



# NRCPB NEWSLETTER

ICAR- National Research Centre on Plant Biotechnology,  
Pusa Campus, New Delhi



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## FROM PROJECT DIRECTOR'S DESK



Welcome you to the issue 1, volume 4 of the half-yearly newsletter of Indian Council of Agricultural Research- National Research Centre on Plant Biotechnology (ICAR-NRCPB). This is a premier institute under the umbrella of ICAR and is the leading research institution of India for Plant Biotechnology education, research and product development with a global impact. The present issue of

ICAR-NRCPB Newsletter highlights some of the important activities of the Centre during the first half of 2017.

Among the major research highlights, our Centre published a high-density intra-specific linkage map of pigeonpea (*Cajanus cajan*) incorporating 932 DNA markers, draft chloroplast genomes of pigeonpea and its wild relative *Cajanus scaraboedis*, high resolution mapping of QTLs for reproductive stage heat tolerance in rice, and first draft of the jute genome.

The Centre has continued its strong extension and outreach activities by participating in Krishi Unnati Mela 2017 at Pusa Campus, New Delhi and making several visits to the villages adopted under the Mera Gaon Mera Gaurav (MGMG) initiative of the Government, holding farmers-scientists interactions to obtain farmers' feedback and expectations from the scientists doing advance biotechnological research in the laboratory.

The present issue also reports on the visits to the Centre by school children, college students, national and international scientists, trainings conducted and awards and recognitions received by ICAR-

NRCPB during the period.

I deeply appreciate the efforts put in by Dr. P.K. Mandal, chairman of the Newsletter committee and its members, Drs. Subodh Kumar Sinha, Navin Chandra Gupta, Amitha Mithra, Amolkumar Solanke, Mahesh Rao and Nimmy MS for beautifully putting together the ICAR-NRCPB newsletter.

(Nagendra Singh)

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## RESEARCH HIGHLIGHTS

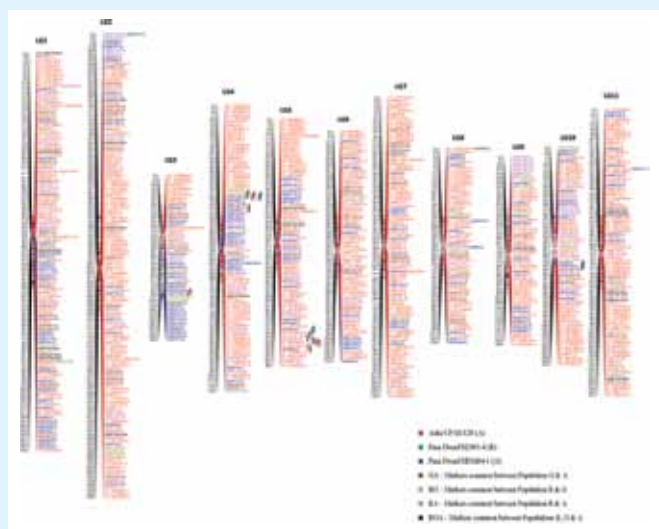
### High density SNP linkage map and chloroplast genome of Pigeonpea published

ICAR-NRCPB was the first to decode the pigeonpea genome in 2011. To improve and refine the genome sequence and to augment the genomic resources, Centre has continued working on this important food legume crop. This has resulted in three publications in the last six months, describing integrated high-density linkage map and a pigeonpea transcription factor

database in high impact journals, Frontiers in Plant Science and Plos One.

The dense intraspecific linkage map of pigeonpea comprising of 932 DNA markers spanning total adjusted map length of 1,411.83 cM was constructed based on three different mapping populations. The map includes 547 bead-array SNPs, 319 RAD-SNPs and 65 simple sequence repeat (SSR) marker loci. This high-density linkage map will be helpful in improving

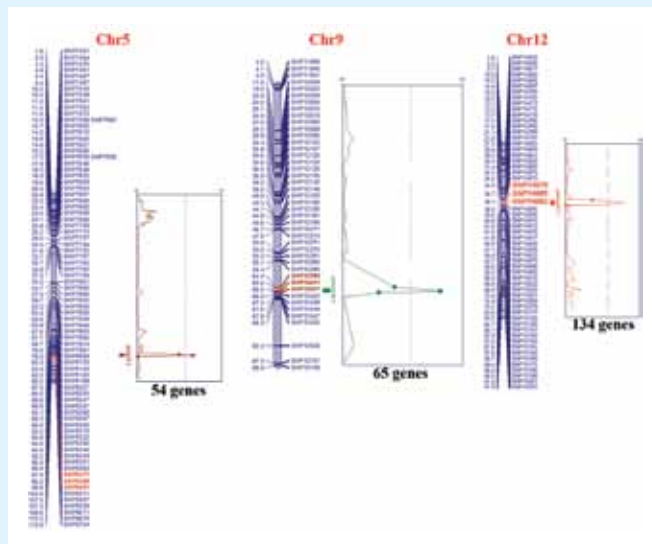
the genome assembly, mapping of genes and quantitative trait loci for useful agronomic traits and subsequently in molecular breeding. The chloroplast genomes of *Cajanus cajan* and its wild relative and donor of A2 CMS system, *Cajanus scarabaeoides* (L.) Thouars for hybrid breeding were sequenced. Chloroplast genome of *C. cajan* is 152,242 bp long with 292 SSRs while that of *C. scarabaeoides* is 152,201 bp long with 280 SSRs. The pigeonpea chloroplast genome has 116 unique genes, including 30 tRNA, 4 rRNA, 78 protein coding genes and 5 pseudogenes. Comparison with other legumes revealed the contraction of IR boundaries in pigeonpea due to absence of *rps19* gene in the IR region. RNA editing was observed at 37 sites in both the species with maximum occurrence in the *ndh* genes. The pigeonpea chloroplast genome sequence will be useful in providing informative molecular markers for genetic diversity analysis and understanding the plant systematics studies among major grain legumes.



### Robust QTLs for heat tolerance in Rice identified

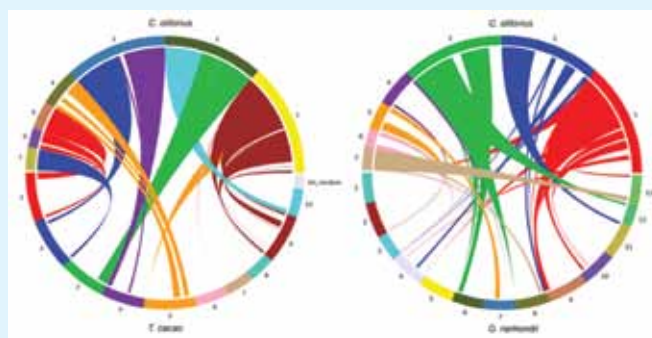
Incidence of heat stress at reproductive phase results in abnormal pollination leading to floret sterility, low seed set and poor grain quality in rice. Identification of QTLs and causal genes for heat stress tolerance at flowering will facilitate breeding for improved heat tolerance in rice. In this context, ICAR-NRCPB scientists have identified two major and one minor QTLs for heat stress tolerance, one novel and one known, in narrow genetic intervals and reported in the journal 'Rice'. High resolution mapping was possible owing to a fairly large mapping population comprising of 272 F8 recombinant

inbred lines derived from a cross between Nagina22 and IR64, precise phenotyping for heat stress tolerance at controlled phenotyping facility available at ICAR-Indian Institute of Wheat and Barley Research, Karnal, India, and use of Illumina Infinium 5K SNP array. The high effect QTLs were mapped on chromosomes 5 and 9 in less than 400 Kbp genomic regions, comprising of 65 and 54 genes.



### Genome of Golden fibre dark jute decoded

ICAR-NRCPB plays an active role in decoding genomes and enhancing the genomic resources. Recently the draft genome (377.3 Mbp) of dark jute (*Corchorus olitorius*) was sequenced. Seven chromosome-scale genetically anchored pseudomolecules were constructed with a total size of 8.53 Mbp. A total of 57,087 protein-coding genes with annotated functions are present in the jute genome. The annotated genes show the highest sequence similarity with *Theobroma cacao* followed by *Gossypium raimondii*.



## EVENTS

### New Year Celebration

ICAR-NRCPB celebrated New Year 2017 on 1<sup>st</sup> Jan 2017 at the Institute auditorium, where Project Director addressed the staff and students and motivated them. This was followed by New Year's address from eminent staff of the institute, Prof. N. K. Singh, National Professor, B. P. Pal Chair and Dr R. C.

Bhattacharya, Professor, Molecular Biology and Biotechnology, PG School, IARI. On this occasion, former project directors and professors were also present and bestowed their wishes for the growth and better performance of the institute. The programme ended with cultural performance by the institute staff and students.



New Year celebration at ICAR-NRCPB, New Delhi

### Felicitation of Dr T. R. Sharma

A programme was organized by staff and students of ICAR-NRCPB, New Delhi on 7<sup>th</sup> January 2017 to felicitate Dr T. R. Sharma, Ex-Project Director of our institute for getting selected as Executive director of NABI, Mohali. Dr TR Sharma worked as Project Director, ICAR-NRCPB from April 2014 to January 2017 and served as Scientist for more than 20 years at ICAR-NRCPB, New Delhi. The staff and students of ICAR-NRCPB shared their experience working with him and presented him with a memento.



Felicitation of Dr T. R. Sharma, Executive director, NABI, Mohali and Ex-Project Director ICAR-NRCPB

### Joining of Dr N. K. Singh as Project Director (In charge) of ICAR-NRCPB, New Delhi

On 7<sup>th</sup> January 2017, Prof. N. K. Singh, National Professor, B. P. Pal Chair took charge as Project Director, ICAR-NRCPB, New Delhi as directed by the ICAR. The staff and students of ICAR-NRCPB welcomed and wished him success in his new assignment.



Joining of Prof. N. K. Singh as Project Director, ICAR-NRCPB, Delhi

### Institute Management Committee Meeting

The Institute Management Committee meeting was held on 6<sup>th</sup> February, 2017 under the chairmanship of Prof. N. K. Singh, Project Director, ICAR-NRCPB. Other external members present were Dr NP Singh, Dr P. R. Choudhary, Dr KV Bhat, Dr Ratan Tiwari and Dr KK Chaturvedi. Institute members namely, Dr RC Bhattacharya, Dr Kishor Gaikwad, Dr PK Mandal, Dr TK Mandal, Dr D Pattanayak were also present. Mr. Rajesh K Sharma, SAO and Mr. Mohan Singh, F&AO were special invitees.

### Swachhata Abhiyan

Scientists and technical staff of ICAR-NRCPB visited the adopted villages viz., Nekpur, Java and Agota of district Bulandsahar, UP and a Swacchata drive was launched to clean the villages. The farmers of the villages participated and discussed on different aspect of cleanliness. We are also following the Swachhata Abhiyan on the last day of every month at ICAR-NRCPB premises.

### International Yoga Day

International Yoga day was celebrated on 21<sup>st</sup> June 2017 in collaboration with IARI and other ICAR institute situated in Pusa Campus, New Delhi. Dr Trilochan Mohapatra, Director General, ICAR and Secretary, DARE was the chief guest for this function and all the staff and students of the institute actively participated in the Yoga Day celebration.



Yoga Day celebration at Pusa Campus, New Delhi

### Sports

A team of ICAR-NRCPB staff participated in ICAR Inter-Zonal Sports Tournament held at ICAR-IARI, Pusa Campus, New Delhi from 25-29 April 2017. Dr Prasanta K Dash, Senior Scientist, ICAR-NRCPB got first prize in shot-put event in this sport tournament.



Dr P.K. Dash receiving the award during the ICAR Inter-Zonal Sports Tournament

## EXTENSION ACTIVITIES

### Visit to Nekpur village

A team of scientists from ICAR-NRCPB, New Delhi under the leadership of Dr Sanjay Singh visited Nekpur village in Bulandsahar district, UP on 10<sup>th</sup> March 2017 for monitoring seed production field and for field demonstration of mustard variety Pusa Jaikisan. A Kisan Gosthi was organised at Nekpur village and agriculture related problems were discussed.

### Krishi Unnati Mela

ICAR NRCPB participated in Krishi Unnati Mela, 2017 held from 15<sup>th</sup>-17<sup>th</sup> March at IARI, New Delhi. A stall depicting the research activities and achievements of the institute was set up at the mela venue. Our staff and students actively participated in the mela. Posters describing profile of the institute and salient achievements were displayed. Seed samples of popular



as well as promising varieties released by ICAR-NRCPB alone or in association with other ICAR institutes were also displayed. In addition, a live demonstration of tissue culture and plant transformation was organized. Demonstration of isolation of DNA from banana at our stall attracted the interest of visitors, especially, students and agriculture graduates. Following the mandate and vision of our institute, the visitors were sensitized on various issues related to genetically modified (GM) crops and their potential in enhancing the agricultural output. During these three days of Krishi Unati Mela, thousands of visitors were received at our stall and learnt about the efforts of ICAR-NRCPB towards welfare of Indian agriculture.



Visitors at Krishi Unnati Mela held during 15<sup>th</sup> -17<sup>th</sup> March 2017

### Farmers-Scientists Interaction - I

Fourteen farmers from Dadari and Bulandsahar, UP, accompanied by the program co-ordinator and project managers of Indian Society of Agribusiness Professionals (ISAP) visited ICAR-NRCPB, New Delhi on 07<sup>th</sup> March 2017. The Project Director along with the scientific staff of ICAR-NRCPB interacted with these farmers and discussed about the specific problems of farmers' with respect to rice, wheat, mustard, pulses, coriander, fennel and garlic cultivation. The Project Director gave a brief introduction about the genesis of the institute, its research programs and agriculture related schemes and programmes of the Government of India. Farmers also visited the rapeseed-mustard research field at research farm.



### Farmers-Scientists Interaction - II

Twenty two farmers from three districts of Rajasthan viz., Bundi, Bara and Sawai Madhopur accompanied by the program co-ordinator and project managers of ISAP visited ICAR-NRCPB on 17<sup>th</sup> March 2017. The Project Director and other scientific staff of ICAR-NRCPB discussed agriculture related issues with the farmers. The farmers visited the ICAR-NRCPB stall in Krishi Unnati Mela at Mela Ground and also visited the rapeseed-mustard field.



### Visit to the adopted village under MGMG program:

A group of scientists visited their adopted villages Java and Agaota during May and June 2017. Kishan Gosthis were organized and the scientist interacted with the farmers.

## NEW PROJECTS SANCTIONED

SI No	Title of the project	Funding agency	PI	Grant amount (Rs in lakh)	Date of start
1	Structural and functional genomics study of deep water adaptations of local rice land races of Assam	DBT, New Delhi	Dr Tapan Kumar Mondal	24.47	1st April 2017
2	Generation and comparative analysis of salinity responsive miRNAs and miRNA-mediated pathways of halophyte ( <i>Oryza coarctata</i> ) and a tolerant glycophyte ( <i>Oryza sativa</i> cv Nonabokra)	DBT, New Delhi	Dr Tapan Kumar Mondal	60.60	1st April 2017

3	Decoding tea ( <i>Camellia sinensis</i> ) genome for identification of commercially important genes	National Tea Research Foundation, Tea Board, Kolkata	Dr Tapan Kumar Mondal	116	27th April 2017
4	Development of haploid inducer line in <i>Brassica oleracea</i> var. botrytis through CRISPR-Cas mediated engineering of centromeric histone H3 gene	Early Career Research Award By Science & Engineering Research Board (SERB)	Dr Anshul Watts	40.21	27th June 2017

## OUTREACH: TRAINING AND VISITS

### Visit by School / College students

Almost three hundred students from Kerala, Chhattisgarh and Maharashtra Agricultural Universities visited NRCPB during Jan-May, 2017. Around 30 students from Salwan public school, Paschim Vihar Delhi also visited the centre during this period. They visited different laboratories and facilities and also interacted with scientists. They were told about various technologies developed by NRCPB and their application.



SI No	Date	University/college/school	No of visitors	State
1	9-1-2017	College of Horticulture, IGKV	38	Chhatisgarh
2	16-2-2017	College of Agriculture Padanekkad	53	Kerala
3	21-3-2017	College of Agriculture	79	Kerala
4	24-3-2017	K K Wagh College of Agricultural Biotechnology	48	Maharashtra
5	30-3-2017	College of Agriculture, Vellayani, TVM	60	Kerala
6	25-5-2017	Salwan Public School, Paschim Vihar	27	Delhi



### Training for Technical officers

ICAR-NRCPB conducted ICAR sponsored training on "Use of Different Molecular Biology Techniques in Crop Improvement Program" from 17<sup>th</sup> to 31<sup>st</sup> Jan 2017 for the technical staff of ICAR to strengthen the scientific activity and improve the contribution of technical officers in crop improvement programs. The training was attended by 14 technical officers. Two participants were from NRRRI, Cuttack, one from CICR, Nagpur and one from IARI regional station Katrain, and remaining ten participants were from different Divisions of IARI.

### Training on Genetic Fidelity Testing and Virus Indexing of Tissue Culture-Raised Plants

A DBT-BCIL sponsored training program for Accredited Testing Laboratories (ATLs) on "Genetic Fidelity Testing and Virus Indexing of Tissue Culture-Raised Plants" was conducted by Dr Amolkumar Solanke and Dr SV Amitha Mithra, ICAR-NRCPB, New Delhi from 20<sup>th</sup> February – 4<sup>th</sup> March, 2017 along with Advanced Centre for Plant Virology, Division of Plant Pathology, IARI. The participants included two contract scientists and three technical assistants from different ATLs and one senior scientist from DFR, Pune.



## Workshop for Biology school teachers

A Workshop on basic genetics and molecular biology was organized at ICAR-NRCPB, New Delhi from 8-9 June, 2017, on behalf of Genetics Trust for the biology teachers.

## Professional Training for ARS Scientists

A group of four newly recruited ARS Scientists joined NRCPB for their three months professional training. They were: Mr. Gurav Kumar, National Rice Research Institute, Cuttack; Dr. Shivani Nagar, Indian Institute of Soybean Research, Indore; Mr. Kiran Kumar Kommu, Central Citrus Research Institute Nagpur; and Dr. Throat Yogesh Enkathrao, Indian Institute of Sugarcane Research, Lucknow.



## VISITS AND EXCHANGES

### National/ International:

- ◆ Shri Deepak Kumar, Secretary, IT, Biotechnology, S&T and HRD, Govt. of Uttarakhand visited the institute on 21-01-2017.
- ◆ Dr Murray Grant from School of Life Sciences, University of Warwick, United Kingdom visited the institute on 21-02-2017.
- ◆ Dr Rupesh Deshmukh, Visiting Professor, University of Laval, Quebec, Canada delivered a talk on 01-03-2017.
- ◆ Dr Nese Sreenivasulu from IRRI, Philippines delivered a talk at ICAR-NRCPB on 03-05-2017.
- ◆ Six Russian delegates from Nikita Botanical Garden, Russia visited ICAR NRCPB on 06-06-2017.
- ◆ Dr Rohini Sreevathsa, Dr Vandana Rai (Sr. Scientists) and Dr Era Vaidya Malhotra and Dr Sandhya (Scientists) visited Zurich, Switzerland to attend short term proteomics course jointly organized by the Indo-Swiss Collaboration in Biotechnology (ISCB) and Functional Genomics Centre during 25<sup>th</sup> March to 1<sup>st</sup> April, 2017.

- ◆ Dr Pranab Kumar Mandal, Principal Scientist and Dr Subodh Kumar Sinha, Sr. Scientist visited United Kingdom for attending Phenotyping and Phenomics course at Rothamsted Research, Harpenden from 3<sup>rd</sup> June to 12<sup>th</sup> June, 2017.

### Foreigners visit



## AWARDS AND HONOURS

Dr Anshul Watts received the IARI Gold medal from Hon. Minister of Agriculture and Farmers' Welfare, Shri Radha Mohan Singh, during 55<sup>th</sup> Convocation of IARI for his outstanding Ph.D. research work.

Dr N. C. Gupta received the Best poster presentation award for "TS-2: variability in oxalic acid production among different geographical isolates of *Sclerotinia sclerotiorum*" In International Seminar on Oilseed Brassica (ISOB 2017) held from Feb 23-27, 2017 at SIAM, Jaipur, Rajasthan, India.

Dr N. C. Gupta received "Fellow Award" from Society for Applied Biotechnology, Tamil Nadu, India

### Invited Talks:

- ◆ Dr Tapan Kumar Mondal delivered a lecture on "Analysis of genome-wide miRNA genes from the ten diploid *Oryza* species" on 18th March, 2017 at National Symposium entitled "Biotechnology in health care: challenges and opportunities" organised by Jamia Hamdard, New Delhi, and sponsored by UGC SAP (DRS-1) and ICAR, New Delhi.
- ◆ Dr Subodh K. Sinha delivered an invited talk on "Improving Nitrate Uptake Efficiency in wheat employing root-based approaches" in 2<sup>nd</sup> National Seminar on Current Trends in Life Sciences, during 20-21 February, 2017 held at Central University of South Bihar, Patna.



- ♦ Dr Amitha Mithra SV delivered an invited talk on “Introduction to National Repository of Rice EMS Mutants: Utility for the Rice Researchers” on 11<sup>th</sup> April 2017 at Jorhat, Assam Agricultural University in the AICRP and AAU sponsored Rice Workshop.
- ♦ Dr Solanke AU delivered an invited talk on “Role of Bioinformatics in Agriculture”, at “19th Annual National Conference of Society of Statistics, Computer and Applications” conducted on March 6-8, 2017 at Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu, J&K, India.
- ♦ Dr Sharmistha Barthakur delivered a talk on “ Terminal heat stress induced WRKY10 transcription factor from bread wheat: isolation and functional characterization in Arabidopsis”, In: 38th Annual meeting of Plant Tissue Culture Association (India) and National Symposium on Plant Biotechnology, held on March 3-5, Kolkata
- ♦ Dr N. C. Gupta delivered an invited talk on “Genome editing in oilseed brassica for crop improvement” in 20th ADNAT Convention; International Symposium on “Genome editing technologies and their applications in biology, medicine and agriculture” from 16th-18th Feb, 2017, KIIT University, Bhubaneswar.

## Publications

A total of fifty-four publications including articles in international peer reviewed high impact factor scientific journals were published by NRCPB Scientists during the reporting period.

Type of Publication	Number
Research Papers	44
Book chapters	10

## हिन्दी गतिविधियां-2017

### जनवरी से जून २०१७ तक सम्पन्न हिन्दी गतिविधियाँ

वर्ष 2017 के अंतर्गत दो कार्यशालाओं एवं दो हिंदी राजभाषा कार्यान्वयन समिति की बैठकों का आयोजन किया गया। कार्यशालाओं का विवरण निम्न प्रकार से है:-

सं.	दिनांक	तिमाही	व्याख्यानकर्ता
1.	04.03.2017	जनवरी- मार्च, 2017	प्रोफेसर अनिल राय विषय: हिन्दी का भविष्य और भविष्य की हिन्दी हिन्दी विभाग, दिल्ली विश्वविद्यालय
2.	14.06.2017	अप्रैल-जून, 2017	श्री अरविन्द कुमार सिंह, विषय: कृषि वैज्ञानिकों द्वारा हिन्दी के प्रयोग में कौन सी सावधानियाँ बरती जाएं मुख्य सम्पादक, राज्यसभा टी.वी एवं अध्यक्ष अखिल भारतीय राइटर्स एवं जर्नलिस्ट ,सोसिएशन
3.	04.02.2017	जनवरी- मार्च, 2017	राजभाषा कार्यान्वयन समिति बैठक
4.	15.05.2017	अप्रैल-जून, 2017	राजभाषा कार्यान्वयन समिति बैठक
5.	30.06.2017		नगर राजभाषा कार्यान्वयन समिति (उत्तरी दिल्ली) बैठक में भागीदारी



## EDUCATION AND TRAINING

### Farewell

Biotech Club organized a farewell program and felicitated all 7 Ph.D. and 6 M.Sc. degree recipients from Molecular Biology



& Biotechnology division of IARI during 55<sup>th</sup> Convocation held on 9<sup>th</sup> Feb 2017.

### From Students of NRCPB to Scientists of ICAR

Four students from ICAR-NRCPB (Sudhir Kumar, Shruti Sinha, Devanna and Viraj Kamble) have joined the ARS as scientists in the discipline of Agricultural Biotechnology

### Condolence and Homage

During the farewell program, heartfelt condolence has been expressed by NRCPB faculties and students of the Molecular Biology & Biotechnology division for the untimely demise of one of the M.Sc. student, Mr. Pramod Awakale and prayed for his soul to rest in peace.

## PERSONNELIA

### Transfer/ Deputation

- ◆ Dr TR Sharma, Project Director was relieved from ICAR-NRCPB on 7<sup>th</sup> January 2017 and joined National Agri-food Biotechnology Institute, Mohali as Executive Director on deputation.



- ◆ Dr. Era Vaidya, Scientist, was transferred from ICAR-NRCPB, New Delhi to ICAR-NBPGR, New Delhi on 3<sup>rd</sup> April 2017.



### New Joining

- ◆ Prof. N.K. Singh, National Professor took over the charge of Project Director, ICAR-NRCPB on 7<sup>th</sup> January 2017.

- ◆ Dr. Ashish Kumar, Sr. Scientist (Plant Pathology), joined ICAR-NRCPB on 27<sup>th</sup> June 2017 after getting transferred from IARI (RS), Pusa, Samastipur, Bihar.



- ◆ Dr. S.R. Bhat has joined ICAR-NRCPB as Emeritus Scientist on 1<sup>st</sup> Feb 2017.



### Promotion

- ◆ Dr. Tapan Kumar Mondal, Sr. Scientist, was promoted to Principal Scientist from 17<sup>th</sup> Feb 2017.

## FORTHCOMING EVENTS

- ◆ Institute Research Committee (IRC) meeting
- ◆ Research Advisory Committee (RAC) meeting
- ◆ Centre for Advanced Faculty Training
- ◆ Kharif Field Day
- ◆ Hindi Chetana Mas
- ◆ Felicitations of newly admitted PG students

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