

# बीज अनुसंधान निदेशालय

# ICAR-DIRECTORATE OF SEED RESEARCH

## NEWSLETTER



### 30<sup>th</sup> Annual Group Meeting of AICRP - National Seed Project (Crops)

30<sup>th</sup> Annual Group Meeting of AICRP - National Seed Project (Crops) was inaugurated on 3<sup>rd</sup> April, 2015 at ICAR-Directorate of Seed Research, Mau, Uttar Pradesh and attended by more than 150 delegates. Dr S. Rajendra Prasad, Project Director, ICAR-DSR, Mau welcomed all the dignitaries and delegates of the meeting. Dr. S. Ayyappan, Hon'ble Secretary DARE & DG, ICAR inaugurated the meeting and during inaugural speech, emphasized contribution of AICRP-NSP (Crops) in accelerating varietal replacement rate (VRR) and seed replacement rate (SRR) in varied field crops. He appreciated the efforts of various cooperating centres in breeder seed production and maintenance breeding for achieving breeder seed production of 83422.15q. ICAR-DSR in collaboration with various SAUs/ ICAR Institutes should devise apt plan for export of quality seeds to SAARC, BRIC, BIMSTEC, ASEAN and African countries. He urged to develop climate resilient seed production technologies to mitigate adverse

effect of climate change. It was emphasized on development of novel seed quality enhancement strategies viz., use of biopriming, nanotechnology and magnetic seed treatments and to adopt innovative seed distribution approaches like automatic seed vending machines for better outreach. In his concluding remarks he pondered upon development of entrepreneurship programme in seed production involving unemployed youth/women farmers/ agricultural graduates and urged to foster Public Private Partnership in seed sector for supplying quality seed at affordable price to farmers.

Project Director, ICAR-DSR, Mau presented achievements in Breeder Seed Production (BSP) and Seed Technological Research (STR) made under AICRP - National Seed Project (Crops) during 2014-15. Dr. A.K. Sharma, Director, ICAR- NBAIM, Mau stressed upon importance of quality oat seeds for nutritional security further, he emphasized on dissemination of technologies through quality seeds. Dr. B.



Singh, Director, ICAR- IIVR, Varanasi has emphasized on quality seed production in high value low volume crops. Dr. N.P. Singh, Director, ICAR- IIPR, Kanpur exhorted about development of novel technologies like embryo encapsulation in pulses (chickpea). Dr. S.K. Rao, Dean, JNKVV, Jabalpur urged to tap beneficial microbes for seed quality enhancement. Dr. R.R. Hanchinal, Chairperson, PPV&FRA, New Delhi emphasized on formulation of DUS guidelines and to embrace OECD seed standards, since India is signatory for the same.

During the occasion, superannuating scientists of AICRP-NSP (Crops) were felicitated for their remarkable achievements. IARI RS, Karnal and MPKV, Rahuri were adjudged and awarded as best BSP and STR centres.

## Network Projects

### 1. AICRP – National Seed Project (Crops)

- The total breeder seed production under AICRP-NSP (Crops) reached the level of 104781.98q against the indent of 91484.4q during 2014-15. Total breeder seed production in cereal crops was 85411.3q, wheat with 44588.35q was the major contributor followed by paddy wherein 37200.65q of breeder seed was produced. While in pulse crops 8094.14q of breeder seed was produced and major contributor for total production has been from chickpea i.e. 5207.67q alone. Among oilseed crops, soybean contributed 5119.71q alone to the total production of 9934.93q. Out of 1202.51q of total production in forage crops, guar contributed 650.40q followed by forage oats (262.33q). The breeder seed production in fibre crops reached 139.10q wherein, major share is contributed by cotton with 127.60q.

### 2. ICAR Seed Project – Seed Production in Agricultural Crops

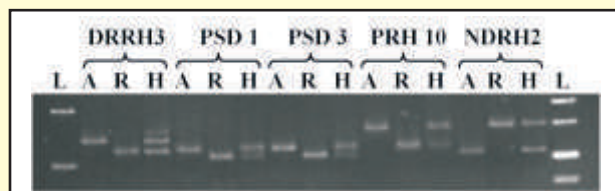
- Under ICAR Seed Project, an amount of Rs. 1129.45 lakh was released to 62 cooperating centres during 2014-15, for continuation of seed production activities, technology dissemination and human resource development in seed domain at different cooperating centres.

## Research Highlights

### Seed Molecular Biology

#### Molecular Characterization of Paddy Hybrids Using Microsatellite SSR Markers

- Molecular characterization of five paddy hybrids (DRRH3, PSD1, PSD3, PRH10 and NDRH2) was done using breeder seed to assess the genetic purity by using microsatellite SSR marker at genomic level. Most of the bands were found to be monomorphic across the genotypes tested, indicating substantial homogeneity in respect to the genome and loci



tested. RM228 SSR marker showed amplification of an allele, which was very specific and unique to a particular parental line and not amplified in any other parental line or hybrid tested. The dendrogram generated using the data, also confirmed close kinship among the hybrid and their parents while both were found to be grouped separately with each other. It also showed that the hybrids are near or having similar distance from both the parents and indicate true blend of both the parents. Thus, these SSR markers are found to be the effective and alternative tool against the conventional Grow Out Test (GOT) and prospects immensely to reduce the cost and time required for estimation of genetic purity in paddy hybrids.

### QTL mapping for seed vigour in rice (*Oryza sativa* L.)

F<sub>1</sub> crossed seed derived from crosses IR 64 X GP 74 and IR 36 X GP 74 was selfed during off season *Rabi* 2014-15 at regional station, ICAR-DSR, Bengaluru. Referred morphological traits as depicted below viz., prominent basal leaf: sheath colour (brown), leaf margin colour (dark brown) and number of tillers per plant i.e. 32 (effective tillers: 22-25) has been found in F<sub>2</sub> plants and same has been compared with its parents. Similarly, test weight of two crosses IR 36×GP 74 and IR 64 ×GP 74 were ranged from 20.48 g to 33.40 g with mean of 27.91 g and 22.15 g to 31.83 g with mean of 27.65 g respectively. Attributed morphological markers (basal leaf: sheath and leaf margin colour) will serve as cues in identification of Recombinant Inbred Lines (RILs) population in due course.



Prominent basal leaf: brownish sheath colour and dark brown leaf margin colour



Prominent basal leaf: sheath and leaf margin with no colour

### Agro-techniques for improved seed production

#### Devising agro-techniques for reducing the seed rate of wheat (*Triticum aestivum* L.)

In specified study effect of seed rate on yield attributing characteristics and seed yield were evaluated. Seed yield and harvest index (41.43 q & 37.85) were significantly higher with 75 kg/ha seed rate with spacing 22.5x7.50 cm as compared to 50 & 100 kg/ha with spacing 22.5x10 & 22.5x5.0cm. Among the different genotypes PBW 502 recorded significantly higher seed yield as well as harvest index. Among all the treatments, IAA & GA<sub>3</sub> recorded significant increase in the seed yield (39.63 & 39.43 q) over control (35.95 q). Straw & biological yield (72.59 & 111.14 q/ha) were significantly higher in 100 kg/ha seed rate with spacing 22.5x5.0 cm as compared to 75 & 50 kg/ha with spacing 22.5x7.50 & 22.5x10 cm. Among the different genotypes PBW 550 recorded significantly higher straw yield as compared to PBW 502 & HD 2733. The seed treated with GA<sub>3</sub> has significant increase in straw and biological yield over all other treatments. Significant

improvement in the seed quality parameters viz. germination (95.78 %), root length (21.36 cm), seedling length (35.06 cm), seedling dry weight (0.199 g), vigour index I & II (3365.50 & 19.07) were significantly higher with 50 kg/ha seed rate with spacing 22.5x10 cm as compared to 75 & 100 kg/ha with spacing 22.5x 7.50 & 22.5x5.0 cm. Among the genotypes HD 2733 recorded significantly higher values of seed quality parameters as compared to PBW 550 & PBW 502.

#### **Impact of genotypes and conservation tillage on seed quality and productivity of wheat in the eastern-UP**

Referred study was initiated during *Rabi* 2012-13 with 18 treatment combinations of three tillage operations Zero Tillage (ZT), Conventional Tillage (CT) and Furrow Irrigated Raised Bed (FIRB) and six genotypes (PBW 502, KRL-213, HD-2733, HD-2967, DBW-39 and PBW-550) in a split plot design with three replications. Zero tillage treatment recorded significantly higher growth and yield attributes (DMA, tillers m<sup>-2</sup>) as compared to CT and FIRB. However, plant height was more under CT. The yield attributes like spike length and seeds/spike were more under FIRB system due to border effect of each row. Among the wheat genotypes, HD 2967 recorded significantly higher growth and yield attributes followed by KRL 213 and DBW 39 and least in HD 2733. The results on cost economics revealed maximum cost of cultivation under CT followed by FIRB and lowest in ZT. Gross return, net return and B: C ratio was highest under ZT followed by CT and FIRB.

#### **Integrated approach for maximization of seed yield in hybrid rice**

Impact of fertilizer dose on yield and yield attributing traits was positive and significant on traits viz., panicle length (cm), number of seeds per panicle, panicle weight (g), test weight (g), seed yield (q/ha), straw yield (q/ha) and biological yield (q/ha) except for harvest index. Among fertilizer doses, treatment RDF+ZnSO<sub>4</sub>basal + ZnSO<sub>4</sub>foliar showed positive response, which increased all the yield and yield attributing traits viz., panicle length (24.5 cm), number of seeds per panicle (10.9), panicle weight (5.2 g), test weight (20.0 g), seed yield (8.7 q/ha), straw yield (42.2 q/ha) and biological yield (50.9 q/ha) in both the hybrids compared to other fertilizer doses. Among the yield and yield attributing traits *i.e.* harvest index (18.0) recorded higher values for RDF + ZnSO<sub>4</sub>foliar application. The hybrid DRRH-3 and balanced fertilizer dose RDF + ZnSO<sub>4</sub> basal + ZnSO<sub>4</sub> foliar may be recommended for enhancing the seed yield potential. Hybrid rice DRRH-3 recorded significantly higher values for seed quality parameters viz., germination (93.3%), shoot length (13.7cm), seedling dry weight (0.829 g), vigour index I & II (2549.6 & 78.2) except root length and seedling length (cm) which showed no significant difference. Further fertilizer dose RDF+ZnSO<sub>4</sub> basal + ZnSO<sub>4</sub> foliar showed higher response for seed quality parameters viz., germination (95.3 %), shoot length (13.7cm), seedling dry weight (0.89g), vigour index-I & II (2622.9 & 85.7) as compared to other doses.

#### **Integrated approach for maximization of seed yield in wheat**

**Method of sowing:** Ridge sowing was significantly superior over normal sowing for all observed traits viz., plant height 60 DAS, 90 DAS and at harvest (59.1, 95.0 & 97.3 cm), number of tillers/plant 60 DAS and 90 DAS (7.27

& 7.44), spike length (11.21 cm), spike weight (2.27 g), spikelet/ spike (20.47), number of seeds/ spike (58.20), seed weight/ spike (1.87 g), test weight (42.71 g) and seed quality parameters viz., germination (95.05%), root length (20.95cm), shoot length (16.61 cm) seedling length (37.56 cm), seedling dry weight (0.170 g), vigour index I & II (3590.7 & 16.13) over conventional sowing.

**Fertilizer Application:** The recommended dose of fertilizer as a basal + ZnSO<sub>4</sub> + Mn was found to be significantly superior for straw yield (60.20 q/ha) and biological yield (96.10 q/ha).

#### **Optimization of seed production technology in summer mungbean for maximizing seed yield per unit area under North Indian conditions**

The treatments were laid out in split plot design (SPD) during summer season 2014 with three dates of sowing *i.e.* 30 March, 15 April & 30 April, 2014 as main treatments; two spacings *i.e.*, 20 cm x 10 cm & 30 cm x 10 cm as sub treatments and six combinations of fertilizer and seed treatment as sub-sub treatments with the variety SML 668. First date of sowing (30 March, 2014) was significantly superior over second and third dates of sowing (15 April & 30 April, 2014) for seed yield (12.14 q/ha) stover yield (20.79 q/ha), biological yield (32.95 q/ha) and for seed quality parameters.

Regarding spacing, 30 X 10 cm was significantly superior over 20 X 10 cm spacing for seed yield (11.44 q/ha), stover yield (20.05 q/ha) and biological yield (31.51 q/ha). In reference to fertilizer application, recommended dose as basal + seed treated with Rhizobium and PSB + Borax spray (100 ppm) at flowering initiation was found to be significantly superior for seed yield traits.



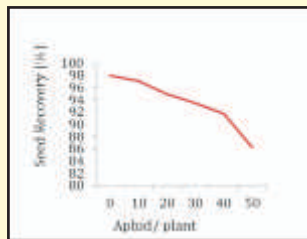
*Summer Mungbean– Integrated approach for maximization of seed yield*

#### **Standardization of seed production of multi-cut forage sorghum hybrids under north Indian conditions**

In reference to optimal dates of sowing, 30 June, 2014 date of sowing was significantly superior over 20 June, 2014 and 10 July, 2014 dates of sowing for observed seed yield traits. Staggered planting *i.e.* planting of male parent 4 days prior to planting of female parent was found to be superior for seed yield rather than same day planting.

## Seed Entomology

Effect of aphid, *Lipaphis erysimi* on seed quality parameters of mustard was evaluated with six different insect densities which were 0, 10, 20, 30, 40 and 50 aphids per plant. Observed data revealed strong negative correlation (- 0.96) between aphid density and seed recovery percentage.

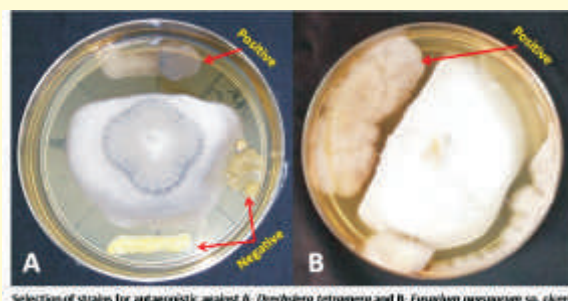
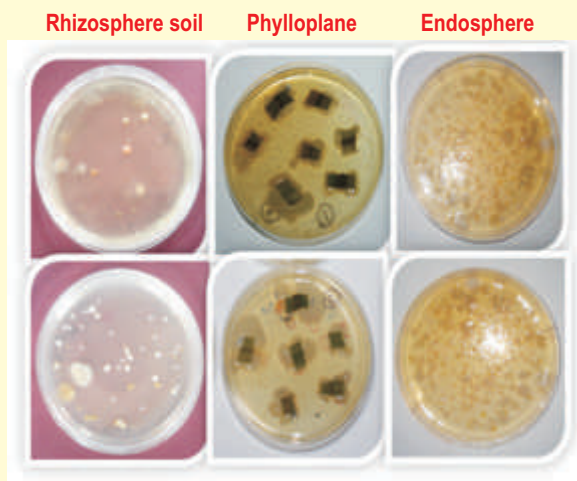


However, non-significant correlation has been found between aphid density and germination percentage of seed.

## Seed Pathology

### AMAAS Project: Role of potential microorganisms in seed and crops health of rice, wheat and mustard

- More than 300 bacteria were isolated and stored from different agro-climatic zones of India from wheat, mustard and rice crops by means of three different domains i.e. from rhizosphere, phylloplane and endosphere.
- All isolated strains were screened for plant growth promoting activity tests and subsequently antagonistic activity tests against nine fungal pathogens viz., *Xanthomonas oryzae*, *Cercospora sesame*, *Drechslera tetramera*, *Colletotrichum gloeosporioides*, *Sclerotium rolfsii*, *Rhizoctonia solani*, *Ustilaginoidea virens*, *Magnoperthea oryzae*, *Fusarium oxysporum* f. sp. *ciceri*.



Selection of strains for antagonistic against A. *Drechslera tetramera* and B. *Fusarium oxysporum* sp. *ciceri*

## Seed Economics

### Cost economics of pigeonpea seed production

Analysis of primary data collected from Gulbarga district of Karnataka for the agricultural year 2013-14 revealed that ratio of fixed and variable cost in Pigeonpea certified seed production was 32:68. Human labour was the major component of cost on inputs applied for seed production of Pigeonpea. Its share in total costs was about 32.46 per cent. It was followed by bullock & machine labour accounting for about 12.29 per cent of the total cost. The total cost in certified seed production of Pigeonpea was Rs. 39436 per hectare. The gross and net returns were Rs. 73300 and Rs. 33864 per hectare respectively. The decision of the farmer on adoption of seed production technology was positively influence by his education, age, land holding, irrigated land, number of crops grown and extension contacts while family size influencing negatively on adoption of seed production technology. Only two variables out of seven variables included in the model were significant. Extension contacts were significant at 5 per cent probability level and land holding was significant at 10 per cent probability level. Higher yield and profitability in seed production may be popularized among the farming community to increase the certified seed production. The farmers may be encouraged to take up seed production of Pigeonpea by providing required quantity of breeder / foundation seed along with technical guidance.

### Revisit to Seed Multiplication Ratio (SMR)

Ascribed study analyses the SMR of various crops using data compiled from ICAR Seed project. SMR data, which was already in use for various crops, was compared with the data obtained from varied centers of ICAR Seed Project. The comparison shows a need to revise the old / obsolete SMR, which is currently used for estimating demand and supply requirement of quality seed in the country and more importantly an essential cog in seed certification for seed yield realization from unit area. Most of the crops showed a higher ratio for seed multiplication when compared with the existing data. In addition to SMR, the percentage difference from the seednet SMR data was also computed to understand the productivity gains through technology advancement. In this view, for a given estimated quality seed demand of a particular crop, based on higher per unit seed yield a lesser area may be recommended to produce the same seed yield while exploiting the productivity gains through technological advancement. Current analysis shall also pave way for optimization of seed yield realization from unit area during the process of certification, by which seed production and seed entrepreneurship per se shall carve its rightful niche in Indian agriculture and will boost growth in agriculture.

## Meetings / Trainings

### Organized

#### Awareness cum training programme on "Protection of Plant Varieties & Farmers' Right Act 2001" on 16<sup>th</sup> Feb, 2015

The training programme was inaugurated with a guest lecture by Dr. R.K. Chowdhury, former OSD DSR, Mau. About 300 farmers attended this training programme from different parts of Mau. This programme was sponsored by PPV&FR Authority, New Delhi. Dr. R. C. Agrawal, Registrar General of PPV&FRA, New Delhi delivered lecture on

importance of conservation and registration of local plant varieties and also focused on newly developed plant varieties registration. Dr. R.K. Chowdhury, Ex-OSD, DSR, Mau, Dr. P.K. Sharma, I/c Director, NBAIM Mau, and Dr. D.K. Agarwal, Principal Scientist, ICAR-DSR, Mau had delivered lectures on plant varieties protection and farmer's rights. Dr. S. Rajendra Prasad, Project Director, ICAR-DSR, Mau addressed farmers regarding their rights pertinent to local varieties. On this occasion, a training manual titled Protection of Plant Variety and Farmers' Right 2001 was released.



A progressive farmer Shri Chandra Shekhar from Varanasi was honoured by Dr. R. C. Agrawal, Registrar General of PPV & FRA and Dr. R.K. Chowdhury, Ex-OSD, ICAR- DSR, Mau for their contribution in plant variety development. Shri Chandra Shekhar demonstrated his own developed plant varieties and shared his success story with farmers during training programme. All farmers visited DSR farm and benefited from demonstration of different plant varieties of wheat. Dr. Arvind Nath Singh, Senior Scientist & Coordinator of training programme gave thanks to all invitee and farmers for the success of training programme.

### Kisan Mela

ICAR - Directorate of Seed Research organized Kisan Mela on 02 March, 2015. The Mela was inaugurated by Dr. Gautam Kalloo Former DDG (Horticulture), ICAR. Various ICAR Institutes, other government/private agencies displayed their exhibits. Besides these, various banks like State Bank of India, Punjab National Bank and NGOs also displayed their inventory for farmers. On the occasion of Kisan Mela, a magazine titled "Prasar Patrika" was released. About 3000 farmers from Uttar Pradesh and students from different schools visited and benefited during the occasion.



In his inaugural address, chief guest Dr. Gautam Kalloo highlighted the significant contributions made by DSR for the awareness of the farmers in seed realm. Dr. S. Rajendra Prasad, Project Director, DSR welcomed the dignitaries and highlighted the major achievements of the Institute. He exhorted that the technologies developed by the institute are performing well in eastern Uttar Pradesh. Dr. Arvind N. Singh, Senior Scientist & Convener proposed vote of thanks.

### Attended

- A. K. Sinha attended "Expert elicitation programme for wheat in Uttar Pradesh" at ICAR-National Bureau of Fish Genetic Resources, Lucknow organized by ICAR- National Institute of Agricultural Economics and Policy Research, New Delhi in collaboration with CIMMYT.
- Arvind Nath Singh attended and presented paper in 17th Indian Agricultural Scientist & Farmers' Congress on Agri-Innovation for enhancing Production & Rural Employment during 21-22 February, 2015 at Allahabad.
- Arvind Nath Singh attended and presented paper in International Conference on Agriculture, Veterinary & Life sciences during 30-31 January, 2015 at Vikram University, Ujjain, M.P, India.
- Arvind Nath Singh attended meeting of Scientific Advisory Committee of Krishi Vigyan Kendra, Mau as the member on 04. 02.15 at KVK, Mau.
- Arvind Nath Singh attended the Exhibition at Barhi, Hazaribagh, Jharkhand from 27 to 28 June 2015. Honourable Union Minister of Agriculture, Govt. of India inaugurated the exhibition on the occasion of unveiling foundation stone of Indian Agriculture Research Institute-Jharkhand by Hon'ble Prime Minister.

- Arvind Nath Singh attended the meeting of Institute Technology Management Committee (ITMC) of ICAR-NBAIM Mau on 01.01.15.
- Hardev Ram participated and enabled in institution of exhibition stall in Eastern Zone Regional Agriculture Fair organized by ICAR-CPRI regional station, Patna, Bihar during 19-21 Feb, 2015.
- Hardev Ram participated in short course (10 days) on "Bio-fortification of food crops" at IIPR, Kanpur during 04-14, Oct. 2014.
- Hardev Ram participated in short course (10 days) on "Principles and practices of direct seeded rice" at CCSHAU-RRS, Karnal during 22.09.2014 to 01.10.2014.
- Hardev Ram participated in XII Agricultural Science Congress during 03-06, Feb. 2015 at ICAR –NDRI, Karnal.
- Radhika C. attended a conference titled "International Conference on Innovation and Business Management" at Haridwar on June 20-21, 2015 organized by Society of Technical and Management Professionals (STMP).
- S. Natarajan attended Annual Breeder Seed Review Meeting at ICAR RC NEH Umiam, Barapani during 07-08 Jan, 2015.
- S. Natarajan attended workshop for HRD Nodal Officers on 26.02.2015 at NAARM, Hyderabad
- S. P. Jeevan Kumar attended a training programme on "RNA-interference as a Tool for Plant Functional Genomics and Crop Improvement" at NRCPB during 6-26 May, 2015.
- Udaya bhaskar K. attended a conference titled "International Conference on Innovation and Business Management" at Haridwar on June 20-21, 2015 organized by Society of Technical and Management Professionals (STMP).

## Publications

### Articles

- Avinash Kumar Pathak, Dhandapani, R; Ambika Rajendran; Madan Kumar; Natarajan, S and S. Rajendra Prasad (2014). Transferability of Rice SSR markers in Wheat (*T. aestivum*). Current Trends and Biotechnology & Pharmacy. Vol. 8(2): 204-212.
- Govind Pal (2015). Analysis of export scenario and potential of Indian Lac, Indian Forester 141 (5): 533-537.
- Govind Pal (2015). Study on methodology for estimation of Lac production in India, International Research Journal of Agricultural Economics and Statistics 6 (1): 205-209.
- Hardev Ram., J. P. Singh, J. S. Bohra, A. S. Yadav and J. M. Sutaliya (2015). Assessment of productivity, profitability and quality of rice (*Oryza sativa*) under system of rice intensification in E-UP. Indian Journal of Agricultural Sciences 85(1) 38-42.
- Hardev Ram., J. P. Singh, J. S. Bohra, Rajiv K. Singh and J. M. Sutaliya (2014). Effect of seedlings age and

plant spacing on growth, yield, nutrient uptake and economics of rice (*Oryza sativa*) genotypes under system of rice intensification. Indian Journal of Agronomy 59(2) 256-60.

- S. P. Jeevan Kumar, S. Rajendra Prasad, Rintu Banerjee and Chakradhar Thammineni (2015) Seed birth to death: dual functions of reactive oxygen species in seed physiology. Annals of Botany (doi:10.1093/aob/mcv098).
- Shivay, Yashbir Singh, Prasad Rajendra, Singh, Rajiv Kumar and Madan Pal (2015). Relative efficiency of zinc-coated urea and soil & foliar application of zinc sulphate on yield, nitrogen, phosphorus, potassium, zinc and iron bio-fortification in grains and uptake by basmati rice (*Oryza sativa* L.), Journal of Agricultural Science.
- T.N.Tiwari, T.K. Srivastava, A.B. Mandal and Dipti Kamal (2015) Seed coating with Hoagland solution enhances seed quality, growth and yield of rice under salt affected soil. Indian Journal of Agricultural Sciences.

### Abstracts / Summary

- Govind Pal, Radhika C., Hardev Ram, R. K. Singh and S. Rajendra Prasad (2015). An Analysis of Sources and Management of Paddy Seed in Eastern Uttar Pradesh, In Souvenir and Abstracts of ISEE National Seminar during Feb. 26-28, 2015 at RVSKVV, Gwalior, P. No. 164.
- Govind Pal, Radhika C., R. K. Singh, Udaya bhaskar K., H. Ram and S. Rajendra Prasad (2015). An analysis of economic profitability and determinants of adoption in pigeonpea seed production technology: A case study in Karnataka, In Abstract book 'National seminar on harmonizing biodiversity and climate change: challenges and opportunity' during 17-19 April, 2015 at ICAR- CIARI, Port Blair, P. No. 99.
- Hardev Ram., R.K Singh., S. R. Prasad and G. Pal (2015). Impact of conservation tillage and genotypes on seed yield and economics of wheat in the E-India (Extended summary). "National symposium on agricultural diversification for sustainable livelihood and environmental security" organized by ISA, ICAR and PAU at Ludhiana during 18-20, Nov. 2014, P. No. 692-93.
- Pal, Govind, Radhika, C., Ram Hardev, Singh, R. K. & Prasad, S. Rajendra (2015). An analysis of sources and management of paddy seed in Eastern Uttar Pradesh, ISEE National Seminar on Extension innovations and methodologies for market led agricultural growth and development, organized by ISEE, IARI, in Collaboration with ICAR, New Delhi and RVSKVV, Gwalior from 26-28 February, 2015, P. No. 164.
- Renu, Upasana Sahu, Manish S. Bhojar, Udai B. Singh, Dipak T. Nagrale, Rajiv Singh and Arun Kumar Sharma (2015). Potational use of plant growth promoting bacteria from rice Rhizosphere in organic farming, 3rd UP Agricultural Science Congress on 'Strategic Governance and Technological Advancement for Sustainable Agriculture', organized

by SHIATS, Allahabad, UPCAR and UPAAS, Lucknow from 14-16 June, 2015, P.No. 354.

- Singh Arvind Nath; Agarwal D. K and Prasad, S. Rajendra. Effect of extraction solvents on repellent activity of *Adhatoda vasica* against *Sitophilus oryzae*. In: 17th Indian Agricultural Scientist & Farmers' Congress on Agri-Innovation for enhancing Production & Rural Employment. 21-22 February 2015, Allahabad. 35.
- Singh Arvind Nath; Pandey, Swapnil and Prasad, S. Rajendra. Efficacy of Insecticide Impregnated Bag on Storability of Wheat Seed. In International Conference on Agriculture, Veterinary & Life sciences. 30-31 January, 2015, Vikram University, Ujjain, MP, India.
- Singh, Rajiv K, Ram Hardev, Pal, Govind Prasad, S. Rajendra Chauhan, R.K. (2015). Influence of age of seedlings and spacing on seed yield, quality and economics of hybrid rice under SRI, International Conference on Natural Resource Management for Food Security and Rural Livelihoods, organized by Soil Conservation Society of India New Delhi, India In Collaboration with Indian Council of Agricultural Research, New Delhi, India from 10-13 February, 2015, P.No. 343.
- T. N. Tiwari, D. K. Agarwal, Arvind K. Singh and S. Rajendra Prasad (2015). Seed coating in relation to minimizing the effects of seed ageing in rice cultivars (*Oryza sativa* L.). International conference on Agriculture Veterinary and life sciences held at Vikram University, Ujjain.

#### Annual Reports

- S. Natarajan, Sripathy, K. V; D.K. Agarwal; Udaya Bhaskar, K; Dhandapani R; Umesh R. Kamble; A. N. Singh; Rajiv Kumar Singh; Ramesh K. V; D. Ragavendra; Chandhu Singh; S. P. Jeevan Kumar and Sudhir Kumar Singh (2015) Annual Report of AICRP-NSP (Crops) for the 30<sup>th</sup> Annual Group Meeting held at DSR, Mau.

#### Popular Article

- A.K. Sinha, T.N. Tiwari, D.K. Agrawal and Arvind Nath Singh, 2015. "Krishi Utpadan Me Unnat Avam Gunvattayukt Beej Ke Mahatta" Nand Prasar Jyoti-Rabi 2014. 31-33.
- N.K. Singh, D.P. Singh, V.K. Singh, Saurbha Varma and Arvind Nath Singh, 2015. "Sabjiyo Hetu Akekrit Keet Prabandhan" Smarika Kisan Mela 2015. 28-30.
- N.K. Singh, V. K. Singh, Saurabh Varma and Arvind Nath Singh, 2015. "Sabjiyo Ke Jaivik Khethi" Smarika Kisan Mela 2015. 34-38.

- N.K. Singh, D.P. Singh, V.K. Singh, Saurbha Varma and Arvind Nath Singh, 2015. "Tamatar Akekrit Nashijiwa Prabandhan" Smarika Kisan Mela 2015. 20-27.

#### Technical bulletins / Leaflets

- Arvind Nath Singh, A.K. Sinha, D. Raghavendra and Umesh Kamble 2015 Keet Prabandhan Me Neem (Kisan Mela/05/2015).
- Arvind Nath Singh, D.K. Agarwal and T.N. Tiwari 2015 Dhan ke Mitra Keet (Kisan Mela/03/2015).
- Arvind Nath Singh, Rajiv Kumar Singh and Udaya bhaskar K. 2015 Keet Nashako Ka Prayog Karte Samye Sawadhaniya (Kisan Mela/04/2015).
- Boraiah K. M, Sinha A.K, Chandu Singh, Raghavendra D. and Rajendra Prasad S. (2015). Uttar Pradesh Ke Liye Sarsaon Ki Anukool Prajatiyaan Aur Sankar Kishme", Kisan Mela 02.03.15, ICAR-DSR, Mau.
- T. N. Tiwari, D. K. Agarwal, Arvind Nath Singh and Umesh Kamble 2015. Beej Pariwardhan, Beej Suracha Avam Utpadan Sambandhi Takneki Sanstutiya. (Kisan Mela/08/2015).

#### Training manuals

- Dinesh K. Agarwal, Rajiv K. Singh, Bhojaraja Naik K. and S. M. Pillegowda (2015) "Advanced Training on Fodder Seed Production Technology", ICAR-DSR, Mau P.No. 1-132.

#### Awards

- Arvind Nath Singh received "Bioved Young Scientist Associate Award 2015" in the 17<sup>th</sup> Indian Agricultural Scientist & Farmers' Congress on Agri-Innovation for enhancing Production & Rural Employment during 21-22 February 2015 at Allahabad.
- Arvind Nath Singh received best paper award in International Conference on Agriculture, Veterinary & Life sciences during 30-31 January, 2015 at Vikram University, Ujjain, M.P, India.
- Govind Pal received 'Best Paper Presentation Award' in the national seminar on extension innovations and methodologies for market- led agricultural growth and development during February 26-28, 2015 at RVSKVV, Gwalior, MP by Indian Society of Extension Education, New Delhi.
- Govind Pal received 'Best Researcher Award' by EET CRS, Noida, Uttar Pradesh under Science and Technology Award – 2015.

Staff	Personnel Scientific	Date of Joining
Dr. Ajai Kumar Tiwari	Senior Scientist	25.04.2015

## अखिल भारतीय समन्वित अनुसंधान परियोजना— राष्ट्रीय बीज परियोजना (फसल)

अखिल भारतीय समन्वित अनुसंधान परियोजना—राष्ट्रीय बीज परियोजना (फसल) की तीसरी वार्षिक बैठक का आयोजन दिनांक 03 से 05 अप्रैल, 2015 को भा.कृ.अनु.प.—बीज अनुसंधान निदेशालय, मऊ उत्तर प्रदेश में किया गया। इसका उद्घाटन डा. एस. अय्यप्पन, माननीय सचिव कृ.अनु. और शिक्षा विभाग एवं महानिदेशक भा.कृ.अनु.प., कृषि एवं किसान कल्याण मंत्रालय द्वारा किया गया। उन्होंने अपने उद्घाटन सम्बोधन में अखिल भारतीय समन्वित अनुसंधान परियोजना के द्वारा विभिन्न फसलों में किस्म व बीज प्रतिस्थापन दर पर हुए प्रभाव पर प्रकाश डाला। इस परियोजना के विभिन्न केन्द्रों की प्रशंसा करते हुए कहा कि इनके प्रयास से ही आज देश में प्रजनक बीज उत्पादन 83422.15 कु. हो गया है। उन्होंने कहा की भा.कृ.अनु.प.—बीज अनुसंधान निदेशालय, मऊ विभिन्न कृषि विश्वविद्यालयों एवं भा.कृ.अनु.प. के संस्थानों के साथ मिलकर एक ऐसी योजना तैयार करें, जिससे गुणवत्ता युक्त बीजों को सार्क, ब्रिक, बिस्मटेक, आशियान व अफ्रीकी देशों को निर्यात किया जा सके। उन्होंने बदलते हुए जलवायु परिवर्तन के प्रति सहिष्णु बीज उत्पादन की नई तकनीकी विकसित करने एवं बेरोजगार नौजवानों, महिला किसानों, कृषि स्नातकों को बीज उत्पादन को उद्यम के रूप में अपनाने पर बल दिया, साथ ही किसानों को उचित दर पर समुचित मात्रा में बीज की उपलब्धता के लिए पी.पी.पी. माडल को आवश्यक बताया।

परियोजना निदेशक भा.कृ.अनु.प.—बीज अनुसंधान निदेशालय, मऊ ने अखिल भारतीय समन्वित शोध परियोजना—राष्ट्रीय बीज परियोजना (फसल) के अंतर्गत चलने वाले प्रजनक बीज उत्पादन तथा बीज तकनीकी अनुसंधान की वर्ष 2014-15 के उपलब्धि को प्रस्तुत किया। डा. ए. के. शर्मा, निदेशक, राष्ट्रीय कृषि उपयोगी सूक्ष्मजीव ब्यूरो, मऊ ने पोषण सुरक्षा के लिए महत्वपूर्ण जई के गुणवत्तायुक्त बीज पर प्रकाश डाला व गुणवत्तायुक्त बीज से तकनीकी प्रसार पर जोर दिया। डा. बी. सिंह, निदेशक, भारतीय सब्जी अनुसंधान संस्थान, वाराणसी ने सब्जियों के बीज उत्पादन पर प्रकाश डाला। डा. एन. पी. सिंह, निदेशक, भारतीय दलहन अनुसंधान संस्थान, कानपुर ने गुणवत्तायुक्त दलहनी फसल के बीज उत्पादन पर प्रकाश डाला। डा. एस. के. राव, अधिष्ठाता, जवाहर लाल नेहरू कृषि विश्वविद्यालय, जबलपुर ने सूक्ष्म जीवों द्वारा बीजों की गुणवत्ता बढ़ाने पर बल दिया। पादप किस्म संरक्षण एवं कृषक अधिकार प्राधिकरण, नई दिल्ली के अध्यक्ष डा. आर. आर. हन्दिनाल ने बीजों के प्रति विशिष्ट, अद्वितीय, स्थिरता के मानदंडों के आधार पर बीज उत्पादन करने के लिए प्रोत्साहित किया। इस अवसर पर बीज तकनीकी अनुसंधान के क्षेत्र में सुदीर्घ सहयोग एवं योगदान को मान्यता देने के लिए अखिल भारतीय समन्वित शोध परियोजना—

राष्ट्रीय बीज परियोजना (फसल) से जुड़े वैज्ञानिकों को सम्मानित किया गया। भारतीय कृषि अनुसंधान संस्थान—क्षेत्रीय केन्द्र करनाल को सर्वश्रेष्ठ प्रजनक बीज उत्पादन केन्द्र व एम.पी.के.वी. राहुरी, महाराष्ट्र को सर्वश्रेष्ठ बीज तकनीकी शोध केन्द्र के रूप में पुरस्कृत किया गया।

### शोध उपलब्धियाँ

- धान के संकर बीज (डी.आर.आर.एच. 3, पी.एस.डी. 1, पी.एस.डी. 3, पी.आर.एच. 10, एवं एन.डी.आर.एच. 2) की आनुवांशिकी शुद्धता जानने के लिए प्रजनक बीजों का प्रयोग करते हुए माइक्रो सेटेलाईट एस.एस.आर. मार्कर से इनका शूक्ष्मतम वर्णन किया गया।
- गेहूँ के बीज दर का उत्पादकता पर प्रभाव के अध्ययन में पाया गया कि 75 कि.ग्रा./हे. बीज दर व 22.5 × 7.5 से.मी. के अंतराल पर गेहूँ की बीज उत्पादकता 50 व 100 कि.ग्रा./हे. बीज दर एवं 22.5 × 10 एवं 22.5 × 5 से.मी. के अंतराल की तुलना में सार्थक रूप से अधिक पायी गयी।
- संरक्षणात्मक कृषि का बीज उत्पादकता पर प्रभाव के अध्ययन में पाया गया की शुन्य जुताई विधि में बीज उत्पादन, संरक्षणात्मक जुताई व रिज्ड बेड की तुलना में सार्थक रूप से अधिक थी।
- सरसों के बीज उत्पादन पर माहू कीट के प्रभाव के अध्ययन में पाया गया कि माहू कीट का घनत्व व बीज उत्पादन के बीच ऋणात्मक सह:सम्बन्ध (−0.96) था।
- भारतवर्ष के विभिन्न क्षेत्रों से गेहूँ, सरसों व धान की फसलों से 300 से ज्यादा बैक्टीरिया को पृथक करके भण्डारित किया गया।
- कर्नाटक के गुलबर्गा जिले में अरहर बीज उत्पादकों से प्राथमिक आंकड़ें संकलित किये गये। आंकड़ों के विश्लेषण में यह पाया गया की अरहर बीज उत्पादन में स्थिर व परिवर्तनीय लागत का अनुपात 32:68 था। अरहर के प्रमाणित बीज उत्पादन में कुल लागत, सकल आय व शुद्ध आय क्रमशः रु. 39436/—, रु. 73300/— व रु. 33864/— प्रति हेक्टेयर थी।

### किसान मेला

भा.कृ.अनु.प.—बीज अनुसंधान निदेशालय, मऊ में दिनांक 02 मार्च, 2015 को एक दिवसीय वृहद किसान मेले का आयोजन किया गया। मेले का उद्घाटन डा. गौतम कल्लू, पूर्व उप महानिदेशक (उद्यान), भा.कृ.अनु.परि. के द्वारा किया गया। इस आयोजन के दौरान विभिन्न भा.कृ.अनु.परि. के संस्थानों, सरकारी व निजी क्षेत्र के संगठनों, बैंकों एवं गैर सरकारी संगठनों ने अपनी तकनीकों/योजनाओं/उत्पादों का प्रदर्शन किया। इस मेले में प्रसार पत्रिका का भी विमोचन किया गया। इस आयोजन में उत्तर प्रदेश के लगभग 3000 किसानों व छात्रों ने भाग लिया व लाभान्वित हुए।

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