minister of Agriculture and Farmer’s Welfare, Govt. of Haryana underlined the initiatives taken by the Government of Haryana towards crop di-

versification, under which a subsidy of Rs. 7000 per acre is being given for growing maize. However, still maize is not gaining popularity, while the government is keen to encourage maize as an alternative to rice. He highlighted the potential of silage maize in the state and assured all support to promote the technology. The Guest of Honour, Dr. P.K. Singh, Agriculture Commissioner, Govt. of India admired the efforts being made by the ICAR-IIMR and its partners not only in bringing out maize technologies but demonstrating before the farmers its potential. He expressed his hope that with such efforts more farmers will be encouraged to grow maize and a maize-based sustainable ecosystem will be built in the region. He assured that the Central government will support viable schemes to promote maize in the state. Dr. Sujay Rakshit, Director, ICAR-IIMR, Ludhiana added that in addition to water saving and incorporation of the crop residue at ease with reduced crop duration compared to rice, maize enables early wheat or other rabi crop plantation enabling skipping of terminal heat stress. He urged to promote maize-mustard-mung bean cropping system to protect the environment and ensure crop diversification, along with increased oil and pulse production. Dr. PC Sharma, Director, ICAR-CSSRI, Karnal stressed that out scaling of best management practices in maize is key to



Glimpses of the State-Level Maize Day

harness the full potential of maize in crop diversification. Dr. Mahesh Gathala, CIMMYT, Dr. Jeet Ram Sharma, Director Research, CCS Haryana Agricultural University, Hissar, Dr. Sain Dass, former Director Maize, ICAR also addressed the gathering and highlighted the potential of maize to diversify the rice-based cropping system in the state, which needs strong policy support and political will. Stalls of different institutes, ICAR-IIMR, CIMMYT, and private

enterprises showcased their maize technologies, machinery, and products to guests and visitors. More than 600 farmers attended the program and also 15 progressive farmers including women farmers were honored by the Chief guest.

Student visit

Exposure visit of students of the Saraswati Modern Senior Secondary School, Ludhiana was organized under SSR activity of SERB funded project.



Glimpses of student visit at ICAR-IIMR

HUMAN RESOURCE DEVELOPMENT

Participation in training programs

Sl. No.	Scientist	Training programme attended	Venue	Date
1	Dr. Krishan Kumar	Genetically Engineered (GE) Plants: Biosafety considerations, Policies, Challenges and detection strategies	ICAR- National Bureau of Plant Genetic Resources (NBPGR), New Delhi	July 19-25 2022
2	Dr. Sumit Kumar Aggarwal	Online training on “Biosecurity and Biosafety: Policies, Diagnostics, Phytosanitary Treatments and Issues”	ICAR- National Bureau of Plant Genetic Resources (NBPGR), New Delhi	August 2-11, 2022
3	Ms. Susmita C.	Advanced Wheat Improvement Course 2022	CIMMYT, Mexico in collaboration with Cornell University (virtual mode)	September 19-October 14, 2022
4	Ms. Susmita C.	Biometrics and Breeding Schemes Optimization	CIMMYT, Hyderabad	October 31- November 2, 2022
5	Dr. Yathish K.R	Training on Doubled Haploid production in Maize	DH facility unit, Kunigal, Karnataka	December 23 -27, 2022

Participation in Conferences/Workshops/Symposium/Meetings

Sl. No.	Name of scientist	Foreign visits/Conference/Seminar/Workshop/meeting attended	Venue/Organized by	Date
1	Dr. Seema Sepat	Delivered Oral presentation in IV th International conference on ICAAS-2022	Himachal Pradesh University, Shimla, HP	June 12 -14, 2022
2	Dr. Yathish KR	Tending Mendel's Garden for a Perpetual and Bountiful Harvest: A three-day symposium commemorating birth bicentenary of Gregor Johann Mendel	ICAR-Indian Agricultural Research Institute (IARI), New Delhi	July 19-21, 2022
3	Ms. Susmita C.	Tending Mendel's Garden for a Perpetual and Bountiful Harvest: A three-day symposium commemorating birth bicentenary of Gregor Johann Mendel	ICAR-Indian Agricultural Research Institute (IARI), New Delhi	July 19-21, 2022
4	Dr. Abhijit Kumar Das	Refresher Webinar on Fall Armyworm Management in South Asia	CIMMYT (Virtual mode)	July 21, 2022
5	Dr. SB Singh	Annual review & planning meeting of ICAR-CIMMYT collaborative project "Heat Tolerant Maize	CIMMYT, Hyderabad	October 19-20, 2022
6	Dr. Mamta Gupta	Attended webinar "DDGS for Animal Feed: Opportunities and Challenges"	Organized jointly by Biotech Consortium India Limited and leading industry associations viz. The Compound Livestock Feed Manufacturers' Association of India (CFLMA), Karnataka Poultry Farmers & Breeders Association (KPFBA), All Indian Poultry Breeders Association (AIPBA) and Broiler Coordination Committee (BCC).	November 11, 2022
7	Dr. S. B. Singh	Organizing convener of International Web Conference on Global Research Initiatives for Sustainable Agriculture & Allied Sciences (GRISAAS-2022)	Birsa Agricultural University, Ranchi, Jharkhand, India (Online)	November 21-23, 2022

Sl. No.	Name of scientist	Foreign visits/Conference/Seminar/Workshop/meeting attended	Venue/Organized by	Date
8	Dr. SB Singh	International Web Conference on Global Research Initiatives for Sustainable Agriculture & Allied Sciences (GRISAAS-2022)	Birsa Agricultural University, Ranchi, Jharkhand, India (Online)	November 21-23, 2022
9	Dr. Dharam Paul	19 th Biennial International Conference of Animal Nutrition Society of India	Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana	November 16-18, 2023
10	Dr. P. Lakshmi Soujanya	3 rd National symposium Entomology 2022: Innovation and Entrepreneurship.	Professor Jayashankar Telangana State Agricultural University (PJ TSAU)	December 8-10, 2022

Awards/Honours/Recognition

- Dr. N. Sunil was awarded with Fellow of the Indian Society of Plant Genetic Resources (ISPGR) for the year 2021 on August 20, 2022 at Dr B P Pal Auditorium, ICAR-NBPGR, New Delhi .

- Dharam Paul was awarded with Best Paper Presentation Award during the 19th Biennial International Conference of Animal Nutrition Society of India, held at GADVASU, Ludhiana during November 16-18, 2022.

Lecture /TV/ radio talks delivered delivered

Sl. No.	Name of scientist	Lecture delivered	Organized by	Date
1	Dr. Shankar Lal Jat	खरीफ मक्का की बुवाई एवं उन्नत किस्में, किसान की बात कार्यक्रम	FM Gold	July 11, 2022
2	Dr. Shankar Lal Jat	खरीफ मक्का की बुवाई, हेल्लो किसान लाइव कार्यक्रम	DD Kisan	July 13, 2022
3	Dr. Dharam Paul	Makki di fasal di kashat ate sambhavanavan	Mera Pind Mere Khet Program, Jalandhar, Doordarshan	July 30, 2022
4	Dr. Dharam Paul	Makki da achar (krantikari fasal badlav)	Mera Pind Mere Khet Program, Jalandhar, Doordarshan	October 22, 2022
5	Dr. Shankar Lal Jat	रबी मक्का की बुवाई एवं उन्नत किस्में, किसान की बात कार्यक्रम	FM Gold	October 28, 2022

Sl. No.	Name of scientist	Lecture delivered	Organized by	Date
6	Dr. P. Lakshmi Soujanya	“Assessment of post-harvest losses of agri produce in India pertaining to cereals with special emphasis on maize”	During National seminar on “Assessment of post-harvest losses of agriproduce in India” conducted by NABCONS	October 30, 2022
7	Dr. Seema Sepat	पॉली हाउस परियोजना in चौपाल चर्चा	DD Kisan	November 3, 2022
8	Dr. Suby SB	Identification of insect pests of maize and their management	Technical training on “Diagnosis and management of economically important insects in Agriculture is scheduled during at Division of Entomology, ICAR- IARI, New Delhi	November 16, 2022
9	Drs. Alla Singh and Sujay Rakshit	“Maize Silage in relation to Livestock Security and Bovine Health’	In 19 th Biennial International Conference on Nutritional Technologies to Augment Livestock, Poultry, Canine and Fish Production for Global Competitiveness.	November 16-19, 2022
10	Dr. Shankar Lal Jat	रबी मक्का की देखभाल और समसामयिक कार्य, हेल्लो किसान लाइव कार्यक्रम	DD Kisan	December 9, 2022
11	Dr. Seema Sepat	Agro-tourism in चलो गांव चलें	DD Kisan	December 22, 2022

Organization/ Participation of Kisan Mela/Kisan Goshti/ Exhibition/ Field Day/ Lectures

Name of the Scientist	Name of the Program	Venue	Date
Drs. Sujay Rakshjit, SL Jat, Romen Sharma and Ramesh Kuamr	Organized state Level Maize-day under “Participatory Innovation Platform on Potential Yield Realization of Maize-based Cropping Systems in Punjab and Haryana” programme by ICAR-CIMMYT in collaboration with CCSHAU, and state department of agriculture	Chhattan Village, Shahzadpur Block, Ambala	September 22, 2022
Dr. BS Jat	Organized Haryana State Level Maize Field Day	Chettan, Ambala, Haryana	September 22, 2022
Dr. BS Jat	Attended “Kisan Mela” on the theme “Kisan bhagidari prathmikta hamari abhiyaan”	KVK, Moga	April 26, 2022
Dr. BS Jat	Exhibited ICAR-IIMR technology at Punjab Agricultural University (PAU) “Kisan Mela” 2022	Punjab Agricultural University (PAU), Ludhiana	September 23-24, 2022
Dr. BS Jat	Exhibited ICAR-IIMR technology at CIPHET Foundation Day and Krishi Expo 2022	Central Institute of Post-Harvest Engineering & Technology (CIPHET), Ludhiana	October 3-4, 2022
Dr. Mamta Gupta	Exhibited ICAR-IIMR technology at Punjab Agricultural University (PAU) “Kisan Mela” 2022	Punjab Agricultural University (PAU), Ludhiana	September 23-24, 2022

Nurturing diversity, Resilience, Livelihood and Industrial inputs



ICAR-IIMR Newsletter : July-December, 2022

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