



# IARI NEWS



Vol. 35, No. 3

July-September, 2019

## RESEARCH

### New Wheat Varieties Identified

Four wheat varieties, viz., HI 1621, HI 1628, HI 8802 and HI 8805 were identified for release in 58<sup>th</sup> All India Wheat and Barley Research Workers' Meet held at ICAR-IARI, Regional Station, Indore. Characteristic features of these varieties are as under:

**HI 1621-** A bread wheat genotype identified for release under very late sown condition of both North Western Plains Zone and North Eastern Plains Zone. It is high yielding (3.28 t/ha) with a yield potential of 4.61 t/ha. It has excellent *chapati* quality (7.87), biscuit quality (8.52), bread quality (7.53) and sedimentation value (48.3 ml-NWPZ, 55.2 ml-NEPZ). It has also high levels of field resistance to stripe and leaf rusts.

**HI 1628** - A bread wheat genotype identified for release



HI 1621: field and grains view



HI 1628: field and grains view



HI 8802: field and grains view

under timely sown, restricted irrigation conditions of North

Western Plains Zone. It is high yielding (5.04 t/ha) with excellent *chapati* quality (7.56), bread quality (7.64), biscuit spread factor (8.27) and high sedimentation value (56.6 ml). It has high levels of field resistance to stripe and leaf rusts.

**HI 8802** - A *durum* wheat genotype identified for release under restricted irrigation, timely

sown conditions of Peninsular Zone. It is high yielding (2.91 t/ha) with yield potential of 3.60 t/ha. It has high levels of field resistance to stem and leaf rusts and good levels of resistance to Karnal bunt, loose smut, flag smut and foot rot. It has high protein content (13.0%), yellow pigment content (5.7 ppm), test weight (83.7 kg/hl), sedimentation value (40.4 ml), iron content (39.5 ppm), zinc content (35.9 ppm) with overall pasta acceptability (6.2).

**HI 8805-** A *durum* wheat genotype identified for release under restricted irrigation, timely sown conditions of Peninsular Zone. It is high yielding (3.04 t/ha) with yield potential of 3.54 t/ha. It has high protein content (12.8%), yellow pigment content (4.9 PPM), test weight (83.7 kg/hl), sedimentation value (42 ml), iron content (40.4 ppm), zinc content (33.9 ppm) with an overall pasta acceptability (5.7). It has high levels of field resistance to stem and leaf rusts with good levels of resistance to Karnal bunt, loose smut, flag smut and foot rot.

### Anthocyanin Rich Purple Genotypes of Tropical Broccoli

Pusa Purple Broccoli is a new genotype with purple head, derived by recurrent selection from a segregating exotic material (obtained through NBPGR, New Delhi) with medium head size weighing 600-750 g, early maturity, seed production capacity, etc. It takes around 75-85 days after transplanting and produce seeds profusely in plains of North India during winter season. Its average head width is 17.6 cm and head length is 15.6 cm. It is rich in anthocyanin ( $30.31 \pm 0.68$  mg/100g fw). It is suitable for staggered sowing/planting from September end to November mid, hence, has a longer harvest window and a desirable trait for market.



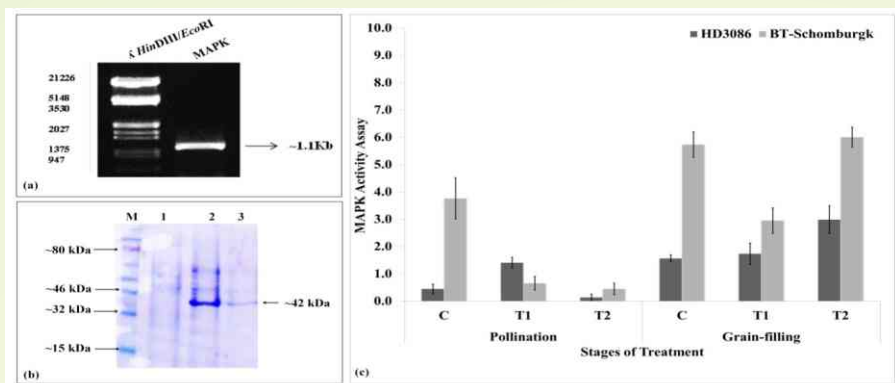
Pusa Purple Broccoli



HI 8805: field and grains view

### Sensors of Heat Stress: Characterizing the Recombinant Mitogen-Activated Protein Kinase (MAPK) from Wheat and Elucidating their Role in Thermo-tolerance

Heat stress has severe impact on the quality and yield of wheat grains. A network of signalling cascade operates inside the plants in order to protect it from the biotic and abiotic stresses. MAPK signalling cascades plays an important role in modulating the tolerance of plant against heat stress. Two heat-responsive MAPK genes of 1.3 kb (*MAPK*) and 1.6 kb (*MAPK-1*) were cloned from wheat and presence of Serine/Threonine Kinase (STKs) domain was observed in both the genes. The recombinant MAPK protein of ~40.3 kDa was also isolated through heterologous expression system and observed with very high kinase activity in response to HS. *In vivo* assay, it showed very high kinase activity in wheat *cv.* HD 3086 (thermo-tolerant) under HS, as compared to BT-Schomburgk (thermo-susceptible). A positive correlation was established between the kinases activity and different biochemical markers associated with thermo-tolerance like SOD, CAT, GPX, and accumulation of proline, and ROS under HS. The heat-induced MAPK can be used as potential thermosensor for analysing the stress level. MAPK can be used for manipulating the stress signalling cascade in plants having amplified impact on overall tolerance levels.



Molecular cloning and characterization of mitogen activated protein kinase in contrasting wheat cvs.

### GFP Tagging Based Method to Analyze Efficiency of Genome Editing

The CRISPR/Cas is regarded as revolutionary bio technology for its wide application in functional studies of genes and genetic crop improvement. Green fluorescent protein (*GFP*) a strategy was adopted to tag exogenous /endogenous genes to rapidly analyze genome editing efficiency of gRNAs targeting gene of interest. The study has demonstrated the utility of GFP fluorescence marker to detect the targeting efficiency of gRNAs which can be broadly applicable to study genome editing efficiency of gRNAs targeting both endogenous and exogenous genes through transient expression systems in *N. benthamiana*. This study will help to select the most efficient gRNAs to edit the gene of interest in several crop species.

### A Novel Methodology for the Isolation of Rice False Smut Pathogen, *Ustilagoidea vires*

Rice false smut disease caused by *Ustilagoidea vires*

is emerging as one of the most damaging rice fungal disease which causes severe yield loss and grain quality reduction. Isolation of the pathogen is difficult due to slow growing nature of the pathogen. Hence, a novel methodology for the isolation of fungus was developed with 80- 88% success rate, for studies on further characterization of the fungus.

## EDUCATION

### Teachers' Day Lecture

IARI organized teachers' day lecture on September 5, 2019 at Dr. B.P. Pal Auditorium of the Institute to pay tribute to Dr. S. Radhakrishnan, the former President of India and a great

educationist, and philosopher. Dr. Rashmi Aggarwal, Dean & Joint Director (Education), IARI delivered the welcome address. Dr. A.K. Singh, Director, IARI emphasized the significance of the Teachers' Day. The Teachers' Day lecture was delivered by Prof. D.P. Singh, Chairman, University Grants Commission, on the topic "Quality Higher Education". In his thought provocative and introspective lecture, Prof. Singh explained the different dimensions of education system and personality; holistic education and holistic development of personality; role of universities; qualities and role of teachers and new initiatives of UGC in the area of higher education. The Chairman of the function Prof. A.K. Misra, Chairman, ASRB, New Delhi gave the concluding remarks.

### Valedictory Function of the Students of Afghanistan National Agricultural Sciences and Technology University (ANASTU)

Teaching of the third batch of 20 M.Sc. (Agronomy) students of ANASTU was organized at IARI



Prof. D.P. Singh, Chairman, UGC delivering Teachers' Day Lecture-2019

from December 1, 2018 to August 1, 2019. On the completion of course, a valedictory function was organized on August 2, 2019 for Grade Card distribution in the Plant Virology Auditorium at IARI. Dr. A.K. Singh, DDG (Agricultural Extension), ICAR & Director (IARI), New Delhi, graced the occasion as Chief Guest and distributed the Grade Cards to the students. Dr. V.K. Singh, Head, Division of Agronomy, IARI, delivered the Welcome Address. Professor Anupam Varma, Advisor (ANASTU) apprised the audience about the ANASTU programme. Besides, Dr. J.P. Sharma, Joint Director (Extension) & Dean (Officiating), IARI; Mr. Pratik Negi, Coordinator, ANASTU Programme, MEA and Dr. Hazrat Mir Totakhil, Chancellor, ANASTU also addressed the gathering on this occasion. The programme concluded with a formal vote of thanks by Dr. T.K. Das, Professor, Division of Agronomy, IARI.



Valedictory Function at IARI to the third batch of M.Sc. (Agronomy) students of ANASTU



11<sup>th</sup> Dr. S. Pradhan Memorial lecture held at the Division of Entomology

### Institute Research Council Meetings

The Institute Research Council (IRC-II-2019) meetings of the schools of IARI were held from 20.08.2019 to 04.09.2019 under the Chairpersonship of Dr. A.K. Singh, Director (Acting), IARI and Co-Chairpersonship of Dr. Ashok Kumar Singh, Joint Director (R) (Acting), IARI. In the IRC-II, presentations were made school-wise wherein the school coordinator of the particular school presented the Action Taken Report of the recommendations of IRC-2018.

### Dr. S. Pradhan Memorial Lecture

The Division of Entomology, ICAR-IARI in association with Entomological Society of India organized the 11<sup>th</sup> Dr. S. Pradhan Memorial lecture on September 9, 2019 in NIPB Auditorium, Pusa Campus, New Delhi. Dr. Omkar, Professor, Department of Zoology, University of Lucknow delivered the memorial lecture on “Predatory Ladybird: A Reproductive Perspective”. In his lecture, he talked about the reproductive behavior and biology of ladybird beetles, which are potential biological control agents of a large number of agricultural and horticultural insect and acarine pests. Dr. Balraj Singh, Project Coordinator, AICRP on Honey Bees and Pollinators chaired the session. Dr. R K Sharma, Head, Division of Entomology gave welcome address and Dr. Rashmi Aggarwal, Dean and Joint Director (Education) introduced the speaker.

## EXTENSION

### Soil Health & Water Sampling Campaign

A campaign on soil health & water sampling was organized to aware the farmers about the soil health & quality of water for irrigation in Sadrana, Hasanpur, Sakatpur villages of Gurugram district and a total of 68 farmers were benefitted. Farmers were demonstrated how to collect the soil sample and importance of the soil testing.

### Field Days

Two field days on pearl millet under FLD & OFT were organized on September 23 and 25, 2019 in Tajnagar and Tirpadi village of Gurugram district, respectively. In these field days 76 and 59 farmers and farm women participated, respectively.

### Jal Shakti Abhiyan

The Institute's KVK at Shikohpur organized *melas* on “Jal Shakti” at Bilaspur village of Gurugram district & Hasanpur village of Nuh district on September 3, 2019 where 841 & 837 farmers & students participated, respectively. The basic theme of mela was rainwater harvesting and water conservation.

### Plantation of Fruit Plants

The Institute's KVK at Shikohpur organized a programme on large scale plantation and distribution of plants on September 17, 2019. In

this programme, 600 plants of jamun, guava, mango, etc. were distributed to the farmers and 100 plants were planted in KVK campus.

### National Animal Disease Control Programme

The Institute's KVK at Shikohpur organized a national animal disease control programme on September 11, 2019, wherein 80 animals were vaccinated against FMD, and 69 cattle were inseminated artificially with the help of Veterinary and Animal Husbandry Officers, Government of Haryana.

### Participation in Exhibition

The institute participated in following two exhibitions:

- *Kisan Mela* organized by YFA at Rakhra, Patiala, Punjab on September 17, 2019. In this exhibition, latest IARI varieties of wheat were displayed for the benefit of farmers.
- Regional Agriculture & *Pashu Mela* (North Zone) from September 21 to 23, 2019 organized by Directorate of Extension Education, Guru Angad Dev Veterinary & Animal Sciences University, Ludhiana.

## CAPACITY BUILDING

### Trainings

- The Division of Agricultural Extension conducted two training programmes on

“Skill Building in Agri-Nutrition for Rural Women-Value added Nutri products of Bael, Vegetables and Pulses” from July 8 to 10, 2019 at Sunehra, Baghpat district, U.P and on “Pulses & Rice based Products for Nutrition Security of Rural Women” from August 21 to 23, 2019 at Jagdishpur, Sonipat district, Haryana. In each of the training programme, a group of 50 rural women representing various Self Help Groups participated.

- CATAT organized a training programme on “Promotion of Bio Fertilizers for Organic Farming” from July 23 to 24, 2019. A total of 32 farmers from six states, i.e., UP, Haryana, Uttrakhand, Punjab, MP and Gujarat participated in the programme.
- A Training Programme on “ICT based Strategies for Nutrition Security” was conducted under the Centre for Advanced Faculty Training (CAFT) from August 16 to September 5, 2019 in the Division of Agricultural Extension. Nineteen participants comprising assistant professors from SAUs and KVK's subject matter specialists attended the training.
- ZTM & BPD Unit organized a training programme on “Intellectual Property Rights & Business” from September



Dr. N.S. Rathore, Ex. DDG (Education), ICAR addressing in the CAFT training programme on “ICT based Strategies for Nutrition Security”

4 to 6, 2019. The training witnessed 09 participants from MSMEs, ICAR-Universities, and Academic Institutes etc. from different parts of India.

- The Division of Biochemistry organized a CAFT training on “O m i c s M e e t P l a n t Biochemistry: Applications in Nutritional Enhancement with One Health Perspective” from September 7 to 27, 2019.
- The Division of Plant Pathology organized training on “Genomics Assisted Molecular Systematics of Fungi” from September 9 to 17, 2019. Twenty five students from 20 different universities of 19 states participated in the training. Dr. Deeba Kamil, Sr. Scientist was the Course Director.
- The Division of Entomology organized a training program on “G e n o m i c s o f Agriculturally Important Insects” from September 18 to 28, 2019 under NHEAP, CAAST Programme of

ICAR. Dr. C. Viswanathan, Project Investigator, CAAST, Dr. R. K. Sharma, Head, Division of Entomology, Dr. S. Subramanian were Course Directors.

### All India Wheat and Barley Research Workers' Meet

IARI, Regional Station, Indore organized 58<sup>th</sup> All India Wheat and Barley Research Workers' Meet from August 24 to 26, 2019 at Indore in collaboration with ICAR-Indian Institute of Wheat and Barley Research, Karnal. Nearly 350 delegates from different national & international institutes and private industry had participated in this meet.

### Workshop

ZTM & BPD Unit organized a workshop “Samarth Phase-3” on September 12-13, 2019. The workshop was attended by all the budding Incubator managers representing 20 agri-incubators pan India. It was followed by training on “Public Financial Management System (PFMS) and GEM portal”. Valedictory

session was hosted for all RABIs, with certificate distribution and remarks by Dr. AK Singh, JD (Research).

## MISCELLANEOUS

### Externally Funded Projects Sanctioned

- “Mapping of QTLs for drought tolerance in mungbean” funded by SERB, DST. Amount Rs. 37.57 lakhs for 3 years. Principal Investigator: Dr. Dharmendra Singh, Principal Scientist, Division of Genetics
- “Enhancing quality of novel bio-insecticidal formulations of entomopathogenic nematodes for improved shelf life and biocontrol” funded by DBT-BIRAC. Amount Rs. 42.96 lakhs for 18 months. Principal Investigator: Dr. Anupama Singh, Head, Division of Agricultural Chemicals
- “Electrochemical sensing of Aflatoxin B1 in groundnut extract based on an isotropic gold nano particle decorated self-assembled thiol monolayer using monoclonal antibody suitable for field application” funded by DBT-BIRAC. Amount Rs. 47.58 lakhs for 18 months. Principal Investigator: Dr. Irani Mukherjee, Principal Scientist, Division of Agricultural Chemicals
- “Establishing an efficient platform for precise genome

editing in rice” funded by DBT. Amount Rs. 44.62 lakhs for 3 years. Principal Investigator: Dr. Viswanathan Chinnusamy, Head, Division of Pl. Physiology

- “Proteomic profiling of the salinity induced responses in the cyanobionts of different species of *Azolla*” funded by CSIR. Amount Rs. 23.62 lakhs for 3 years. Principal Investigator: Dr. G. Abraham, Principal Scientist, Division of Microbiology
- “Imparting sheath blight disease tolerance in rice” funded by DBT. Amount Rs. 80.39 lakhs for 3 years. Principal Investigator: Dr. Gopala Krishnan S., Principal Scientist, Division of Genetics
- “Development of high density linkage map and tagging salinity tolerance in lentil using genotyping-by-sequencing approach for improving salt tolerance” funded by DBT. Amount Rs. 72.99 lakhs for 3 years. Principal Investigator: Dr. Dharmendra Singh, Principal Scientist, Division of Genetics
- “Development of sustainable resources management systems in the water vulnerable areas of India-Development of regionally adopted salt-tolerant soybean” funded by JIRCAS,

Japan. Amount USD 5000 for 1 year. Principal Investigator: Dr. S.K. Lal, Principal Scientist, Division of Genetics

- “Biofortification of lentil for Bihar” funded by Harvest Plus-International Food Policy Research Institute, USA. Amount USD 30000 for 4 years. Principal Investigator: Dr. H.K. Dikshit, Principal Scientist, Division of Genetics
- “New extension methodologies and approaches (NEMA)” funded by ICAR. Amount Rs. 3.36 lakhs for 2 years. Principal Investigator: Dr. R.N. Padaria, Principal Scientist, Division of Agricultural Extension

### Patent Granted

- Nanofabrication of Phosphorus on Kaolin Mineral Receptacles (Patent No. 316692)
- Heat Stable Anthocyanin Rich Composition and Process of its Preparation (Patent No. 321722)

### Technologies Commercialized

Three IARI Technologies, i.e., Wheat variety HD 3226, Mustard variety Pusa Mustard 31 (Double Zero) and maize Hybrid-Pusa Jawahar Hybrid Maize-1 (PJHM-1) were licensed to 52 industry partners, generated a revenue of Rs. 29,56,000 (Rs twenty nine lakh fifty six thousand only) in this quarter.

### Arise Graduation Ceremony

A valedictory and graduation ceremony for start-ups was organized on the culmination of Arise 2019, on July 12, 2019 at NAAS Complex, IARI. In the ceremony, the incubates shared their experience of incubation at Pusa Krishi incubator. The incubates of Arise 2019 program were awarded with 'Certification of Completion' upon the completion of their two-month of incubation in-residence program.

### Technology Innovation Day

Pusa Krishi Incubator organized the “Technology Innovation Day” on August 30, 2019 at NRL auditorium (IARI), to felicitate its partnership with



Technology Innovation Day celebrated at NRL auditorium

industry and start-ups through technology commercialization and incubation activities at IARI. The event was attended by corporate leaders, start-ups, SMEs, ecosystem partners along with students and faculty from

IARI. The agreement signing ceremony was honoured by the keynote address by Dr. Trilochan Mohapatra, Director General, ICAR and Secretary, Department of Agricultural Research & Education (DARE).

### Corporate Membership

In this quarter, twenty four new members were registered and twenty nine corporate memberships were renewed, generating revenue of Rs. 2,66,500.

### Visitors from Abroad

During the period July-September, 2019, two delegations from Lesotho and Afghanistan visited the Institute. The delegation from Lesotho was led by H.E. Mr. Mahala Motapo, Hon'ble Minister of Agriculture & Food Security and Afghanistan delegation was led by Dr. Khalilullah Kaliwal, Chancellor, Balkh University, Afghanistan.



Lesotho delegation with IARI team

Published quarterly by the Publication Unit on behalf of the Director, Indian Agricultural Research Institute (IARI), New Delhi-11 0012, and printed at M. S. Printers, C-108/1 Back Side, Naraina Industrial Area, Phase-1, New Delhi-110024, Tel.: 011-45104606

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