



# IARI NEWS



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## *Krishi Unnati Mela-2018*

The national agricultural fair *Krishi Unnati Mela-2018*, with a major theme of doubling farmers' income by 2022, was organized at the campus of Indian Agricultural Research Institute (IARI), New Delhi from March 16 to 19, 2018. It was a collaborative venture of Indian Council of Agricultural Research (ICAR)/Department of Agricultural Research & Education (DARE) and Department of Agricultural Cooperation (DAC), Ministry of Agriculture and Farmers' Welfare. The *mela* was inaugurated by



Hon'ble Prime Minister of India, Shri Narendra Modi addressing the audience at *Krishi Unnati Mela-2018* at IARI Mela ground

Hon'ble Union Minister of Agriculture and Farmers' Welfare, Shri Radha Mohan Singh. Hon'ble Union Ministers of State for Agriculture and Farmers' Welfare Shri Parshottam Rupala, Shri Gajendra Singh Shekhawat and Smt. Krishna Raj also graced the occasion. In his keynote address, Shri Radha Mohan Singh stated that India is moving towards a Digital and Mobile revolution and even far-flung villages have access to mobile phones, and dissemination of information on research and development in agriculture will be easy in near future.

The 10<sup>th</sup> National Conference of *Krishi Vigyan Kendras-2018* was also organized during the *mela* (March 16-17, 2018). The theme of the conference was "Technology for Doubling Farmers' Income". The conference was inaugurated by Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR). Shri Chhabilendra Roul, Additional Secretary (DARE) & Secretary (ICAR), Dr. A.K. Singh, Deputy Director General (Agricultural Extension) & Director, IARI (Additional Charge) also graced the occasion.

The occasion was graced by Hon'ble Prime Minister of India, Shri Narendra Modi who visited the *Krishi Unnati Mela-2018* on March 17 and addressed a huge gathering of the farmers, agricultural scientists and other participants. Hon'ble Prime Minister inaugurated the *Jaiwik Kheti* portal and laid the foundation stone of 25 KVKs, besides launched an e-marketing portal for organic products. He gave away the *Krishi Karman Awards* and *Pandit Deen Dayal Upadhyaya Krishi Protsahan Puraskar*. Addressing the gathering, Hon'ble Prime Minister said that such *Unnati Melas* play a key role in paving the way for New India. He appreciated that he had the opportunity to

simultaneously speak to two sentinels of New India – farmers and scientists. He said farmers and scientists have to work together to transform agriculture. While appreciating the spirit and the hard work of farmers and their achievements in agriculture, he mentioned present problems of agriculture, which reduced farmers' income while increasing the input cost and expenditure. Speaking about the progress made, Hon'ble Prime Minister said that more than 11 crore soil health cards have been distributed so far. Cent per cent replacement of conventional urea with neem coated urea has also resulted in lowering expenditure on fertilizer, apart from raising productivity. He said the *Pradhan Mantri Krishi Sinchai Yojana* envisions water for every farm. Rupees 80,000 crore are being spent to complete pending irrigation projects. He said the *Kisan Sampada Yojana* is helping in strengthening the supply chain from the farm to the market and is creating modern agriculture infrastructure.



Dr. T. Mohapatra, Secretary, DARE and Director-General, ICAR welcoming Hon'ble Union Minister of Agriculture and Farmers' Welfare, Shri Radha Mohan Singh during *Krishi Unnati Mela-2018*

Hon'ble Prime Minister informed the gathering that, several Model Acts related to farmers' welfare have been prepared and State Governments have been urged to implement them. Government is working to ensure that farmers get improved seeds, adequate power supply, and easy market access. The farmers Unions and Organizations would be given relief on income tax, on the lines of cooperative societies. Now the minimum support price (MSP) will be raised to one and a half times the production cost of all notified crops. Comprehensive steps are being taken for Agriculture Marketing Reforms to connect rural retail markets with wholesale and global markets. He said that in the recent Union Budget, the concept of *Grameen* Retail Agriculture Markets has been envisaged. Twenty two thousand rural *haats* will be upgraded with necessary infrastructure, and integrated with APMC and the e-NAM platform. The Prime Minister also emphasized the importance of Farmer Producer Organizations, and mentioned that Farmer Producer Marketing Reform is being added in this programme with the e-marketing portal for organic products. According to him, along with the Green Revolution and White Revolution, we must stress on Organic Revolution, Water Revolution, Blue Revolution, and Sweet Revolution. He said that the *Krishi Vigyan Kendras* (KVKs) will play a key role in this regard. The Prime Minister mentioned the importance of Bee-keeping as an additional source of income for farmers. At the same time, he spoke about the benefits of harnessing solar power in agriculture. He informed the gathering about the *Go-Bar Dhan Yojana* for creating compost, bio-gas, etc. from bio-waste. The Prime Minister warned about the deleterious effect of crop residue burning, and benefits of recycling them by incorporation into soil biomass as manure or mulch. The Government is working to ensure the availability of adequate credit in agriculture. The Prime Minister encouraged the organization of

*krishi mela* of this kind and said that such events should also be held in far-flung areas. However, he also called for impact analysis of such events.

The *Jaivik Mahakumbh* pavilion was a special attraction to showcase techniques for organic crop production. A *Sahakar Sannmelan* was also organized to boost cooperative societies in agriculture. Apart from this, 9 sessions of farmers-scientists interaction (3 seminars per day) were also organized on important issues. Exclusive seed selling counters were also put up in the fair. Theme pavilions focused on ways to enhance farmers' income by dissemination of ideas and novel inventions such as micro-irrigation, neem-coated urea, soil check/Soil Health Card, reducing cost through less use of fertilizer, effectiveness of crop insurance scheme and new avenues of income generation, such as animal husbandry, bee-keeping, poultry farming, etc. More than 800 stalls of the Central and State Governments and various private agencies were set up. Farmers had a glimpse of improved farming through live demonstrations.

On 18<sup>th</sup> March during Valedictory Ceremony, Hon'ble Union Minister of Agriculture and Farmers' Welfare, Shri Radha Mohan Singh felicitated 6 farmers with 'IARI-Fellow Farmer Award' and 44 progressive farmers with 'IARI-Innovative Farmers Award' which included four women



Hon'ble Union Minister of Agriculture and Farmers' Welfare, Shri Radha Mohan Singh presenting fellow farmer award during *Krishi Unnati Mela-2018*

farmers from different states of India. Hon'ble Ministers of State for Agriculture & Farmers Welfare, Shri Parshottam Rupala and Smt. Krishna Raj; Shri Surya Pratap Shahi, Hon'ble Agriculture Minister of Uttar Pradesh; Shri Tarun Shridhar, Secretary, DADF; Dr. Trilochan Mohapatra, Secretary, DARE & Director-General, ICAR; Dr. A.K. Singh, Director, IARI & DDG (Agriculture Extension), ICAR; Dr. Ashok Dalwai, Chief Executive Officer, National Rainfed Area Authority, Ministry of Agriculture and Farmers Welfare; Dr. J.P. Sharma, Joint Director (Extension), IARI and other dignitaries were also present during valedictory ceremony. Shri Radha Mohan Singh delivered the valedictory address and also launched a new mobile app called PUSA m KRISHI® for farmers in order to take the technology to farm. In his address, he reiterated the central role of new and innovative farm technologies in doubling income of farmers. He said that modern technologies and crop varieties must reach to farmers without any time lag and must be demonstrated on farmers' fields for winning the confidence of farmers. The government is working towards increasing the usage of technology by the farmers under various schemes like *Pradhan Mantri Krishi Sinchai Yojana*, Soil Health Card Scheme and Traditional Agriculture Development Scheme (*Paramparagat Krishi Vikas Yojana*), etc. with a vision of doubling farmer's income by 2022. More than one lakh farmers from across the country visited the fair and gained useful knowledge and information.

## IARI Holds 56<sup>th</sup> Convocation

The 56<sup>th</sup> Convocation of the Post Graduate School of the Indian Agricultural Research Institute was held on February 9, 2018. Hon'ble President of India, Shri Ram Nath Kovind was the Chief Guest. Hon'ble Union Minister of Agriculture and Farmers Welfare, Shri Radha Mohan Singh presided over the function. Dr. T. Mohapatra, Secretary, DARE & Director-General, ICAR, former Director-Generals of ICAR and former Directors of IARI also graced the occasion. The Chief Guest presented the medals and awards to the students, while the Chairman presented the degrees to the students and awards to the faculty. The Chief Guest released IARI publication and 19 IARI varieties of different crops. In his convocation address, the Chief Guest highlighted the importance and priorities in field of agricultural research and education. Dr. A.K. Singh, DDG (Agricultural Extension), ICAR & Director, IARI presented his report on the significant research achievements of the Institute during 2017, while Dr. R.K. Jain, Dean & Joint Director (Education), IARI presented the vote of thanks.

During the Convocation, 237 candidates (133 M.Sc., 7 M.Tech. and 97 Ph.D.) including 14 (12 M.Sc./M.Tech. and 2 Ph.D.) international students were awarded degrees. One student each in M.Sc. (Ms. Priti Priyadarshani, Agricultural Extension) and Ph.D. (Ms. N.

Anuradha, Genetics & Plant Breeding) were awarded the Best Student of the Year Awards. Five students each in M.Sc. and Ph.D. received IARI Merit Medals. Dr. V. K. Baranwal, Professor of Plant Pathology and Dr. T.K. Behera, Professor of Vegetable Science jointly received the Best Teacher Award-2017 for their achievements in academics. The twentieth Sukumar Basu memorial award for the biennium 2015-16 was awarded to Dr. V.K. Singh, Head, Division of Agronomy for his outstanding research contributions towards "Site-specific Nutrition Management System and Integrated Farming System (IFS) Model for Small Holders". The eighteenth Hari Krishna Shastri Memorial Award for the year 2017 was awarded to Dr. Radha Prasanna, Principal Scientist, Division of Microbiology for her outstanding research contribution in the field of "Exploring Cyanobacteria Capabilities as Plant Growth Promoting and Biocontrol Agents". Fourth Dr. A.B. Joshi Memorial Award for the biennium 2017-18 was awarded to Dr. P.K. Agrawal, Assistant Director General (NASF), ICAR for his outstanding research contributions in "Quality Protein Maize (QPM) Breeding and Institution Building".



Dr. Girish Sahni delivering the 48<sup>th</sup> Lal Bahadur Shastri Memorial Lecture



IARI Best student in Ph.D receiving award from Hon'ble President of India, Shri Ram Nath Kovind during the Convocation

As a part of the Convocation Week, Dr. Girish Sahni, Secretary, DSIR & Director General, CSIR delivered the 48<sup>th</sup> Lal Bahadur Shastri Memorial Lecture on the topic "The Joy, Tribulations and Opportunities in Scientific Innovation: Personal Insights" on February 8, 2018. Dr. T. Mohapatra, Secretary DARE & Director-General, ICAR presided over the function.

## RESEARCH

### *In-vitro* Protocol for Efficient Regeneration of French Marigold (*Tagetes patula* L.)

*In-vitro* protocol for efficient regeneration of French marigold (*Tagetes patula* L.) was developed from ray floret and thalamus explants. MS medium supplemented with BAP (1.0 mg/l) and IAA (0.5 mg/l) exhibited high regeneration from ray florets, whereas, MS media along with BAP (1.0 mg/l), KIN (0.5 mg/l) and IAA (1.0 mg/l) showed high regeneration from thalamus explant of French marigold var. Pusa Deep. High proliferation was found with MS + BAP (0.5 mg/l) + NAA (0.1 mg/l), shoot elongation MS+ GA<sub>3</sub> (0.5 mg/l) and maximum rooting with MS+IBA (0.5 mg/l). *In-vitro*

hardening of plantlets was high in plastic cups having Peat + Soilrite mixture saturated with ½ strength MS medium. Hardened plants were transferred to main field and further characterized using morphological markers.

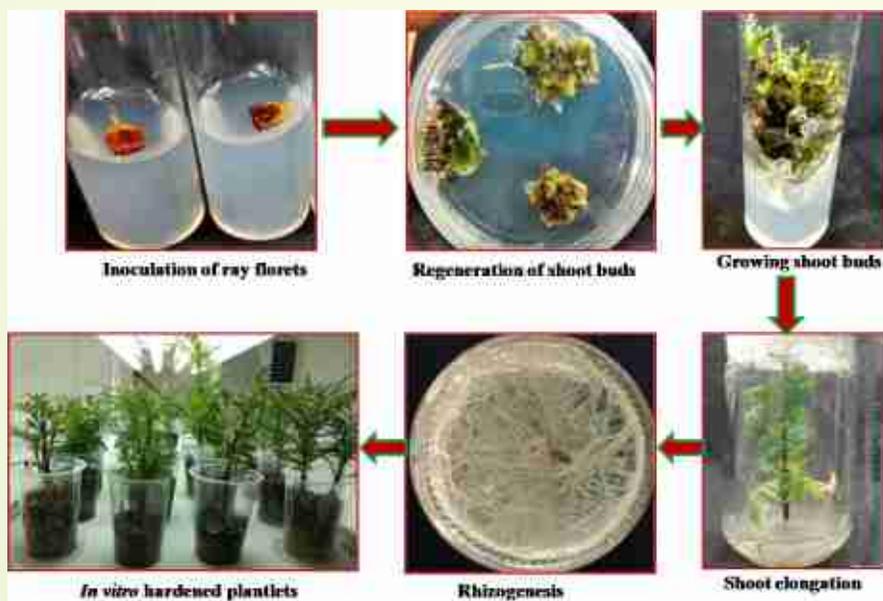
### Standardization of Phytic Acid Estimation Method

The Institute's Division of Biochemistry has developed an improved, quantitative technique for accurate estimation of phytic acid (PA) using HPLC. A rapid PA extraction method utilizing sonication of sample in 0.78 M HCl for 3 min. followed by mechanical agitation and separation on a strong anion exchange (SAX) column in a vacuum manifold has been optimized. The elution of PA uses an RP-C<sub>18</sub> column with an

isocratic mobile phase [Acetonitrile, 35 mM formic acid and tetrabutyl ammonium hydroxide (4.8: 5.1: 0.1, v/v/v)] and this modified method has been found to be precise and reproducible with a relative standard deviation of 1.80 and 3.01 % ( $n = 10$ , for 1 mg ml<sup>-1</sup>) for within and between days, respectively, with linearity ( $R^2 = 0.999$ ,  $P < 0.05$ ), low limit of detection (LOD = 7.8 µg ml<sup>-1</sup>) and limit of quantification (LOQ = 31.25 µg ml<sup>-1</sup>).

### Locally Adapted Host Differentials Developed for Indian Pathotypes of Wheat Leaf Rust

NP 4 was selected as a background parent which is not known to carry any *Lr* gene or suppressor factor for leaf rust resistance, being early maturing, slow rusting, lodging-tolerant, non-shattering, heat and drought tolerant, and bold seeded variety. Earlier a total of 9 differentials carrying *Lr1*, *Lr2a*, *Lr2c*, *Lr3a*, *Lr9*, *Lr10*, *Lr15*, *Lr17a* and *Lr20* were developed in NP 4 background and registered. Now the NILs carrying leaf rust genes *Lr13*, *Lr18*, *Lr19* and *Lr26* were developed by backcrossing NP 4 line with thatcher lines carrying these genes. A total of six backcrosses were done in succession followed by



*In-vitro* protocol for efficient regeneration of French marigold (*Tagetes patula* L.)

selection and testing which was completed in 2015-16. HI KK10 (NP4+Lr13) (IC0624491, INGR17034), HI KK11 (NP4+Lr18) (IC0624492, INGR17035), HI KK12 (NP4+Lr19) (IC0624493, INGR17036) and HI KK13 (NP4+Lr26) (IC0624494, INGR17037) carrying these leaf rust resistance genes were registered with ICAR-NBPGR, New Delhi.

**HI 8751 (IC0623451; INGR 17032) and HI 8765 (IC0624495; INGR17038) Registered**

IARI Regional Station, Indore has developed two *durum* genetic stocks viz., HI 8751 (HD 4685/HI 8634) and HI 8765 (HI 8504/CPAN 6206//HI 8627) which were registered at ICAR-NBPGR, New Delhi as genetic stocks with multiple disease resistance. These *durum* wheat genotypes showed high levels of adult-plant resistance to most prevalent and virulent pathotypes like 77-5 and 104-2 of leaf rust, 40A and 117-6 of stem rust, and 46S119 and 78S84 of stripe rust in isolated nurseries. They also showed resistance to other diseases like flag smut and Karnal bunt. Hence, they can be utilized in *durum* wheat improvement as potential resistance donors to breed new varieties.

### Identification of Best Sowing Date of Wheat Cultivars Using APSIM-Wheat Crop Model

A methodology involving crop simulation model that saves time and effort, furthermore it is specific to location and cultivar was attempted using APSIM – Wheat crop model. This study was performed with ten different wheat cultivars calibrated and validated for crop yield based on experimental observations under normal irrigation condition at New Delhi. Crop model was then used to identify the best sowing date in terms of yield by performing the crop simulation for each day of sowing from October 15 to December 15. Simulation studies clearly showed that the sowing of wheat cultivars during second week of November gave the highest yield. Apart from this, the results from the simulation modeling were validated through experiments conducted on staggered sowing of wheat at 15 days of interval from October 15 to December 15. Pooled statistical analysis showed high  $R^2$  (0.939) and low values of RMSE (305 kg/ha) and MBE (432 kg/ha) with a Modelling Efficiency of 84.1%. Thus, APSIM-Wheat model can effectively be used to identify

the best sowing date of wheat cultivars.

### Monitoring Paddy Residue Burning in Punjab and Haryana States

There is a practice of open crop residue burning in the months of October and November after the harvest of paddy by the farmers, especially in the states of Punjab and Haryana where mechanized harvesting of *basmati* paddy by combine harvesters is prevalent. Real time monitoring of residue burning between October 10 and November 20, 2016 using satellite data available from IARI Satellite Ground Station was undertaken. The daily thermal infrared images from MODIS, VIIRS and AVHRR sensors were used to determine a large anomaly in the Land-Surface-Temperature (LST), an indicator of active fire. Fire intensity was also estimated based on the extent of LST anomaly. In Punjab, the first major burning event happened on October 18, though majority of burning happened from November 2 to 11, 2016. In Haryana also, the first major burning event was observed on October 10 and later on November 9 to 11, 2016. Paddy residue burning area was estimated to be 2.53 Mha (~83% of paddy area) in

Punjab and 0.36 Mha (29% of paddy area) in Haryana. The number of fires and extent of burning was significantly higher in 2016 than in 2015.

## EXTENSION

### Participation in Exhibitions

The Institute organized/participated in the following agricultural exhibitions/*melas* for display/sale of IARI technologies, products, services and publications:

- Exhibition organized on the occasion of 4<sup>th</sup> ASEAN-India Ministerial Meeting on Agricultural and Forestry, 2018 during January 11-12, 2018.
- 24<sup>th</sup> *Sarson mela* on February 3, 2018 at ICAR-DRMR, Bharatpur.
- National Conference on "Agriculture 2022-Doubling Farmers' Income" organized by Ministry of Agriculture & Farmers' Welfare from February 19-20, 2018 at NASC, Pusa, New Delhi.
- North Zone Regional Farmers' Fair organized by ICAR-IIVR, Varanasi and DAC&FW, New Delhi during February 23-25, 2018 at Trade Facilitation Centre, Varanasi.

- *Kisan mela* organized by Young Farmers Association, Rocha, Patiala on March 10, 2018.
- *Krishi mela* organized by ATMA, Nagaur, Rajasthan on March 25, 2018.
- ZTM & BPD Unit's four incubates, i.e., M/s. Kad Bio-resource Pvt. Ltd., M/s. Anaya Seeds Pvt. Ltd, M/s. Silage Agro Pvt. Ltd. and M/s. W. S. Telematics Pvt. Ltd. showcased their innovative products and technologies in the Festival of Innovation and Entrepreneurship, held from March 19 to 23, 2018 at Rashtrapati Bhawan, New Delhi.

### Field Days Organized

- Four field days on "Mustard" one each in Borakalan, Teekli, Lagra and Maujabad villages of Gurugram district on January 8, 2018, January 15, 2018, January 17, 2018 and February 2, 2018, respectively (67, 63, 69 & 56 farmers participated, respectively).
- Three field days on "Chickpea" one each in Teekli, Borakalan and Taj nagar villages of Gurugram district on January 29, 2018,

February 15, 2018 and February 22, 2018, respectively (62, 64 & 63 farmers participated, respectively).

- Two field days on "Barley and Wheat" one each in Daboda and Kankrola villages of Gurugram district on February 20, 2018 and March 7, 2018, respectively (53 and 47 farmers participated, respectively).

### Campaign for Prevention of Pesticides Poisoning

The *Krishi Vigyan Kendra* (KVK), Shikohpur organized three farmers training cum *gosthi* for prevention of pesticides poisoning of farmers in different village of Gurugram in which 217 farmers and farm women participated. In these programmes, technical knowhow about judicious use and need based use of pesticides with proper safety measures and precautions was provided to the farmers.

### Honey Day

The Institute's KVK organized a honey day at farmers' field in Mubarikpur village, Gurugram in which 63 farmers and farm women participated. During this programme, the rural youth and farmers were provided

technical knowhow on beekeeping and motivated to take up this vocation as an entrepreneurial activity. This vocation helped the farmers in two ways one – in generating income through sale of honey, wax, etc. and second–enhancing the crop production through pollination by honey bees.

## CAPACITY BUILDING

### Trainings

The institute conducted training on “Whole Genome Sequencing of Plant Pathogens: Methods and Applications” under Centre for Advanced Faculty Training (CAFT) in the Division of Plant Pathology from December 29, 2017 to January 18, 2018. Twenty four trainees from various ICAR institutes, SAUs and general universities participated in the training.

The Division of Agricultural Extension conducted a training on “Innovations in Agricultural Extension for Enhanced Technology Application and Stakeholders' Empowerment in Context to Changing Agrarian Needs” under the Centre for Advanced Faculty Training (CAFT) from January 5 to 25, 2018. A total of 14 participants comprising Assistant Professors from different SAUs, Scientists of ICAR Institutes and SMSs from KVKs across the National Agricultural Research and Education System (NARES) of the country. The Division also conducted two training programmes for Self Help Groups (SHGs) on “Pearl Millet Value Added Products for Nutritional Security and Economic Empowerment of Farm Women” in Sehjadpur

village, Sonipat district, Haryana from February 19 to 21, 2018 (51 rural women representing various SHGs participated) and Bajhera village, Mewat district, Haryana from February 26 to 28, 2018 (52 rural women representing different SHGs participated).

The Institute's *Krishi Vigyan Kendra* (KVK), Shikohpur organized three training programmes under ARYA project on: “Protected Cultivation” (January 22 to 27, 2018); Value Addition (March 19 to 24, 2018); and Mushroom Production (March 20 to 26, 2018) in which 64 rural youth from Gurugram district participated. The KVK also organized three vocational training course on: i) “Preservation of Seasonal Fruits and Vegetables” from February 6 to 13, 2018 (28 rural women from different villages of Gurugram district participated); ii) “Motor Rewinding” from February 15 to 24, 2018 at KVK campus (11 rural youth from Gurugram district participated); and iii) “Organic Farming and Production Technology of Vermi-compost” (16 farm youth from different villages of the Gurugram district participated).



Hands-on practical exercise on value addition in pearl millet underway

The Institute's Centre of Agricultural Technology Assessment and Transfer organized a training programme on "Seed Production of *Rabi* Crops" from January 29 to 31, 2018. Twenty two farmers attended the training programme. The Centre also organized two training programmes of one day each on "Organic Farming and its Certification" and "Grading, Packing/Fruits Preservation and Post-Harvest Management" for Extension Staff and Farmers of Delhi on March 22, 2018 and March 25, 2018, respectively. Each training was attended by 20 participants.

A training programme on "Hyperspectral Remote Sensing and its Applications" was organized by Indian Institute of Remote Sensing, ISRO from February 19 to March 14, 2018 in the Division of Agricultural Physics. Fifty participants including students and scientists attended the training.

### Workshop

IARI Regional Station, Pune, Entomology Society of India, and Crop Care Federation of India organized jointly a multi stakeholders' workshop on "Safe Use of Pesticides" at the Station on January 31, 2018. The objective

of the workshop was to create awareness on scientific practices for safe use of insecticides at the ground level, and to ensure that the statutory regulations are made known and enforced by all stakeholders. The Station also exhibited various technologies in a stall for the management of viral diseases in papaya, banana, citrus, tomato, cucurbits, bell pepper, etc., and termite control under field condition.

## MISCELLANEOUS

### External Funded Projects Sanctioned

- "Sensors of heat stress: Exploring mitogen-activated protein kinase genes and dissecting their Role in thermotolerance of wheat (*Triticum aestivum* L.)" funded by CSIR. Amount: ₹ 35.00 lakhs. Principal Investigator: Dr. Ranjeet Ranjan Kumar, Scientist, Division of Biochemistry.
- "Understanding the role of T A L effectors of *Xanthomonas oryzae* pv. *oryzae* in modulating rice innate immune response to cause bacterial blight" funded by DBT. Amount: ₹ 41.92 lakhs. Principal Investigator: Dr. Kalyan K. Mondal, Principal Scientist, Division of Plant Pathology.

- "Unnat Bharat Abhiyan" funded by MoHRD. Amount: ₹ 1.75 lakhs. Principal Investigator: Dr. J.P. Sharma, Joint Director (Extension), IARI.
- "Survey and surveillance for wheat blast caused by *Magnaporthe oryzae* pathotype *Triticum* and strategic research to manage it" funded by NFSM, DAC & FW. Amount: ₹ 127.24 lakhs. Principal Investigator: Dr. Vaibhav Kumar Singh, Scientist, Division of Plant Pathology.
- "Exploring the significance of genetic redundancy of Wnt genes: Mutation and molecular analysis" funded by SERB, DST. Amount: ₹ 36.34 lakhs. Principal Investigator: Dr. Prachi Yadav, Scientist, Division of Genetics.
- "Fine mapping of broad spectrum new leaf rust resistance gene in *Triticum timopheevii* derivative Selection G12" funded by SERB, DST. Amount: ₹ 28.75 lakhs. Principal Investigator: Dr. Shailendra K. Jha, Scientist, Division of Genetics.
- "Unravelling rice interactor(s) for XopF-

T T S S e f f e c t o r o f *Xanthomonas oryzae* race 4 that play crucial role during bacterial blight pathogenesis” funded by SERB, DST. Amount: ₹ 50.25 lakhs. Principal Investigator: Dr. Kalyan K. Mondal, Principal Scientist, Division of Plant Pathology.

- “ I d e n t i f i c a t i o n , characterization and validation of miRNAs and target mRNAs for nitrogen and phosphorus use efficiency in maize” funded by SERB, DST. Amount: ₹ 27.99 lakhs. Principal Investigator: Dr. Mallikarjuna, Scientist, Division of Genetics.
- “Enhancing decomposition rate and quality of bio-waste through microbial consortia for improving soil health” funded by NASF. Amount: ₹ 33.22 lakhs. Principal Investigator: Dr. D.R. Biswas, Principal Scientist, Division of Soil Science & Agricultural Chemistry.
- “Genetic improvement of rice for yield, NUE, WUE, abiotic and biotic stress tolerance through RNA Guided Genome Editing (CRISPR/Cas9/Cpf1)” funded by NASF. Amount: ₹ 103.04 lakhs.

Principal Investigator: Dr. C. Viswanathan, Head, Division of Plant Physiology.

- “Bioremediation of chemical contaminants and their complexes present in drainage wastewater with high dynamic flux used for the irrigation in urban and periurban agriculture” funded by NASF. Amount: ₹ 45.48 lakhs. Principal Investigator: Dr. Neelam Patel, Principal Scientist, Water Technology Centre.
- “Evaluation of Jute and Mesta biomass for bioethanol production potential” funded by ICAR - AMMAAS. Amount: ₹ 24.83 lakhs. Principal Investigator: Dr. Lata, Principal Scientist, Division of Microbiology.

### Patent Granted

- Light Heat and water resistant neem meliacin concentrates and product with controlled release
- Improvements in/or relating to the preparation of liquid pesticidal concentrates of neem meliacin(s)
- Pusa 5SD - a bio-formulation of

*Trichoderma harzianum* (IARI P-4) for seed treatment

- A novel formulation of plant growth promoting Rhizobacteria with enhanced shelf-life and the method of its preparation
- Development of SCAR Marker for identification of *Chaetomium globosum*—A potential biocontrol agent
- Nano encapsulated Hexaconazole: a novel fungicide and the process for making the same
- Development of polymeric formulations of bioactive molecules and method of preparation thereof.

### Technologies Commercialized

In this quarter, two IARI Technologies, i.e., Pusa Soyanut and *Aonla* Candy were licensed to M/s Himalayan Maharani, generating a revenue of ₹ 60,000.

### Corporate Membership

In this quarter, total 18 industry partners were registered through corporate memberships. Out of which 7 new members were enrolled and 11 existing members renewed their membership,

generating a revenue of ₹ 90,000.

### Hindi Prize Distribution Function

The Institute celebrated its Annual Hindi Prize Distribution Function on January 21, 2018 at Dr. B.P. Pal Auditorium. Shri Hari Babu Shriwastawa, Director, LESTAK, DRDO, New Delhi, was the Chief Guest. Dr. A.K. Singh, Director, IARI (additional charge) presided over the function. Dr. K.V. Prabhu, Joint Director (Research) and Chairman, Institute Official Language Implementation Committee gave the welcome address. Shri Keshav Dev, Deputy Director (Official Language) presented the Institute's Official Language Progress Report. On this occasion, the prizes were given away to the winners of

different competitions organized during the year, i.e., *Hindi Vyavhaar Pratiyogita*, Cash Award Scheme of Official Language Department, Ministry of Home Affairs, Govt. of India., Article Competition published in various magazines and papers, Pusa Vishisht Hindi Pravakta Award, Award for the best Rajbhasha Nodal Officer, awards of power point presentations in Hindi and competitions organized during *Hindi Chetna Maas*.

### Hindi Workshop

A workshop on 'Unicode' was organized on March 24, 2018 in CESCRA auditorium of the Institute. Mr. Kewal Krishan, Senior Technical Director in *Rajbhasha Vibhag*, gave information regarding different Hindi typing tools, i.e., phonetic typing, voice

typing, etc. The workshop was attended by scientists and technical officers of different divisions of the Institute.

### Awards/Recognitions

- Dr. Rashmi Aggarwal, Head, Division of Plant Pathology was conferred with Outlook Agriculture Conclave and Innovation Award in the category "Innovation in Crop Protection through Scientific Process" on January 23, 2018 by Hon'ble Union Minister of Agriculture and Farmers Welfare.
- Dr. T. Prameela Devi, Principal Scientist, Division of Plant Pathology received Dr. A.K. Sarbhoy Memorial Lecture Award at the 70<sup>th</sup> Annual Meeting and National Symposium on "Plant Health Management: Embracing Eco-Sustainable Paradigm" at Assam Agricultural University, Jorhat, Assam during February 15-17, 2018.
- Dr. Robin Gogoi, Principal Scientist, Division of Plant Pathology was conferred with the Best Researcher Award in the 6<sup>th</sup> Academic Brilliance Awards 2018 by EET CRS, Research Wing for Excellence in



One of the participant receiving award from Shri Hari Babu Shriwastawa, the Chief Guest, during Hindi Prize Distribution Function

Professional Education & Industry.

- Dr. G. P. Rao, Principal Scientist, Division of Plant Pathology was conferred with the Leadership Excellence Award in Sugarcane Crop Protection by the Thailand Society of Sugarcane Technologists in 6th

IAPSIT International Sugar Conference, Udon Thoni, Thailand held on March 6-9, 2018.

- Dr. Roaf A. Parray, Scientist, Division of Agricultural Engineering received ISAE-TAFE student gold medal for outstanding performance during his Ph.D.

programme in Agricultural Engineering.

- Dr. H.L. Kushwaha and Dr. Tapan K Khura, Senior Scientists, Division of Agricultural Engineering, IARI were awarded as "Fellow" of Institution of Engineers, India.

### Visitors from Abroad

During the period January- March, 2018, four delegations, two from USA, and one each from Iran and Poland visited the Institute. Iranian delegation was led by Dr. Nazar Afzali from the University of Birjand, and Polish delegation was led by H.E. Mr. Jack Bogucki, Minister of Agriculture and Rural Development.



Polish delegation with IARI team

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