



# IARI NEWS



Vol. 31, No. 4

October-December, 2015

## RESEARCH

### New Crop Varieties Released

Fifteen new crop varieties –one of mustard (Pusa Double Zero Mustard 31), two each of wheat (HD CSW 18 & HD 3117) and cauliflower (Pusa Snowball Hybrid 1 & Pusa Kartiki), one each of carrot (Pusa Kulfi), radish (Pusa Sweta), tomato (Pusa Cherry Tomato 1) and summer squash (Pusa Pasand), two each of bitter melon (Pusa Rasdar & Pusa Purvi), sweet orange (Pusa Round & Pusa Abhinav) and gladiolus (Pusa Srijan & Pusa Unnati) were released by Delhi State Seed Sub- Committee, and one variety of chickpea (BG 3022) was released by CVRC.



Wheat variety HD CSW 18

Pusa Double Zero Mustard 31 is the first double zero (Erucic acid <2% and glucosinolates < 30ppm) Indian mustard variety of the country released for timely sown

irrigated conditions of National Capital Region of Delhi and adjoining areas in the states of Haryana, Rajasthan and UP. It has an average seed yield of 2379 kg/ha in multi-location coordinated trials and 2518 kg/ha under Delhi conditions. Its seed coat colour is yellow and seed contains 40.56% oil content. It has compact and erect plant type and matures in 144 days. Improved oil and seed meal quality (Canola quality) makes this variety beneficial for farmers, traders and consumers.



Mustard variety Pusa Double Zero Mustard 31

Wheat variety HD CSW 18 was released for early sown under conservation agriculture condition of Delhi and NCR region. It has an average yield of 6.29 t/ha with wide adaptability. It has long ear head with long grain (40 g test weight). It

is highly resistant to brown rust and moderately resistant to yellow rust.

Wheat variety HD 3117 was released for conservation agriculture under late sown irrigated conditions of Delhi and NCR region. Average yield of this variety under late sown (after 15<sup>th</sup> Dec.) condition is 4.78 t/ha under tilled condition and 4.79 t/ha under conservation agriculture condition. Its grain is amber white with around 11.7% protein content. It is free from brown and yellow rusts under natural condition. It is highly tolerant to Karnal bunt.

Extra-large seeded *Kabuli* chickpea variety BG 3022 has been released for timely sown irrigated conditions of north west plains zone (NWPZ). It has 100-seed

weight of 36 g with an average grain yield of 1.8 t/ha which is 10.4 % higher than that of the best check.

Pusa Snowball Hybrid 1 is the first indigenously developed snowball cauliflower hybrid using CMS system. Its marketable yield is 50-55 t/ha with average curd weight of about 1.5 kg. The curds of this variety are very compact, attractive, snow white in colour with self branching habit. It has field tolerance to black rot disease.

Cauliflower Variety Pusa Kartiki has marketable curd yield of 34.14 t/ha at Delhi location with curd weight of 500-600 g. This variety is tolerant to high temperature and humidity and is resistant to black rot disease. It is suitable for June to October under Delhi and North Indian conditions.



Cauliflower Variety Pusa Kartiki

Pusa Kulfi is the first pale mustard colour variety of carrot with an average root yield of 27.94 t/ha. Its marketable maturity period is 90-100 days, and roots are better in length and diameter. This variety is rich in nutrients like carotenoids, lutein, thiamine and niacin.

Radish variety Pusa Sweta has an average root yield of 44.04 t/ha which is higher than the prevailing popular varieties of radish. It takes 50-55 days to marketable maturity and can be kept in field for couple of weeks with yield advantage of 15-18 t/ha. Its roots are pith free, white coloured, broad and cylindrical in shape. It is better in quality.



Radish variety Pusa Sweta

Pusa Cherry Tomato 1 is the first indigenous cherry tomato variety suitable for green house



Kabuli chickpea variety BG 3022



Tomato Variety Pusa Cherry Tomato 1

environment. Its average yield is 15-18 t/1000 m<sup>2</sup> area with an average per plant yield of 4-5 kg. Its first fruit harvest is at 70-75 days and crop lasts for 9-10 months. Its plant is of indeterminate habit with an average vine length of 9-13 m. It is tolerant to root-knot nematode.

Pusa Pasand is a fattish round variety of summer squash for spring season conditions of north India both under open and protected cultivation. It has the average fruit yields of 16.3, 24.1 and 22.9 t/ha during spring summer under open field condition, naturally ventilated polyhouse and plastic low tunnel during winter season, respectively. Its fruits are ready for harvest in 45-50 DAS. It has an average fruit weight of 75-80 g with continuous fruit setting which is a desirable trait.

Bitter gourd variety Pusa Rasdar has the average yields of 454 kg/100m<sup>2</sup> and 407 kg/100m<sup>2</sup> under insect proof net and polyhouse conditions, respectively. It is an extra early (41-45 days for fruit harvest) variety for protected cultivation. It has an average fruit weight of 110 g. Its fruits are smooth, non-pricked with tender skin and fleshy.

Pusa Purvi is the first small fruit variety of bitter gourd with an average fruit yield of 10.5 t/ha. Its fruits are small in size (4-5 cm long and 3-4 cm diameter) having pointed tubercles with crispy flesh and are suitable for stuffed cuisine. Its fruits contain more calcium, manganese, zinc and iron. Its antioxidant activities like vitamin C, CUPRAC and FRAP values are significantly high.

The sweet orange variety Pusa Round (MS 13) has an average fruit yield of 24.43 kg/plant with fruit weight of 268.68 g and 48.26% juice. Its juice has 10.14°B TSS and this variety can be grown on closer spacing up to 400 plants/ha.



Sweet orange variety Pusa Round

The acid lime variety Pusa Abhinav (ALC 40) has an average fruit yield of 13.9 kg/plant. It has 365 fruits per plant with average fruit weight of 38.10 g. It has high juice content (58.86%) with 8.71 °B TSS. This variety can be grown on closer spacing up to 400 plants/ha. It is resistant to fruit cracking.

Gladiolus hybrid Pusa Srijan produces spikes of more than 85 cm length in which florets ranges from 15-17 in number which lasts for more than 9 days in vase. Its rachis

length is more than 45 cm. It is a very good multiplier producing 3.10 corms and 27.44 cormels from each mother corm. This is an early flowering hybrid which takes 73 days to first floret opening. Its floret colour is attractive purple group (N-78B) (Dark pink/mauve). It is highly suitable for garden display/kitchen garden and landscaping.

Gladiolus hybrid Pusa Unnati produces spikes of more than 115 cm length in which florets ranges from 16-20 in number which lasts for more than 9 days in vase. Its rachis length is more than 56 cm. It is a very good multiplier producing 2.55 corms and 49.78 cormels from each mother corm. It takes 107 days to first floret opening. Its floret colour is red purple group (72B) (inner two tepals are light white at base). It is highly suitable for cut flowers and bouquet preparation.



Gladiolus hybrid Pusa Unnati

### Coloured Baby Capsicum for Growing under Greenhouse for Higher Income

An experiment on evaluation of small fruited coloured capsicum



Baby capsicum crop under greenhouse condition at CPCT

was conducted at CPCT farm under fan-pad greenhouse condition. Two big fruited capsicum yellow var. Bachata and red var. Paserella, and three small fruited capsicum, orange var. 9967422, yellow var. 9956434 and red var. 9954559 were evaluated. The total yield of baby (small) capsicum was more [10.40 kg/m<sup>2</sup> (orange var. 9967422), 11.50 kg/m<sup>2</sup> (yellow var. 9956434) and 8.80 kg/m<sup>2</sup> (red var. 9954559)] than big sized capsicum [9.60 kg/m<sup>2</sup> (Bachata) and 9.75 kg/m<sup>2</sup> (Paserella)]. The cost of big fruited capsicum is ₹ 17.50 - 25 per fruit while the cost of small fruited (baby) capsicum fruit is ₹ 2.40 to

3.30 per fruit. Hence, the small fruited capsicum is affordable and acceptable to lower income group.

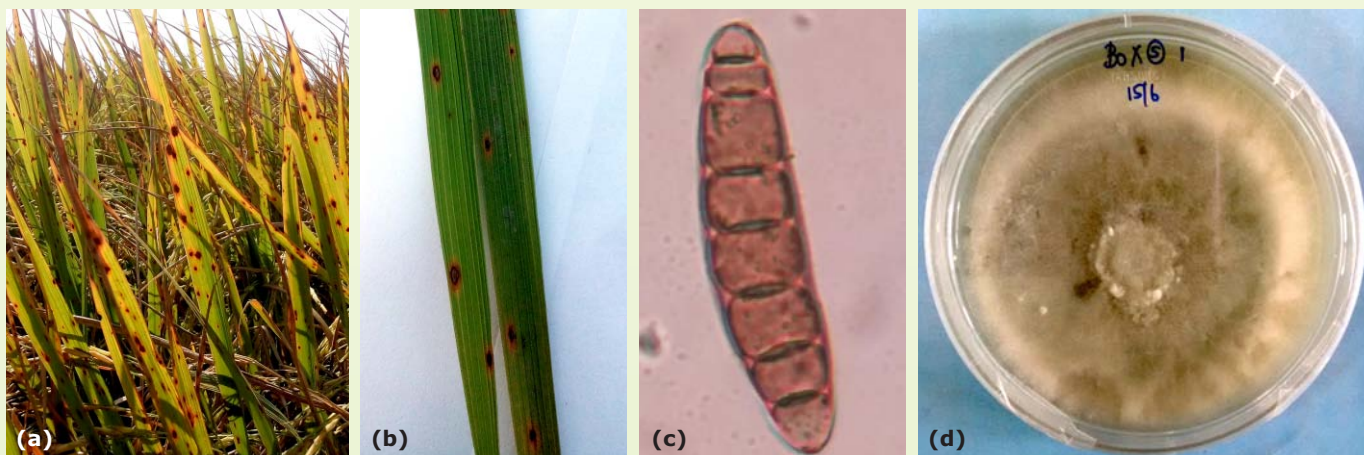
### Developed PCR based Diagnostic Assay to Detect *Bipolaris oryzae* Causing Brown Spot of Rice

A quick and reliable PCR-based diagnostic assay has been developed to detect *Bipolaris oryzae* for its rapid monitoring in rice grown areas. One set of primers (RABO-F and RABO-R) was designed from hypothetical small secreted protein gene, unique to *Bipolaris oryzae* (XM\_007689836.1).

It amplifies a band of 275 bp, only in *B. oryzae* isolates. The detection limit of marker in conventional PCR assay was 10fg.

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

In order to estimate the GHGs emission from the paddy biomass burning after harvest in Punjab and Haryana, a study was conducted to monitor in real time the paddy residue burning (mid October - mid November 2014) using coarse resolution satellite data available from IARI ground station. It was estimated that a maximum area of 13779 sq km showed burning on November 6, 2014. In order to improve estimate of burnt area, moderate resolution Landsat OLI multispectral images of October 5, 2014 (prior to burning) and November 6, 2014 (following burning) were acquired for the study area- Sangrur district. The changes in spectral signature from healthy crop area to burnt area and non-burnt area were studied and Normalized Burnt Ratio (NBR) was calculated for two dates after converting images to reflectance.



*Bipolaris oryzae* infected rice plant (a), leaf (b), *B. oryzae* spore (c) and culture plate (d)

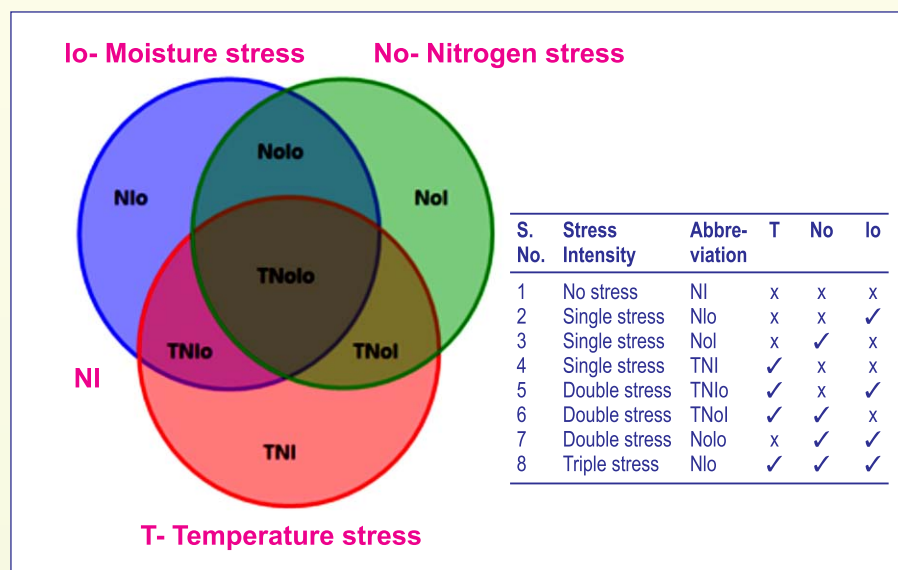
The change in Normalized Burnt Ratio index ( $\Delta\text{NBR}$ ) between prior to burning and following burning was calculated and it was found that a threshold  $\Delta\text{NBR} > 0.68$  showed area with high intensity of burning. It was estimated that in Sangrur district, in about 153,000 ha burning was observed and it was about 47% of the total paddy area.

### Cropping System Analysis of Upper Gangetic Plains of India

With the support of Indian Institute of Farming Systems Research (IIFSR), Modipuram, cropping system of upper Gangetic plains of India was retrieved along with its area coverage using time series MODIS satellite –EVI product of 250 m for the agricultural calendar, May 2012 to April 2013 and using crop information at 1086 sample points collected by IIFSR Modipuram. Based on geo tagged ground truth on cropping system in different farmers’ fields, temporal EVI profile was created as pure end members and stalked time series data was classified based on these end members to retrieve cropping system. Statistical result was finally validated with ground collected information of IIFSR.

### Crop Status Index of Wheat Crop Growth Condition under Abiotic Stress

Crop Status Index (CSI) calculated by means of minimum dataset and nonlinear weighted additive integration showed the best ability to distinguish different intensity of abiotic stress in wheat. In general, the CSI values were



Details of the abiotic stress treatments moisture, nitrogen and high temperature stress characterized in the present study and their abbreviations

lower under higher intensity of abiotic stress condition, and showed that abiotic stress effect was inclining towards a detrimental effect on crop status for wheat production under semi-arid condition.

### CPAN 1842: A Novel Source of APR to Leaf Rust in Wheat

Adult-plant resistance (APR) to leaf rust in Peruvian bread wheat genotype CPAN 1842 was observed to be governed by a dominant gene which was shown to be different from the documented APR *Lr* genes, viz., *Lr12*, *Lr13*, *Lr22a*, *Lr22b*, *Lr34*, *Lr35*, *Lr37*, *Lr48*, *Lr49* and *Lr68* based on allelic tests; and from *Lr67* based on genotyping with the closely linked molecular marker *cfdf71*.

### Delineation of Rabi Fallow Areas of Eastern India

Delineation of *rabi* fallow areas of eastern region of India comprising of eastern UP, Bihar, Jharkhand, Chhattisgarh, West

Bengal and Odisha was done using temporal satellite data products (i.e. 36 data sets of 10 days MVC) of Normalized Difference Vegetation Index of SPOT4 with 1km spatial resolution for agricultural calendar year, June 2012 to May 2013. It was observed that nearly 12.54 m ha area is being kept fallow during *rabi* season. This includes both land kept fallow after rice (rice fallow) and also land kept fallow after other *kharif* crops. The estimated areas were further analyzed with respect to different water related constraints. Based on available water, residual soil moisture content and water requirement of *rabi* crops different alternate crops for *rabi* fallow areas were suggested with required number of irrigation to optimize agricultural land use in the *rabi* fallow areas of eastern India.

### Non-invasive Assessment of Tomato Fruit Firmness

An investigation was undertaken to identify reflectance

based indices and to develop models for non-invasive estimation of tomato fruit firmness. Tomato fruits of two varieties and two hybrids were either directly harvested from plants (fresh fruits) or taken after 5 and 10 days after storage at  $25 \pm 1$  °C (aged fruits). Tomato fruits at all the eight distinct ripening stages were sampled. This sampling procedure provided fruits with substantial variability in firmness. Reflectance of fruits (350 to 2500 nm) was recorded with spectroradiometer. Fruits firmness (Newton, N) was then actually determined by texture analyzer. Spectral data and corresponding firmness data were analyzed and subjected to dimension reduction for identification of suitable index/indices. Values of fruit firmness ranged from maximum of 11.74 N (immature/green mature fruits) to minimum of 1.13 N (over ripe fruits). Out of eight indices, two best indices were;  $R_{501}$  (1<sup>st</sup> derivative) and  $R_{521}$ . Model based on the index  $R_{501}$  (1<sup>st</sup> derivative) [y (firmness, N) =  $1260.8x + 3.3087$ ] can predict the firmness accurately for difference  $\geq 1.05$  N (with bias = -0.01). The second model based on the index  $R_{521}$  [y (firmness, N) =  $-5.3768x^2 + 18.209x + 2.9509$ ] has the predictability of  $\geq 1.11$  N (with bias = -0.002). Both the models were found to be valid across varieties/hybrids, ripening stages and conditions like; plant harvested fruits and stored fruits. These models can serve as simple, rapid, effective and cost-effective tools in assessment of tomato fruit firmness and can be applied for

rapid/automated phenotyping, screening, monitoring and sorting of tomato fruits as desired and required by researches and tomato based agro-processing industry.

### Meeting of Research Advisory Committee (RAC)

The Institute's Research Advisory Committee (RAC) meeting was held on November 23 and 24, 2015 under the chairmanship of Dr. P. L. Gautam, former Chairperson, Protection of Plant Varieties & Farmers' Right Authority, New Delhi, Govt. of India. The other members who attended the meeting were: Dr. J. S. Sandhu, DDG (Crop Science), ICAR; Dr. S.P. Ghosh, former DDG(Horticulture), ICAR; Dr. B. Mishra, former VC, Sher-e-Kashmir UAS&T, Jammu; Dr. C. L. Acharya, former Director, IISS (ICAR), Bhopal; Dr. K.R. Koundal, former Joint Director (Research), IARI; Dr. P. K. Joshi, Director, South Asia, IFPRI, Dr. R. Khetarpal, Regional Director (South Asia), CABI; and Dr. I. S. Solanki, ADG (F&FC). Dr T. Mohapatra, Director, IARI, & Dr. K.V. Prabhu, Joint

Director (Research) and Member-Secretary, (RAC), Joint Director (Education), Project Director (WTC), heads of divisions & regional stations, In-charge of Units, Comptroller and Chief Administrative Officer participated in the meeting.

Dr. T. Mohapatra, while welcoming the Chairman and RAC members informed the house that all the major recommendations of the previous RAC has been agreed upon by the council and suitable action has already been initiated to incorporate the suggestions into the new ongoing research projects of the Institute. Dr. K. V. Prabhu presented the Action Taken Report (ATR) of RAC 2014 meeting.

Dr. Gautam was of the view that IARI should continue to play the flagship role by pursuing research in frontier areas at national level and that more success stories pertaining to commercialization and impact assessment of IARI technologies should be brought out for greater visibility and value to the institution.



Dr. T. Mohapatra addressing the officials during Research Advisory Committee (RAC) Meeting

In the concluding session, Dr. T. Mohapatra, Director, IARI thanked Chairman RAC & all RAC members for sparing their valuable time to participate in the RAC meeting and giving useful suggestions.

## CAPACITY BUILDING

### Winter School

The Division of Vegetable Science organized a winter school on “Advances in Improvement of Vegetable Crops Using Biotechnological Approaches” from September 18 to October 8, 2015. Twenty five participants working on different aspects of vegetable crop improvement, from sixteen different states of the country participated in this training programme. The topics covered during the training programme included genome analysis and its implication in vegetable crop improvement, designing futuristic vegetable varieties for multiple purposes, transgenic development, biotic and abiotic stress resistance, proteomics and metabolomics, marker assisted

vegetable breeding, bioinformatic tools in vegetable crop, conservation strategies for elite genetic resources of vegetable crops, tilling and eco-tilling, transcriptome analysis and RNAi technology and its application in vegetable crop improvement, SNP genotyping, defense signaling responses in plants as well as status of biotechnological interventions for improvement in different vegetable crops.

### Trainings

The Institute’s *Krishi Vigyan Kendra* (KVK) at Shikohpur organized six vocational trainings programmes on: i) “Production Technology on Button Mushroom Cultivation” from October 5 to 14, 2015 (16 rural youth participated); ii) “Dairy Farming” from October 5 to 15, 2015 (42 rural youth from Gurgaon districts participated); iii) “Nutri-farm” from October 12 to 17, 2015 (15 farm women participated); iv) “Dress Designing and Tailoring” from October 21 to December 4, 2015 (25 farm women participated); v) “Value Addition of Soybean and Pearl-millet” from



Training on "Dress Designing and Tailoring"

November 16 to 21, 2015 (20 rural women participated); and vi) “Production Technology of Vermi Compost” from December 8 to December 12, 2015 (16 rural youth participated). The KVK also organized two trainings for extension personnel on: i) “Integrated Plant Nutrient Management on *Rabi* Crops” on November 9, 2015 in which 20 agriculture development officers of Haryana Agriculture Department, Gurgaon participated; and ii) “Livestock Production & Management” on November 26, 2015 in which 10 veterinary livestock development assistants from Animal Husbandry Department, Gurgaon participated.



Winter school on “Advances in Improvement of Vegetable Crops Using Biotechnological Approaches”

The Centre for Agricultural Technology Assessment and Transfer (CATAT) organized ten on-campus training programmes on :i) “Post-harvest Technologies for Horticultural Crops” from October 6 to 9, 2015 (37 farmers sponsored by ATMA, Hanumangarh, Rajasthan participated); ii) “Good Agriculture Practices for Flowers and Vegetables” on October 9, 2015 (20 officers of Delhi Government participated); iii) “Production Technology of Onion and Garlic”

on October 16, 2015 (20 officers of Delhi government participated); iv) Diversification in Agriculture due to Climate Change” on October 21, 2015 (20 officers of Delhi government participated); v) “Preservation of Fruits and Vegetables” on November 6, 2015 (20 officials of Delhi Government participated); vi) “Use and Benefits of Sprinkler and Drip Irrigation, Net House and Green House” on November 16, 2015 (20 officers of Delhi Government participated); vii) “Rabi Crop Production Technology” from November 19 to 20, 2015 (20 officers of Delhi government Participated); viii) “Improved Horticulture Technology” from November 19 to 20, 2015 (12 farm women from Bihar participated); ix) “Integrated Nutrient, Pest and Disease Management and Judicious Use of Insecticide in Cropping System” on December 11, 2015 (20 officers of Delhi Government participated); and x) “Safe and Judicious Use of Pesticide for Food Safety and Quality with Reference to Food Standard of Other Countries” on December 18, 2015 (20 officers of Delhi Government participated).

The Division of Plant Pathology organized a training on “Plant Disease Diagnostics and Management” from October 13, 2015 to November 2, 2015 under Centre for Advanced Faculty training sponsored by ICAR, New Delhi. The major objective of the training programme was to train young faculty and scientists on diagnosis of plant diseases using advanced tools and management of major diseases of crops caused by fungi, bacteria, and viruses. A total

of 18 trainees belonging to 9 states of India participated in the training. The division also organized a symposium on “Challenges in Plant Virology and Our Preparedness” at the Institute on December 5, 2015. Discussions were held on recent emergence of whiteflies in begomovirus epidemics, next generation diagnosis and plant virus disease management in the symposium. Ten resource persons and 67 delegates from all over India attended the symposium.

The Division of Seed Science and Technology organized a training on November 21, 2015 for the eight Nigerian nationals attending a WAAPP sponsored International Certificate Course at DSR, Mau.

The Division of Vegetable Science organized a model training course on “Entrepreneurship Development to Ensure Quality Vegetable Seed Production for Making the Country Nutritionally Secure” from December 10 to 17, 2015 in which 25 officers from 6

states participated. The purpose of this training was to train the participants in the area of vegetable seed production by involving public private partnership/contract farming.

## EXTENSION ACTIVITIES

### *Mera Gaon Mera Gaurav Programme Launched*

IARI Launched *Mera Gaon Mera Gaurav* programme of IARI on December 20, 2015 at Kakda village, Shahpur block, Muzaffarnagar district, Uttar Pradesh. Dr. Sanjeev Kumar Balyan, Hon’ble Minister of State for Agriculture and Farmers Welfare was the Chief Guest of the Program. Dr. J. S. Sandhu, DDG (Crop Science), ICAR was the Guest of Honor of the event. This inaugural function was also graced by Dr. T. Mohapatra, Director, ICAR-IARI, New Delhi, Dr. K .V. Prabhu, Joint Director (Research), Dr. J.P. Sharma, Joint Director (Extension), ICAR-IARI and scientists from IARI, New Delhi.



Dr. Sanjeev Kumar Balyan, Hon’ble Minister of State for Agriculture and Farmers Welfare distributing Pusa seed to the farmers on the occasion of launching Mera Gaon Mera Gaurav programme at Kakda village, Shahpur block, Muzaffarnagar, Uttar Pradesh



Dr. Sanjeev Kumar Balyan highlighted the challenges in agricultural sector and envisioned the role of *Mera Gaon Mera Gaurav* scheme to overcome those challenges. Dr. J. S. Sandhu, emphasized the importance of scientist-famer interface. Dr. T. Mohapatra explained its role in solving agricultural programmes at grass root level. The Chief Guest also distributed Pusa Seeds among progressive farmers of the village on this occasion.

IARI Regional Station, Indore also launched *Mera Gaon-Mera Gaurav* programme on October 17, 2015 in village Puvalda Happa, Indore, M. P. to conduct intensive outreach activities in wheat cultivation. Selected villages under this scheme are: Puvalda Dai, Puvalda Happa, Machukhedi, Makodia and Jamodi.

### **Rose Show 2015**

The Division of Floriculture and Landscaping in collaboration with Rose Society of India organized the All India Winter Rose Show 2015 at the lawns of Division of Genetics, IARI, New Delhi on December 19 and 20, 2015. The show was inaugurated by Dr. T. Mohapatra, Director, IARI. The show was open for public from 10.00 a.m. to 5.30 p.m. A large number of visitors including garden lovers, amateurs, students, farmers from NCR region visited and government officials actively participated in the show and interacted with the scientists to clear their doubts. Different types of roses like Hybrid Tea, floribunda, miniature, creepers in

different arrangements were displayed by the participants in the show. The Chief Guest, Mr. Bharat Hari Singhania, President, Rose Society of India gave away the Prizes to the winners of the show.

### **World Soil Day**

The IARI Krishi Vigyan Kendra, Shikohpur organized the World Soil Day on December 5, 2015 at its campus. The chief guest Dr. A.K. Sikka, Deputy Director-General (NRM), ICAR inaugurated the day. Dr. R.D. Singh, Professor and Dr. Nayan Ahmed, Principal Scientist, Division of Soil Science and Agricultural Chemistry explained about the importance of soil testing, procedure for taking soil samples and requirement of different nutrients for different types of crops to the farmers. Dr. K.V. Prabhu advised the young farmers to make soil testing as a self employment. Dr. J.P. Sharma, Joint Director (Extension) emphasized to use balance fertilizer as per report of the soil testing. Dr. Shikka distributed 250 soil health cards to the farmers in this programme.

### **World Food Day**

The World Food Day was celebrated on October 16, 2015 in Langra village of Gurgaon district in which 60 farmers/farm women participated. During this programme the experts of KVK explained different technologies for better crop and milk production.

### **Women in Agriculture Day**

The Women in Agriculture Day was celebrated on December 4, 2015 in Jataula village of Gurgaon

district in which 35 farm women participated. During this event, different aspects related to women empowerment like dairy farming, safe grain storage value addition of fruits and vegetables, etc. were covered.

### **Animal Health Day**

Two Animal health days were organized on October 16 and December 2, 2015 in Bhoda Kalan and Langra villages of Gurgaon district, respectively. In both the programmes 110 animals were diagnosed and treated.

### **Front line demonstrations**

IARI Regional Station, Shimla conducted front line demonstrations on barley variety BHS 400 at Nihri and Chalog villages of Mandi district. Eighty three farmers were educated about new varieties of barley and demonstrated technical know-how for scientific cultivation of barley. Similarly, front line demonstrations were organized on wheat variety HS 542 at Kangru village of H.P. During farmers' field day, twenty farmers were educated about new varieties of wheat and their characteristic features.

### **Farmers' Field Day**

IARI Regional Station, Shimla organized farmers' field day at Tutikandi Centre for a group of 30 farmers came from Balh Valley. The wheat and barley varieties, developed at the Centre, were demonstrated to the farmers. The farmers were given technical know-how about cultivation of recently released stripe rust resistant wheat varieties.

## Participation in Exhibitions

- ❖ “Agri-Tech world: International exhibition on Agriculture and Horticulture” from October 7 to 9, 2015.
- ❖ “Agricultural Exhibition” during *Rabi Kisan Sammelan* in Delhi on October 17, 2015 at Ravi Patwari Dharmashala, Daulatpur, Nazafgarh, New Delhi.
- ❖ “International Trade Fair” at Pragati Maidan from November 14 to 27, 2015.
- ❖ “International Year of Soils 2015” and “World Soil Day” on December 5, 2015.

## MISCELLANEOUS

### New External Funded Projects Sanctioned

- ❖ “Maintenance, characterization and use of EMS mutants of upland variety Nagina 22 for functional genomics in rice-Phase-II” funded by DBT. Principal Investigator: Dr. A.K. Singh, Head, Division of Genetics, IARI.
- ❖ “Efficient groundwater management for enhancing adaptive capacity to climate change in sugarcane farming system” funded by NMSA. Principal Investigator: Dr. D.K. Singh, Principal Scientist, WTC, IARI.
- ❖ “Isolation and characterization of novel insecticidal genes of the indigenous isolates of entomopathogenic bacterium, *Photorhabdus* spp.” funded by DST. Principal Investigator: Dr.

Tushar Kanti Dutta, Scientist, Division of Nematology, IARI.

- ❖ “Bio-prospecting for insecticidal projects from legumes” funded by DST. Principal Investigator: Dr. Sagar D., Scientist, Division of Entomology, IARI.
- ❖ “Conservation agriculture for improving productivity & profitability and soil health” funded by XII FYP. Principal Investigator: Dr. T.K. Das, Principal Scientist, Division of Agronomy, IARI.
- ❖ “CRP on Genomics (Pathogenomics)” funded by XII FYP. Principal Investigator: Dr. Rashmi Aggarwal, Head, Division of Plant Pathology, IARI.
- ❖ “Documentation of fungal biodiversity through DNA bar-coding and digitization” funded by XII FYP. Principal Investigator: Dr. T. Prameela Devi, Principal Scientist, Division of Plant Pathology, IARI.
- ❖ “NAGS centres for management of plant genetic resources in horticultural crops (bottle gourd)” funded by XII FYP. Principal Investigator: Dr. T.K. Behera, Principal Scientist, Division of Vegetable Science, IARI.
- ❖ “Network Project on computational biology and agricultural bioinformatics (CABin) scheme” funded by XII FYP. Principal Investigator: Dr. C. Viswanathan, Head, Division of Plant Physiology, IARI.

## Patent Filed

- ❖ A microbial consortium of nitrogen, phosphorus and potassium (NPK) providing bacteria.

## Technologies Commercialized

Four IARI technologies, i.e., wheat variety HD 3086 (licensed to 31 more industry partners), wheat variety HD 3118 (licensed to 9 industry partners) and, mango varieties Pusa Peetamber and Pusa Pratibha (licensed to one industry partner) were commercialized, and generated a revenue of ₹ 18,25,000.

## Business Incubation

During this period, Incubation support was extended to M/s Steller Gene, New Delhi under the project entitled “Genomic Consultancy & Services Using GWAS and Molecular Markers in Agrigenomic and Humans”.

First installment of grant in aid of ₹ 6.25 lakhs each under MSME project entitled “Support for Entrepreneurial and Management Development of SMEs through Incubators” was released to: Mr. Nitin Gupta C/o M/s Sickle innovations Pvt. Ltd for the project entitled “Cotton Harvesting Machine”; Mr. Raju Ram C/o M/s Arpan Seeds for the project entitled “Double Mustard: Commercialization of Zero Erucic Acid Mustard (*Brassica juncea*) for Enhancing the Competitiveness of Domestic Edible Oil Industry in India”; Mr. Abhay Kumar Verma C/o M/s Unison Agrico for the project entitled “Instant Millets Mix for Breakfast, Soups, Shake”; and

Mr. Amit Kumar Roy C/o M/s Enzyz Gonvindji Bio Labs for the project entitled “Enzyz Translational Research and Application Centre (enTRAC)”.

### Corporate Membership

In this quarter, 36 new members were registered and 24 corporate memberships were renewed, resulting in generating a revenue of ₹ 2,96,500/-

### Vigilance Awareness Week

The Indian Agricultural Research Institute observed “Vigilance Awareness Week” from October 26 to 31, 2015. A pledge ceremony was administered to all officials and staff on October 26, 2015. This year the main focus of Vigilance Awareness Week was “Preventive Vigilance as a Tool of Good Governance”.

### Rashtriya Ekta Diwas

The Institute observed the birth anniversary of Sardar Vallabhbhai Patel on October 31, 2015 as “Rashtriya Ekta Diwas (National Unity Day)” as per the directions of Ministry of Home Affairs and ICAR, New Delhi. A pledge ceremony was administered by the Director, IARI to all officials and staff of Institute.

### National Conference

The National Academy of Agricultural Sciences/Indian Council of Agricultural Research and Indian Agricultural Research Institute organized jointly a national conference on “Golden Jubilee of Green Revolution” on November 27, 2015. Shri Radha

Mohan Singh, Hon’ble Union Minister of Agriculture and Farmers Welfare inaugurated the National Conference and released a special commemorative stamp on Golden Jubilee of Green Revolution. Former Presidents of NAAS, NAAS fellows, veteran and emeritus scientists, senior officials of ICAR and Ministry of Agriculture, representatives of international agricultural research organizations, Vice-Chancellors and representatives of Agricultural Universities and policy planners participated in this event. Dr. T. Mohapatra, Director, IARI, New Delhi delivered welcome address and emphasized the key role played by IARI in making the green revolution a grand success.

### Annual Hindi Prize Distribution Function

The Institute celebrated its Annual Hindi Prize distribution function on November 7, 2015 at Dr. B.P. Pal Auditorium. Dr. Prasanna Kumar Patasani, Hon’ble Member of Parliament (*Lok Sabha*) and

Convener, Parliamentary Committee on Official Language was the chief guest. Dr. Trilochan Mohapatra, Director, IARI presided over the function. Dr. K.V. Prabhu, Joint Director (Research) and Chairman, Institute Official Language Implementation Committee gave the welcome address. Dr. Patasani released the 8th issue of *Rajbhasha Patrika, Pusa Surbhi*. On this occasion, the prizes were given away to the winners of different competitions organized during the year including *Hindi Vyavhaar Pratiyogita, Rajbhasha Hindi Patra Vyavahaar Pratiyagita*, Hindi article competition on agriculture published in various magazines and papers, *Pusa Vishisht Hindi Pravakta Award Pratiyogita* for the best lecture delivered in training programmes/workshops, and awardees of power point presentations in Hindi and competitions organized during *Hindi Chetna Maas*.

A *Hasya Kavi Sammelan* was also organized on this occasion which brought cheers and smiles to the audience.



Dr. Prasanna Kumar Patasani, Hon’ble Member of Parliament (*Lok Sabha*) releasing the 8th issue of *Rajbhasha Patrika, Pusa Surbhi*

## Power Point Presentation Competition in Hindi

IARI organized a power point presentation competition in Hindi on October 6, 2015 on the topic "GM Phaslen : Janm Se Pahle Hi Mrityu". The scientists and technical officers of the Institute participated in this competition. Dr. Girijesh Singh Mehra, Scientist, Division of Agricultural Extension; Dr. Atul Kumar, Senior Scientist, Division of Seed Science and Technology; Dr. Dinesh Kumar Sharma, Principal Scientist, CESCRA; Dr. Harshwardhan Choudhury, Senior Scientist, Division of Vegetable Science; and Dr. Dinesh Kumar, Principal Scientist, Division of Agronomy received the First, Second, Third, Fourth and Fifth prizes, respectively, from the chief guest at the Annual Hindi Prize Distribution Function.

## Honours/Awards

- ❖ Dr. V.R. Sagar, Head, Division of Food Science & Postharvest Technology and Dr. Kanwar Pal Singh, Principal Scientist, Division of Floriculture & Landscaping received the Fellowship of the Horticultural Society of India.
- ❖ Dr. Ram Roshan Sharma, Principal Scientist, Division of Food Science & Postharvest Technology received "Pusa Vishist Hindi Pravakta Puruskar"

of the Institute for the year 2014-15.

- ❖ Drs. Rakesh Pandey, Neelu Jain, Vijay Paul, GP Singh, RC Meena, Atar Singh, Shine MB, Vinod Pandey and Neha Rai of the Divisions of Plant Physiology and Genetics received the Best Poster Award in the 3<sup>rd</sup> International Plant Physiology Congress (2015) for their research work on "Evaluation of Root System Architecture for Adaptation to
- ❖ Dr. K.K. Bandyopadhyay, Principal Scientist, Division of Agricultural Physics received the 12<sup>th</sup> International Congress Commemoration Award for the year 2015 from the Indian Society of Soil Science, New Delhi.
- ❖ Dr. V. K. Baranwal, Principal Scientist & In-charge, Virology Unit received the Fellowship of National Academy of Agricultural Sciences.

Water Stress in Wheat: Deeper Rooting".

## Visitors from Abroad

During the period, October-December 2015, five delegations one each from European union, African countries, American Council of Education, Afghanistan and China visited the Institute. The Chinese delegation was led by Ms. Ching Ping, Deputy Director-General, Department of Agriculture of Guangdong. Dr. Kenneth Knox, Chair, Canada Science Technology and Innovation Council, Canada also visited the Institute.



Dr. T. Mohapatra, Director, IARI interacting with the members of American Council of Education

Published quarterly by the Publication Unit on behalf of the Director, Indian Agricultural Research Institute (IARI), New Delhi 110 012, and printed at Venus Printers and Publishers, B-62/8, Naraina Industrial Area, Phase II, New Delhi - 110 028.

Joint Director (Research): Dr. K.V. Prabhu; In-charge, Publication Unit (English): Dr. S.S. Sindhu

Website : <http://www.iari.res.in>