भाकृअनुप
ICAR

# 49वीं अखिल भारतीय गेहूँ एवं जौ शोधकर्ता बैठक

# 49th ALL INDIA WHEAT AND BARLEY RESEARCH WORKERS' MEET

## कार्यवाही, संस्तुति एवं कार्ययोजना

## 2010

## Proceedings, Recommendations and Work Plan

गेहूँ अनुसंधान निदेशालय, करनाल
DIRECTORATE OF WHEAT RESEARCH, KARNAL

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# Proceedings, Recommendations & Plan of Work (2010-11)

**49th All India Wheat and Barley Research Workers' meet**

**August 27 - 30, 2010**

**at**

**Punjab Agricultural University, Ludhiana**

**Issued by**

**S.S.Singh**
**Project Director**

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# Contents

# Foreword

The 49th All India Wheat and Barley Research Workers' meet held at Punjab Agricultural University, Ludhiana August 27 - 30, 2010 was jointly organised by Directorate of Wheat Research (DWR), Karnal and PAU, Ludhiana. The meet was inaugurated by Dr M.S Kang, Vice Chancellor, PAU, Ludhiana while Dr Swapan K Datta, Deputy Director General (Crop Science), ICAR presided over the function. Dr RP Dua, ADG (FFC) was also present and gave his remarks. A galaxy of dignitaries and delegates from India and abroad (CIMMYT, ICARDA etc.) graced the occasion.

The meeting, besides reviewing the progress of preceding crop season and finalizing the plan of work for the ensuing crop season, also utilized this opportunity to conduct the special sessions on "Strategies to bridge the yield gaps in wheat & barley production" and "Strengthening international collaboration for wheat and barley research".

I, on behalf of entire fraternity of wheat and barley, extend my gratitude to Hon'ble Dr MS Kang, VC, PAU, Ludhiana for gracing the occasion of the workshop despite his busy schedule. He ignited in all of us, a spirit of quest, to address a series of crucial issues that limits wheat production in the country.

I also express my gratitude to the Dr Swapan K Datta, DDG (Crop Science) for sharing his rich experience and wisdom. I also express my deep sense of appreciation to the ADG (FFC), Dr RP Dua for guidance and support for the programme.

I am thankful to the local organizers, Dr Indu Sharma, Senior Plant Pathologist (Wheat) and her team, for untiring efforts to make the meet successful. An event of this scale is impossible without their unflinching support.

All the Principal Investigators and their staff associated with the preparation of workshop reports and this proceeding need special commendation. Equally, I am thankful to the Chairman's and Rapporteurs of various sessions for smooth conduct and timely preparation of the proceedings. I wish to record appreciation for all the scientific, technical and administrative staff for coming out with the proceedings during the plenary session. The efforts of Sh Yogesh Sharma, Sh P Chandrababu, Sh Pawan, Sh Bhim Sen, Sh Swaran Singh, Sh Sukh Ram and Sh Aman Kumar were commendable.

I wish you all a great success in your endeavours to enhance the wheat and barley production in the country. I trust that with your hard work and dedication, the wheat production target of 82.00 mt will be achieved in the ensuing crop season 2010-11.

**(SS Singh)**

# Introduction

The 49th All India Wheat and Barley Research Workers' Meet held at PAU, Ludhiana during 27th to 30th August, 2010 was jointly organised by PAU, Ludhiana and Directorate of Wheat Research (DWR), Karnal. The meet was attended by more than 350 scientists, policy makers, administrators and all those concerned with wheat and barley research and development. This meet is an annual event of All India Coordinated Wheat and Barley Improvement Project, which was organised to review the progress made in the preceding crop season 2009-10 as well as to discuss and finalise the plan of work for the ensuing crop season 2010–11. In addition, the group also utilized this opportunity to conduct special sessions on, "Strategies to bridge the yield gaps in wheat & barley production" and "Strengthening International Collaboration for Wheat and Barley Research".

The meet was inaugurated by Dr MS Kang, VC, PAU, Ludhiana while, Dr Swapan K Datta, Deputy Director General (Crop Science), ICAR presided over the function. Dr RP Dua, ADG (FFC) was graced the occasion. A galaxy of dignitaries and delegates such as Dr RR Hanchinal, VC, UAS, Dharwar; Dr GB Singh, Ag. Commissioner, GOI; Dr SS Gosal, Director Research, PAU, Ludhiana; Dr JP Tandon, former Project Director (Wheat); Dr GS Nanda, former Head Dept. of Wheat Breeding, PAU, Ludhiana and many others also graced the occasion. Representatives from ICARDA and CIMMYT also participated in the deliberations.

The proceedings and recommendations in respect of different programmes along with plan of work for the ensuing crop season 2010-11 were compiled and presented herein for implementation by all concerned.

# SESSION I

## Research Review Meeting

**August 27, 2010**

**Chairman : Dr S.N.Shukla**
**Rapporteur : Dr Jag Shoran**

**Presentation of Progress Report for 2009-10: Dr SS Singh, Project Director**

During last five years, the productivity of wheat has increased @ 1.75% but the gross production has gone up by 3.67 per cent. Consecutively for the fourth year in a row, the record production of wheat *i.e.* 80.71 million metric tonnes has been achieved in 2010. With accelerated growth rate and steps taken by the government under National Food Security Mission, the target of 90 mmt wheat production by 2030 can be achieved successfully. Dr SS Singh, Project Director (Wheat) presented the work done and significant achievements made in different disciplines of the All India Coordinated Wheat and Barley Improvement Project during 2009-10.

Eight new improved varieties of wheat have been released and made available to the farmers for commercial cultivation. Since, large area under wheat and barley is affected by higher salt content, hence, to grow a successful crop in these lands, two wheat varieties (KRL 210, KRL 213) have been released and made available to the farmers. Not only this, after testing around 500 new wheat genotypes under varying production conditions, number of promising new wheat genotypes have been identified for advance tests. In addition, useful donors for providing resistance/tolerance against various biotic and abiotic stresses, improving the quality and nutrition, and increasing the grain yield *per se* have also been sorted out from germplasm resources. For increasing the availability of improved seed to the farmers, about 35000 quintals of breeder seed of 145 wheat varieties against an indent of 31000 quintals has been produced in 2010. Efforts have been made to discourage the cultivation of disease susceptible obsolete varieties by the farmers. To counter the terminal heat tolerance, both physiologists and molecular geneticists have contributed in the direction of developing futuristic wheat strains endowed with heat resistance/tolerance. Emphasis has been placed on utilizing winter wheats, synthetic hexaploids etc. for wheat improvement in network programme, besides making systematic efforts for developing hybrid wheat for further pushing up wheat production in the country.

A close watch on the dynamics of important diseases and pests has been kept, particularly on Ug 99 race of stem rust disease, which has not so far been observed in the country. The post harvest surveys have again confirmed that the states of Gujarat, Maharashtra and Karnataka are free from Karnal bunt disease of wheat. The high incidences of powdery mildew, foot rot and termites have been observed in Furrow Irrigated Raised Beds (FIRBs) system as compared to either zero tillage or conventional system of wheat cultivation. Recently developed Integrated Pest Management (IPM) modules have shown 10-12% yield gain in wheat under large-scale demonstrations done on farmers' fields in Haryana and Eastern Uttar Pradesh.

The increase in water use efficiency and grain yield of wheat crop has been seen when rice residue was retained @ 6 tonnes per hectare in comparison to removal of rice residue. Also, under residue retention, higher yield of Direct Seeded Rice (DSR) has been recorded. In rice-wheat system, the green gram, vegetable pea or cowpea can be included successfully in rice-wheat rotation for diversification and sustaining this system. Some of the new molecules of herbicides have been marked for controlling noxious weeds of wheat crop.

To fulfil the diversified requirements of different house-holds as well as industries, number of product specific varieties suitable for bread and biscuit making, pasta preparation, besides *roti/chapati* making, have been earmarked. Not only this, new varieties rich in micro-nutrients have also been identified for taking care of nutritional aspects of human diet. Molecular approaches for improving the grain quality and biscuit/bread making quality of wheat have been put into practice for developing improved wheat varieties.

Among the constraints, the gaps identified through the conduction of FLDs, between achievable vs realized yields, needs to be bridged to a greater extent through large scale adoption of available wheat production technologies.

Similarly, in case of barley, the improved varieties/strains of barley suitable for producing malt, feed and fodder have been developed/identified. The barley cultivation is getting momentum in view of increasing demand of malt for different usages like brewery, pharmaceutical purposes etc. Suitable barley production technology for rainfed, limited irrigation, and/or salt affected conditions have been perfected. A special emphasis has, however, been placed on not only developing the high yielding genotypes suitable for malting purposes, but also to bread dual purpose barley varieties suitable for taking fodder as well as grain yields from the same crop.

# Research Review Meeting

## Crop Improvement

**August 27, 2010**

**Chairman : Dr. GS Nanda**
**Co-Chairman : Dr. Jag Shoran**
**Rapporteurs : Drs. Vinod Tiwari & NS Bains**

In this session, research work on Crop Improvement for the year 2009-10 was reviewed. At the outset, Dr GS Nanda, Chairman, emphasized on the importance of wheat coordination programme and its success in ensuring India's Food Security. Referring to the record wheat production during the season, the Chairman congratulated the wheat workers for this achievement. The various Zonal Coordinators presented the results of yield evaluation trials in the respective zones and raised issues and problems in their conduction during the crop season 2009-10.

The first presentation was made by Dr Dharam Pal about the trials conducted in the Northern Hills Zone. Giving details of the trials conducted in the zone, he emphasized on increasing the number of trial conducting centres in the zone. He also pointed about the non-receipt of data from very high altitude locations. The Chairman recommended for the strengthening of centres to improve the conduct and quality of trials. Dr Jag Shoran informed the house that the DRL, Pithoragarh under DRDO would be an excellent centre in Uttrakhand. Dr Dharam Pal also requested for dropping of triticale trial in the zone as cultivation of triticale is almost negligible in this area. Regarding the testing of triticale entries in the zone, the Project Director mentioned that research on triticale is going on at IARI and PAU and the Chairman suggested that discussion on this aspect should be taken up in zone-wise meeting.

Dr VS Sohu presented the results of the trials conducted in North Western Plains Zone in which the success percentage of trial conduct was about 89%. He also presented the qualifying entries for various AVTs to be conducted during the crop season 2010-11. He emphasized that the main centres should record data on ancillary characters and not just report the yield. He pointed about the confusion regarding restricted irrigation trials in breeding and agronomy trials. The Chairman suggested that such trials are conducted to test the ability of rainfed varieties under restricted irrigated conditions and the issue should be resolved in the subsequent session on varietal constitution.

Dr SN Shukla, former ADG (FFC) in his remark stressed on utilization of information technology for reporting of trials and taking up pre-breeding activities for development of elite materials. The Project Director suggested for finding out reasons for low yield potential in trials vis-à-vis the FLDs. The Chairman stressed upon exploring the reasons for rejection of trials at major centres more carefully and also asked Dr Ravi Singh (CIMMYT) to respond to the activities of pre-breeding taken up at CIMMYT. Dr Ravi Singh responded that pre-breeding is a long term effort taking 15-20 years. The synthetic and translocation stocks have been developed at CIMMYT. He also emphasized on continuance of research on hybrid wheat and also stressed for mechanization to improve the quality of trial conduction.

The results of the trials conducted in North Eastern Plains Zone were presented by Dr LP Tiwari. He asked the breeders to supply pure seeds of check varieties as a number of checks showed various degrees of mixture. He also reported about delay in allotment of funds for conduction of FLDs. Project Director emphasized that there would be no delay in providing the funds if the AUCs are submitted in time. Dr Jag Shoran pointed that breeder seed should be utilized for sending the seeds of check

varieties to zonal coordinators for inclusion in trials. Dr Tiwari asked for providing a vehicle to his centre for proper mobility. Dr SS Singh, Project Director, suggested that a recommendation from this workshop may be submitted to government for providing vehicle to all the funded centres in the XII Plan.

Dr AN Mishra presented the results of trials conducted in the Central Zone. He reported excellent condition of the wheat crop in the central zone during the season. Dr Mishra also requested for increase in the number of centres in the zone for conducting trials under limited irrigation. The report on trial conduction in Peninsular Zone was presented by Dr PN Rasal. He stressed on the need to check the problem of trial rejection in the zone due to low site mean.

The report of Southern Hills Zone was presented by Dr Jagdish Kumar. He emphasized the importance of non-traditional wheat growing areas for supplementing the national wheat production. He also pointed about the problem of trial rejection either due to high CV or low site mean. Dr Kumar requested that cheques for payment to voluntary centres be routed through zonal coordinator for ensuring their delivery to the right persons.

The special trial on triticale was presented by Dr GS Mavi. He asserted the importance of triticale for rust and powdery mildew resistance as well as better nutritional quality. Dr Neeraj Kulshreshtha presented the results of salinity/alkalinity tolerance varietal trials and composition of the trial for the coming season. The results on special trial on dicoccum were presented by Dr SC Misra. He also reported the composition of dicoccum trial for the coming season.

The report on evaluation of national/international nurseries was presented by Dr (Mrs) S. Kundu. She also informed the delegates on the need for registration of new released varieties with the PPV&FRA. She suggested that breeders should take up this work on priority and any help in preparation of the registration proposal would be provided by DWR.

The results on physiological investigations particularly on heat stress were presented Dr (Mrs) S Sareen. The Chairman remarked that physiological investigations were important, considering the fact that wheat production in India is recognized as a gamble with temperature. Dr Sharma (Durgapura) wanted to know about the physiological traits which could be directly used for selection in breeding programme and also suggested for genetic studies in this regard.

Dr Jag Shoran presented the status of breeder seed production in the country during the crop year 2009-10. He informed that the highest indent for breeder seed was for Lok-1. He stressed upon the need for submission of indent for new varieties to obtain higher wheat production in the country. A presentation on genetic resource management was made by Dr Phogat from NBPGR.

At the end of the session, the Chairman thanked all the speakers. Dr Jag Shoran thanked the Chairman for smooth conduction of the proceedings of the session.

# Research Review Meeting

## Crop Protection

**Aug., 27, 2010**

**Chairperson : Dr. (Mrs) S.K. Mann, Dean, PGS**
**Co-Chairmen : Dr. H.S. Rewal & Dr. A.K. Sharma**
**Rapporteurs : Drs. S.C. Bhardwaj & H.C. Lal**

Dr AK Sharma welcomed the Chairman and Co-chairman of the Research Review Meeting. The session had 10 presentations.

Dr AK Sharma, PI (Crop Protection), DWR, Karnal gave an overview of Wheat pathology work during the year. There was no serious outbreak of any disease however, incidence of yellow rust was recorded on PBW 343. Black rust of wheat was not identified at farmer's fields. More than 2200 lines of IPPSN, PPSN and EPPSN were evaluated against different wheat diseases at different centres. He appreciated the efforts of the cooperators in developing diseases epidemics in PPSN, IPPSN and other disease/pest screening nurseries.

Dr MC Jat presented the information on Insect Pest Screening nurseries and entomological trials. A few lines showed resistance to shootfly, brown wheat mite, foliar aphid and root aphid. Information on termite control and chemical control of insect pests was also presented. Storage Pest resistance was also discussed. Dr B.Lal, NBPGR, felt the need to study thrips, however, it was observed that it is a localized problem.

Dr AK Singh presented the information on wheat nematodes. Dicoccums and durum wheat lines showed some degree of resistance to cyst nematode based on the information at different centres. There were reports of *Meloidogyne graminicola* moving from rice to wheat in some countries and need was felt to study it in India. Dr. SS Vaish felt a need to study the quantitative effect of crop rotation on nematode population.

Race specific APR was described by Dr BK Honrao and supplemented by Dr BP Kurundkar. Number of stem rust resistant entries was appreciable.

Data on Race specific APR on yellow rust was reviewed by Dr (Mrs) Indu Sharma. Two entries, HPW 251 and MACS 2971, showed resistance to both the pathotypes.

Information on seedling resistance tests and trap plot nurseries was presented by Dr SC Bhardwaj. Considerable diversity for rust resistance was observed in AVT lines. Serious disease occurrence was not recoded in Wheat disease trap nurseries.

Dr DP Singh gave an exhaustive account of distribution of foliar blight pathogens, national scenario and status of the present day varieties. The incidence and severity of *Bipolaris sorokiniana* is increasing in different parts of India. The blight was more pronounced on wheat in eastern India. There had been a gradual increase in the level of blight resistant AVT material.

Chemical control of yellow rust and powdery mildew was presented by Dr MS Saharan, whereas that of stem rust by Dr IK Kalappanavar. Tilt 25 EC was an effective chemical to control wheat diseases.

Dr SS Singh appreciated the contribution of the Pathology group and said that it is highly commendable in tackling the diseases and crop health problems in wheat, leading to better yields. He also felt a strong need to replace PBW 343 on war footing. He felt need to handle pesticides with care and use of genuine chemicals. Individual wheat disease trap nurseries must be discouraged. Dr HS Rewal said that there is a need to have microlevel monitoring of diseases and if need the funding would be provided by DWR, Karnal.

**Recommendations**

1. During routine surveys, many spurious brands of pesticides have been observed in wheat growing areas. Therefore, registered chemical brands should find way to farmers' fields.
2. During the crop protection studies, the source of chemicals should be one.
3. Since the national wheat disease trap plot nursery has got diverse genotypes and would be able to trap Ug 99 type of virulences, therefore, there is no need to have additional disease trap nursery.
4. Spray of Thiamethoxam 25 WG (Actara) @ 12.5g a.i./ha was found effective against foliage feeding wheat aphids.
5. In case of any stripe or black rust outbreak, 2 sprays of propiconazole (Tilt 25 EC) @ 0.1% at the initiation of rust and after 15 days interval would check both stripe rust and powdery mildew on wheat.
6. There is an utmost need to replace PBW 343, which has become susceptible to yellow rust and powdery mildew, with resistant varieties PBW 550 and DBW 17.
7. Keeping in view the increasing incidence of cereal cyst nematode, awareness campaign is required. In heavily affected areas Carbofuran 3G @ 1.5 Kg a.i./ha would help in dealing with the problem.

# Research Review Meeting

## Resource Management

**August 27, 2010**

**Chairman : Dr. US Walia**
**Co-Chairman : Dr. RK Sharma**
**Rapporteurs : Drs. BD Sharma & SC Gill**

At the outset, Dr RK Sharma welcomed the Chairman and requested him to conduct the proceedings on the review of work done during the year 2009-10. The Chairman after welcoming the delegates stressed the need for proper conduct of trials, in-depth analysis to help arrive at valid references. He requested all the participants to take active part in the deliberations. Thereafter, the Chairman asked for the zone wise presentation of the results of experiments conducted during the crop year 2009-2010.

The results of coordinated trials conducted in NHZ were presented by Dr Gurdev Singh, Agronomist, CSKHPKV Regional Station, Bajaura, Kullu, Himachal Pradesh. In all, three trials were conducted in this zone for evaluation of genotypes for irrigated timely sown, restricted irrigation late sown and rainfed conditions and none of the test entry was fond superior to their respective best checks, VL 907, VL 892 and VL 907 of the trial.

The results of five varietal evaluation trials conducted in NWPZ were presented by Dr VP Singh, Professor of Agronomy, Pantnagar. In irrigated timely sown conditions, the test entry PBW 621 gave the highest and numerically higher yield than the best check PBW 550. Among durum wheat varieties, PDW 315 was significantly superior to the best check PDW 314 with yield gain 2.8% whereas PDW 317 showed only numerical superiority with yield gain only 0.7%. In restricted irrigation trial, the recently identified check HD 2967 out yielded all the checks and test entries. The test entry, WH 1080 was statistically at par with the best check PBW 175 under rainfed situation and the response to nitrogen was up to 60 kg/ha. In case of salinity-alkalinity trial, the test entry KRL 238 was numerically better than the best check KRL 210 with a yield gain of 1.3%. The response of nitrogen was observed up to 150 kg N/ha.

Dr RK Singh, Professor (Agronomy), BHU, Varanasi, presented the results of the five trials conducted in NEPZ. None of the new genotypes was found superior compared to the best check HD 2967 under timely sown condition as well as restricted irrigation conditions. Under late sown and rainfed conditions, none of the new genotypes was found superior compared to their respective best checks DBW 14 and HD 2888.

Similar to NWPZ, the response of nitrogen under rainfed trial was only up to 60 kg/ha. In case of salinity-alkalinity trial, the test entry KRL 240 was numerically better than the best check KRL 213 with a yield gain of 2.0%. Similar to NWPZ, the response of nitrogen was observed up to 150 kg N/ha. The pooled results of the salinity-alkalinity trials across NWPZ and NEPZ also gave a response to nitrogen up to 150 kg/ha. The test entries KRL-210 and KRL 238 was found numerically superior than the best check KRL 213.

The results of the Central zone were presented by Dr RK Sharma, Principal Scientist and PI Resource Management Programme, DWR, Karnal. Five experiments conducted in this zone were DxV (TS-TAS), DxV (TS-TDMS), DxV (LS), RIRxV and NxV (RF). In timely and late sown aestivum trials, none of the test entry showed the superiority over their respective best checks HI 1544 and HD 2932. The durum test

entry HI 8691 was numerically superior to the best check MPO 1215 with a yield gain of 1.8%. These two durum entries were numerically better than even the best *aestivum* check HI1544. Under restricted irrigation and rainfed conditions the test entry MP 3288 was found significantly superior to respective best checks Lok 1 and HI 1531 with a yield gain of 10.0 and 5.1%, respectively.

Dr BN Patil presented the results of three experiments conducted in PZ. He reported that durum test entry PDW 315 gave significantly higher yield compared to the best durum check HI 8663 whereas AKDW 4021 was numerically better with a yield gain of 6.6 and 1.4%, respectively. In restricted irrigation and rainfed conditions trials, none of the test entry was found better than the best check HD 2987.

The results of the special coordinated experiments on weed management, resource conservation technologies, residue management, bio-regulators, crop intensification, integrated nutrient management and, pre and post seeding irrigation were presented by Dr RK Sharma. The results of the special trails are summarised hereunder:

- The ready mix combination of sulfosulfuron + carfentrazone with surfactant was found effective against broad spectrum weed flora of wheat, whereas carfentrazone alone was effective against broad-leaved weeds only. The ready-mix combination at 45 g/ha with surfactant dose of 625-750 ml/ha was found optimum for control of complex weed flora.
- Leaving the rice residue at the surface significantly increased the wheat yield over residue removal and the response to irrigation numbers was up to five. The water use efficiency increased with increase in surface retained residue load from 0 to 6 ton/ha.
- In intensification trial under three tillage options (ZT, CT and FIRBS), the performance of short duration legume crop was better when grown on beds (FIRBS). Inclusion of these crops in rice wheat system gave significantly higher equivalent wheat yield compared to sole rice-wheat system.
- In rice residue management trial, the incorporation of residue with 25% additional N gave higher yield in both NWPZ and NEPZ.
- The effect of bio-regulators was not significant at all the locations in NWPZ, CZ and NEPZ except Durgapura and Kota.
- The RCTs and weed management effects were evaluated at two centres in CZ. In Soybean-wheat system, the yields were better in bed planting whereas in Maize-wheat system conventional tillage was better than other tillage options.
- The results of the integrated nutrient management in PZ showed that the maximum yield was obtained when recommended NPK fertilizers were applied along with organic sources and the highest and significantly higher yield was obtained with recommended fertilizers +FYM (3.73 t/ha)+ vermicompost (1.25 t/ha) compared to other treatments.
- The results of pre and post seeding irrigation trials conducted at three locations revealed that the highest grain yield was obtained when dry field preparation and seeding at 2 cm was followed by irrigation.

After thorough deliberations, the Resource Management and Social Sciences group made the following recommendations;

**Technical Recommendations:**

- For control of complex weed flora in wheat, apply ready-mix sulfosulfiuron 25%+carfentrazone-ethyl 20% 45 WDG at 45 (25+20) g ai/ha with cationic surfactant of 625-750 ml/ha at 30-35 days after sowing.
- For higher profitability and sustainability of the rice-wheat system, direct seeded rice followed by wheat with rice residue incorporation or surface retention and 25% additional nitrogen, should be practised.
- Grow summer green gram or cowpea after wheat or vegetable pea after rice followed by late sown wheat in rice-wheat for greater system productivity, profitability and sustainability. For higher productivity of pulse crops, grow green gram, cowpea and vegetable pea under bed planting or zero tillage.

**Administrative Recommendations :**

1. The funds for FLDs must be released by September 30, for effective implementation of the programme.
2. The FLDs conduct report must be submitted by December 30 and the yield report by June 15, by conducting centres.

To end the session, Dr RK Sharma, on behalf of the Directorate, and the RM group proposed a sincere vote of thanks to the Chair for smooth conduct and valuable suggestions during the proceedings.

# Research Review Meeting

## Wheat Quality

**August 27, 2010**

**Chairman : Dr. Tejinder Singh**
**Co-Chairman: Drs. BK Mishra & RK Gupta**
**Rapporteurs : Drs. D Mohan & Anju M. Singh**

The meeting to review wheat quality work was chaired by Dr Tejinder Singh, Ex. Head, Deptt of Food Science and Technology, PAU, Ludhiana. Dr BK Misra, Ex. P.I., Wheat Quality also graced the occasion. In total, 15 delegates attended this meeting to take an account of the progress made in wheat quality during 2009-10. Dr RK Gupta ,P.I., Wheat Quality, DWR, Karnal presented an overview. He mentioned the genotypes available for good product making and other important quality parameters. He also briefly highlighted the work done at different centes for quality improvement and stressed the need to work with more zeal by involving molecular markers in quality improvement activities.

Presentation from different centres was made on bread and durum wheat NIVT's covering characteristics like grain appearance test weight, grain protein content, sedimentation value, phenol reactions in T. *aestivum* and also yellow berry & yellow pigments in case of T. *durum*. Dr. Jyoti Jha and Dr RP Singh (NIVT1A), Dr.RS Saini (NIVT 1B), Dr. N Augustine (NIVT 2), Dr Anil Kumar (NIVT 3), Dr Shasi Madan (NIVT 5A and Salinity/ Alkalinity trials) and Dr. Suma S. Biradar (NIVT 5B & Special T. *dicoccum* trial) initiated the discussion on new test entries. Couple of new materials were available for all the quality parameters in each trial.

Dr Sewa Ram presented the progress made on soft textured wheat and biscuit quality. He assured the house that 70 lines are available for the breeders to make progress in biscuit quality. Dr D Mohan and Dr Anju M. Singh discussed the Quality Component Screening Nursery (QCSN). Two new genetic stocks in bread wheat *i.e.* KYZ 9712 and QLD 11 and one in durum (RD 1336) were identified as protein content in these entries was high 13.9 – 14.5% at 14% grain moisture level. They stressed the need of better field conduct, proper plot size, timely sowing and timely grain supply for quality analysis. It was suggested some initial screening should be carried out by each centre to pick up promising ones for multilcoation testing through this nursery. It was stressed that good interaction between breeders and quality persons is crucial in this endeavour.

In the final discussion, Dr SS Singh, Project Director also participated and some useful suggestions were given by the experts. Dr SS Singh complimented the good work done by the quality group and assured all help for further improvement and involving promising quality genotypes in the crossing block of all the wheat breeders would be his first step in this direction. He gave useful suggestions to devise work plan for further improvement in the conduct of QCSN. Dr BK Misra was of the view that location specificity should be drawn for grain quality characteristics which would help to draw focus only on those traits which are important for the region. The house noticed that some off beat trend could be noticed during 2009-10 as location specificity altered at certain places. A watch on global environmental changes would be required to maintain and improvise quality standards of the Indian wheat. The Chairman Dr Tejinder Singh concluded the session by showering appreciation for the good work on wheat quality and advised to include starch content in grain analysis. The meeting ended with a vote of thanks to the chair.

# Research Review Meeting

## Barley Network

**August 27, 2010**

**Chairman : Dr. S.C. Gulati**
**Co-Chairman : Dr. R.P.S. Verma**
**Rapporteurs : Drs. B. Sarkar & S.R. Verma**

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At the outset, the chairman welcomed all the delegates participating in the meeting. The chairman recalled his memories of working in barley and invited participant to make more effort to make further improvement in achieving the goal of the program. The chairman also welcomed Dr. Flavio Capettini, barley breeder from ICARDA, Syria who participated in the meeting and wished that this will bring more active collaboration with ICARDA.

Dr RPS Verma, DWR, Karnal presented the progress on the conduct of coordinated varietal trials including the constraints faced during 2009-10 crop season. He pointed out the poor conduct of yield trials in NHZ, which was mainly attributed due to poor rainfall during the growing season. He also talked about rejection of number trials in NEPZ in plains due to very low yield levels, which reflects the poor conduct of trials by the breeders in the zone. He stressed the need the breeders should take proper care while conducting trials. While presenting the report he informed the house that the entries contributed in the yield trials by breeders of some centres are direct introductions from various international trials and nurseries from ICARDA. There is no restriction of direct introduction, however since most of these materials except few does not finally go into the final stage of evaluation it was stressed that breeder should make effort in utilizing international nurseries in hybridization program with well adapted Indian materials. It was also pointed out that breeders while submitting the materials for coordinated trials selected from international nurseries should give complete pedigree details along the nursery name, year and entry number. The chairman emphasized the need of shuttle breeding approach by sharing breeding materials from some of the selected $F_2$s between centres and evaluating in targets environment to make further breakthrough in yield level. Dr Verma informed the house about the increased demand of breeders seed especially from the state of UP and Rajasthan. During rabi 2009-10, 3052 q breeder seed was produced against the indent of 2464 q from DAC. Dr Verma pointed out that there is need to take more care in conduct of trials and data reporting (especially in filling the data books).

Dr. Selvakumar presented the report on barley diseases/ pests screening nurseries as well as the experiments on Integrated Pest Management in barley. During the presentation it was pointed out that Bayleton @0.1% is very effective in controlling yellow rust. He also informed the house that there was very poor level of resistance against leaf blights in all entries submitted by the breeders and emphasized the need of developing more materials having resistance against both leaf blights in addition to yellow rust being the most predominant diseases in the country. The chairman commended the effort of Durgapura centre in developing numbers of lines with high level of resistance to yellow rust. He also desired other centres should make use of these resistance lines in their hybridization program in generating better materials having resistance to yellow rust. Similarly there is a need of breeding for resistance to leaf blights and aphid, which are important for optimally managed barley production in NWPZ as well as NEPZ.

Dr AS Kharub made presentation on the results of the various agronomical experiments including the varietal evaluation, trials on dual purpose barley, tillage options in malt and feed barley, row spacing in malt barley and integrated nutrient

management. In the presentation, varietal performance in different agronomic management was discussed. In case of dual purpose trial he pointed out that spilt of nitrogen into ½, ¼, ¼ gave better performance in NWPZ while ½, ½ dose in NEPZ was better while considering the green forage and grain yield together. He also informed the house that in case malt barley row spacing of 18cm gave significantly higher yield than 23 cm spacing and was higher than 20.5 cm. In case of the tillage experiments it was observed that in both NWPZ and NEPZ reduced tillage was at par with conventional tillage, however the zero tillage was inferior in both the zones.

Dr Sneh Narawal presented the significant results of malting quality evaluation. She mentioned that due to late installation of micro-malting system this year all the samples could not be analyzed for all parameters. In total 337 samples from eight centres were analyzed for various grain & malt quality parameters. She informed the house about very high values of friability in general among all entries evaluated this year. She emphasized the need of timely supplying the sufficient quantity of properly cleaned/ stored seed samples in good packing. The breeders were advised to follow the preliminary screening for the grain physical parameters at their centres for evaluating the entries before submission to the coordinated malt barley trials.

In the last presentation Dr B Sarkar made the presentation on evaluation of international trials and nurseries received from ICARDA Syria. He informed the house that during the year, 491 accessions in form of four yield trials & five observation nurseries were evaluated in Karnal and few other locations under barley network. During the presentation he summarized that over the years it has been observed that material coming from the high input programme nurseries is performing better because it is fitting well in our agro-climatic conditions and most of the selection are being made by the breeders. Dr Sarkar also informed the house about the germplasm maintenance activity and mentioned that during the year 1430 accessions were rejuvenated and about 750 accessions were submitted to the NBPGR for long term conservation. During the discussion it was also requested to the ICARDA representative to include an special nursery including the better malting quality material. The timely supply of nurseries was also requested to ensure their proper evaluation and fulfil the objectives of these nurseries.

In his concluding remarks the chairman commended the effort made by barley workers in achieving the goal of the program. He emphasized the need of making serious effort in widening the genetic diversity through use of elite materials coming from national and international programme. Breeding approach by intercrossing superior $F_2$ plants of diverse crosses may also be tried for generating the better segregants. He also commended ICARDA for supplying elite germplasm in the form of various yield trials & nurseries which are being used in the national program and he emphasized the need of developing more collaboration in barley improvement addressing the current objectives like malting, feed and fodder types.

The session ended with thanks to the Chair.

# SESSION II

## Crop Improvement: Research Planning meeting 2010-11

**Organizers: Drs. Jag Shoran and Vinod Tiwari**

The scientists from six major zones deliberated in respective zonal groups and reviewed the results of trials. Following the set norms on yield, diseases (particularly rusts), and quality parameters, the desirable test entries were promoted from NIVTs to Advance Varietal Trials (AVTs). The same norms were taken into account to retain the promising entries for final year test in the AVTs. The scientists dealing with special trials and physiological investigations also followed suit and finalized the trials.

Finally, the constitution of various trial series (within brackets) in NWPZ (5), NEPZ (3), CZ (4), PZ (4), NHZ (6), SHZ (2), Special Trials (3) and Wheat Physiology investigations (2) was completed with the help of collective wisdom of co-operators.

The group also decided that the performance of a genotype under rainfed condition was essential for qualifying for promotion/ retention in rainfed trials and such performance under restricted irrigated situation only will not be enough for inclusion in trials under RF/RI conditions.

The coordinators/organizers of this group also completed the constitution of seven National Initial Varietal Trials and two Initial Varietal Trials utilizing the proposals received from different wheat breeding centres. Besides, the requirement of various international nurseries and trials was assessed for sending the indent to CIMMYT, Mexico.

**Finalization of work plan and Recommendations :**

The details of various wheat breeding yield trials were presented before the Crop Improvement group and were finalized for conduction during 2010-11 crop season. The details of yield trials are given here as under:

# NATIONAL INITIAL VARIETAL TRIALS (2010-11)
# NIVT-1A-IR-TS-TAS

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 10 | Modipuram, Durgapura, Tabiji, Delhi, Ludhiana, Gurdaspur, Hisar, Karnal, Pantnagar, Nagina |
| NEPZ | 8 | Kanpur, Faizabad, Varanasi, Pusa (IARI), Ranchi, Sabour, Kalyani, Burdwan |
| **Total test Sites** | **18** | |

**DETAILS OF TRIAL ENTRIES**

| Sr. No. | Contributing Centres | No. of Entries | Entries |
|---|---|---|---|
| 1. | Delhi | 8 | HD 3076, HD 3077, HD 3078, HD 3079, HD 3080, HD 3081, HD 3082, HD 3083 |
| 2. | Ludhiana | 5 | PBW 661, PBW 662, PBW 663, PBW 664, PBW 665 |
| 3. | Hisar | 5 | WH 1113, WH 1114, WH 1115, WH 1116, WH 1117 |
| 5. | Pantnagar | 5 | UP 2815, UP 2816, UP 2817, UP 2818, UP 2819 |
| 6. | Durgapura | 5 | RAJ 4240, RAJ 4241, RAJ 4242, RAJ 4243, RAJ 4244 |
| 7. | DWR- Karnal | 5 | DBW 78, DBW 79, DBW 80, DBW 81, DBW 82 |
| 8. | Faizabad | 2 | NW 5048, NW 5053 |
| 9. | Varanasi | 2 | HUW 650, HUW 651 |
| 10. | Kanpur | 2 | K 1001, K 1002 |
| 11. | Sabour | 2 | RW 3702, RW 3710 |
| 12. | Chatha | 1 | JAUW 595 |
| 13. | Modipuram | 1 | WCW 2007-21 |
| 14. | Triticales | 2 | TL 2977, TL 2978 |
| | **Checks** | **4** | **PBW 343, DBW 17, K 9107, HD 2733** |
| | **Total Entries** | **49** | |

| | | |
|---|---|---|
| **EXPERIMENTAL DESIGN** | : | SIMPLE LATTICE |
| **REPLICATION** | : | TWO |
| **PLOT SIZE (GROSS)** | : | 6M X 1.38 M (6 rows) |
| **PLOT SIZE (NET)** | : | 6.0M X 0.92 M (4 middle rows) |
| **FERTILIZER DOSE (kg/ha)** | : | 120:60:30 (N:P:K) |
| **DATE OF SOWING** | : | NWPZ: November 5-20<br>NEPZ: November 10-25 |
| **SEED REQUIREMENT** | : | 7.0 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

# NATIONAL INITIAL VARIETAL TRIAL (2010-11)

## NIVT-1B-IR-TS-TAS

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 11 | Delhi, Ludhiana, Gurdaspur, Hisar, Kaul, Pantnagar, Nagina, Modipuram, Durgapura, Tabiji, Karnal |
| NEPZ | 8 | Kanpur, Faizabad, Varanasi, Ranchi, Sabour, Pusa (IARI), Kalyani, Malda |
| **Total test sites** | **19** | |

**DETAILS OF TRIAL ENTRIES**

| Sr. No. | Contributing Centres | No. of Entries | Entries |
|---|---|---|---|
| 1. | Delhi | 9 | HD 3085, HD 3086, HD 3087, HD 3088, HD 3089, HP 1935, HP 1936, HP 1937, HP 1938 |
| 2. | Kanpur | 5 | K 1004, K 1005, K 1006, K 1007, K 1008 |
| 3. | Faizabad | 5 | NW 5038, NW 5045, NW 5049, NW 5050, NW 5054 |
| 4. | Varanasi | 5 | HUW 652, HUW 653, HUW 654, HUW 655, HUW 656 |
| 5. | Durgapura | 3 | RAJ 4245, RAJ 4246, RAJ 4247 |
| 6. | DWR-Karnal | 6 | DBW 83, DBW 84, DBW 85, DBW 86, DBW 87, DBW 88 |
| 7. | Ludhiana | 3 | PBW 666, PBW 667, PBW 668 |
| 8. | Hisar | 4 | WH 1118, WH 1119, WH 1120, WH 1121 |
| 9. | Pantnagar | 1 | UP 2822 |
| 10. | Sabour | 3 | RW 3708, RW 3711, RW 3715 |
| 11. | Modipuram | 1 | WCW 2007-24 |
| | **Checks** | **4** | **PBW 343, DBW 17, K 9107, HD 2733** |
| | **Total Entries** | **49** | |

| | | |
|---|---|---|
| **EXPERIMENTAL DESIGN** | : | SIMPLE LATTICE |
| **REPLICATION** | : | TWO |
| **PLOT SIZE (GROSS)** | : | 6M X 1.38 M (6 rows) |
| **PLOT SIZE (NET)** | : | 6.0M X 0.92 M (4 middle rows) |
| **FERTILIZER DOSE (kg/ha)** | : | 120:60:30 (N: P: K) |
| **DATE OF SOWING** | : | NWPZ: November 5-20<br>NEPZ: November 10-25 |
| **SEED REQUIREMENT** | : | 7.0 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

# NATIONAL INITIAL VARIETAL TRIAL (2010-11)
# NIVT-2-IR-TS-TAS

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| CZ | 9 | Indore, Gwalior, Powarkheda, Sagar, Junagarh, Vijapur, Kota, Udaipur, Bilaspur |
| PZ | 5 | Dharwad, Niphad, Pune, Parbhani, Akola |
| **Total Test Sites** | **14** | |

**DETAILS OF TRIAL ENTRIES**

| Sr. No. | Contributing Centres | No. of Entries | Entries |
|---|---|---|---|
| 1. | Delhi | 5 | HI 1582, HI 1583, HI 1584, HW 5223, HP 1939 |
| 2. | Dharwad | 4 | UAS 333, UAS 334, UAS 335, UAS 336 |
| 3. | Vijapur | 3 | GW 426, GW 427, GW 428 |
| 4. | Niphad | 3 | NIAW 1689, NIAW 1773, NIAW 1816 |
| 5. | Powarkheda | 3 | MP 1257, MP 1258, MP 1259 |
| 6. | Durgapura | 2 | RAJ 4248, RAJ 4249 |
| 7 | Pune | 2 | MACS 6473, MACS 6478 |
| 8. | Junagadh | 2 | GW 430, GW 436 |
| 9. | Sagar | 1 | JWS 139 |
| 10. | Jabalpur | 1 | MP 3350 |
| 11. | Akola | 1 | AKAW 4731 |
| 12. | Lok Bharti | 1 | LOK 66 |
| 13. | Ludhiana | 1 | PBW 669 |
| 14. | Kanpur | 1 | K 1010 |
| 15. | Pantnagar | 1 | UP 2823 |
| 16. | DWR- Karnal | 1 | DBW 89 |
| 17. | Hisar | 1 | WH 1122 |
| 18. | Kota | 1 | RKD 232 |
| | **Checks** | **2** | **NIAW 917, GW 322** |
| | **Total Entries** | **36** | |

| | | |
|---|---|---|
| **EXPERIMENTAL DESIGN** | : | SIMPLE LATTICE |
| **REPLICATION** | : | TWO |
| **PLOT SIZE (GROSS)** | : | 6M X 1.38 M (6 rows) |
| **PLOT SIZE (NET)** | : | 6.0M X 0.92 M (4 middle rows) |
| **FERTILIZER DOSE (kg/ha)** | : | 120:60:30 (N: P: K) |
| **DATE OF SOWING** | : | November 10-25 (Both CZ and PZ) |
| **SEED REQUIREMENT** | : | 7.0 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

# NATIONAL INITIAL VARIETAL TRIAL (2010-11)

## NIVT-3-IR-LS-TAS

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 9 | Delhi, Ludhiana, Gurdaspur, Hisar, Karnal, Pantnagar, Modipuram, Bulandshahar, Durgapura |
| NEPZ | 6 | Kanpur, Faizabad, Varanasi, IARI-Pusa, Ranchi, Sabour |
| CZ | 6 | Indore, Bilaspur, Powarkheda, Jabalpur, Junagarh, Vijapur |
| PZ | 4 | Ugar Khurd, Niphad, Pune, Parbhani |
| **Total Test Sites** | **25** | |

**DETAILS OF TRIAL ENTRIES**

| Sr. No. | Contributing Centres | No. of Entries | Entries |
|---|---|---|---|
| 1. | Delhi | 8 | HD 3090, HD 3091 HD 3092, HD 3093, HD 3094, HD 3095, HD 3096, HI 8723 |
| 2. | Ludhiana | 4 | PBW 670, PBW 671, PBW 672, PBW 673 |
| 3. | Pantnagar | 4 | UP 2824, UP 2825, UP 2826, UP 2827 |
| 4. | Durgapura | 3 | RAJ 4250, RAJ 4251, RAJ 4252 |
| 5. | Kanpur | 3 | K 1012, K 1013, K 1014 |
| 6. | Hisar | 3 | WH 1123, WH 1124, WH 1125 |
| 7. | DWR- Karnal | 3 | DBW 90, DBW 91, DBW 92 |
| 8. | Varanasi | 2 | HUW 657, HUW 658 |
| 9. | Powarkheda | 2 | MP 1260, MP 1261 |
| 10. | Vijapur | 2 | GW 432, GW 433 |
| 11. | Junagadh | 1 | GW 431 |
| 12. | Lok Bharati | 1 | LOK 67 |
| 13. | Faizabad | 1 | NW 5047 |
| 14. | Jabalpur | 1 | MP 3353 |
| 15. | Bilaspur | 2 | CG 1005, CG 1006 |
| 16. | Dharwad | 1 | UAS 337 |
| 17. | Akola | 1 | AKAW 4705 |
| 18. | Sabour | 1 | RW 3705 |
| 19. | Niphad | 1 | NIAW 1689 |
| 20. | Chatha | 1 | JAUW 581 |
| | **Checks** | **4** | **PBW 590, MP 4010, DBW 14, HD 2932** |
| | **Total Entries** | **49** | |

| | | |
|---|---|---|
| **EXPERIMENTAL DESIGN** | : | SIMPLE LATTICE |
| **REPLICATION** | : | TWO |
| **PLOT SIZE (GROSS)** | : | 6M X 1.08 M (6 rows) |
| **PLOT SIZE (NET)** | : | 6.0M X 0.72 M (4 middle rows) |
| **FERTILZIER DOSE (kg/ha)** | : | 120:60:30 (N: P: K) |
| **DATE OF SOWING** | : | NWPZ: December 15 - 25<br>NEPZ: December 10 - 25<br>CZ: December 7 - 25<br>PZ: December 5 - 15 |
| **SEED REQUIREMENT** | : | 7.0 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

# NATIONAL INITIAL VARIETAL TRIAL (2010-11)

## NIVT-4-IR-TS-TDM

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 7 | Delhi, Ludhiana, Gurdaspur, Hisar, Karnal, Bulandshahar, Durgapura |
| CZ | 9 | Mauranipur, Kota, Indore, Powarkheda, Jabalpur, Junagarh, Vijapur, S.K. Nagar, Gwalior |
| PZ | 4 | Ugar Khurd, Niphad, Pune, Akola |
| **Total Test Sites** | **20** | |

**DETAILS OF TRIAL ENTRIES**

| Sr. No. | Contributing Centres | No. of Entries | Entries |
|---|---|---|---|
| 1. | Delhi | 7 | HD 4725, HD 4726, HI 8724, HI 8725, HI 8726, HI 8727, HI 8728 |
| 2. | Vijapur | 4 | GW 1276, GW 1277, GW 1278, GW 1283 |
| 3. | Ludhiana | 4 | PDW 327, PDW 328, PDW 329, PDW 330 |
| 4. | Pune | 3 | MACS 3817, MACS 3825, MACS 3829 |
| 5. | DWR- Karnal | 2 | DDW 21, DDW 22 |
| 6. | Hisar | 2 | WHD 949, WHD 950 |
| 7. | Dharwad | 2 | UAS 438, UAS 439 |
| 8. | Kota | 3 | RKD 219, RKD 225, RKD 231 |
| 9. | Niphad | 1 | NIDW 653 |
| 10. | Akola | 1 | AKDW 4749 |
| 11. | Powarkheda | 1 | MPO 1262 |
| 12. | Pantnagar | 1 | UPD 93 |
| 13. | Parbhani | 1 | PBND 5055 |
| | **Checks** | **4** | **PDW 291, HI 8498, NIDW 295, PBW 343,** |
| | **Total Entries** | **36** | |

| | | |
|---|---|---|
| **EXPERIMENTAL DESIGN** | : | SIMPLE LATTICE |
| **REPLICATION** | : | TWO |
| **PLOT SIZE (GROSS)** | : | 6M X 1.38 M (6 rows) |
| **PLOT SIZE (NET)** | : | 6.0M X 0.92 M (4 middle rows) |
| **FERTILIZER DOSE (kg/ha)** | : | 120:60:30 (N: P: K) |
| **DATE OF SOWING** | : | NWPZ: November 1-15<br>CZ: November 10-25<br>PZ: November 5-15 |
| **SEED REQUIREMENT** | : | 7.0 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

# NATIONAL INITIAL VARIETAL TRIAL (2010-11)

## NIVT-5A-RF-TS-TAS

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| NWPZ | 4 | Ludhiana, Gurdaspur, Ambala, Delhi |
| NEPZ | 5 | Kanpur, Faizabad, Varanasi, Ranchi, Sabour |
| CZ | 4 | Indore*, Sagar*, Jabalpur+, Kota |
| PZ | 5 | Niphad*, Pune, Badnapur, Dharwad, Washim |
| **Total Test Sites** | **18** | |

* Both RF and RI trials. + Only RI trial

**DETAILS OF TRIAL ENTRIES**

| Sr. No. | Contributing Centres | No. of Entries | Entries |
|---|---|---|---|
| 1. | Delhi | 5 | HD 3097, HD 3098, HD 3099, HP 1940, HI 1585 |
| 2. | Kanpur | 2 | K 1015, K 1016 |
| 3. | Powarkheda | 4 | MP 1251, MP 1252, MP 1253, MP 1254 |
| 4. | Ludhiana | 2 | PBW 674, PBW 675 |
| 5. | Hisar | 2 | WH 1126, WH 1127 |
| 6. | Pantnagar | 2 | UP 2828, UP 2829 |
| 7. | Pune | 2 | MACS 6488, MACS 6489 |
| 8. | Dharwad | 2 | UAS 338, UAS 339 |
| 9. | Faizabad | 1 | NW 5034 |
| 10. | Durgapura | 1 | RAJ 4253 |
| 11. | Niphad | 2 | NIAW 1846, NIAW 1858 |
| 12. | Jabalpur | 1 | MP 3349 |
| 13. | Varanasi | 1 | HUW 659 |
| 14. | Sabour | 1 | RW 3707 |
| 15. | DWR-Karnal | 1 | DBW 93 |
| 16. | Sagar | 1 | JWS 138 |
| 17. | Bilaspur | 1 | CG 1007 |
| 18. | Triticale | 1 | TL 2979 |
| | **Checks** | **4** | **PBW 175, HI 1500, HD 2888, NI 5439** |
| | **Total Entries** | **36** | |

| | | |
|---|---|---|
| **EXPERIMENTAL DESIGN** | : | SIMPLE LATTICE |
| **REPLICATION** | : | TWO |
| **PLOT SIZE (GROSS)** | : | 6M X 1.38 M (6 rows) |
| **PLOT SIZE (NET)** | : | 6.0M X 0.92 M (4 middle rows) |
| **FERTILZIER DOSE (kg/ha)** | : | RF – 40:20:00 (N: P: K);<br>RI – 60:30:15 (N: P: K) |
| **DATE OF SOWING** | : | NWPZ: RF – October 20-31; RI – Oct 25 - Nov 10<br>NEPZ: October 25 - Nov 15<br>CZ: RF – October 15-31; RI – Oct 25 - Nov 10<br>PZ: RF – October 15-31; RI – Oct 25 - Nov 10 |
| **SEED REQUIREMENT** | : | 7.0 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

# NATIONAL INITIAL VARIETAL TRIAL (2010-11)

## NIVT-5B-RF-TS-TDM

**Conducting centres**

| Zone | No. | Centres |
|---|---|---|
| CZ | 7 | Dhandhuka, Arnej, Tancha, Sagar, Indore*, Kota*, Powarkheda+ |
| PZ | 4 | Niphad, Pune, Washim, Dharwad |
| **Total Test Sites** | **11** | |

* Both RF and RI trials. + Only RI trial

**DETAILS OF TRIAL ENTRIES**

| Sr. No. | Contributing Centres | No. of Entries | Entries |
|---|---|---|---|
| 1. | Delhi | 5 | HI 8729, HI 8730, HI 8731, HI 8732, HI 8733 |
| 2. | Pune | 3 | MACS 3597, MACS 3812, MACS 3865 |
| 3. | Dharwad | 2 | UAS 441, UAS 442 |
| 4. | Powarkheda | 2 | MPO 1255, MPO 1256 |
| 5. | Vijapur | 3 | GW 1279, GW 1280, GW 1281 |
| 6. | Junagadh | 1 | GW 1282 |
| 7. | Niphad | 2 | NIDW 675, NIDW 694 |
| 8. | Kanpur | 1 | KD 1018 |
| 9. | DWR- Karnal | 1 | DDW 23 |
| 10. | Kota | 1 | RKD 227 |
| | **Checks** | **4** | **A 9-30-1, MACS 1967, B-Yellow, HD 4672** |
| | **Total Entries** | **25** | |

| | | |
|---|---|---|
| **EXPERIMENTAL DESIGN** | : | SIMPLE LATTICE |
| **REPLICATION** | : | TWO |
| **PLOT SIZE (GROSS)** | : | 6M X 1.38 M (6 rows) |
| **PLOT SIZE (NET)** | : | 6.0M X 0.92 M (4 middle rows) |
| **FERTILIZER DOSE (kg/ha)** | : | RF – 40:20:00 (N: P: K);<br>RI – 60:30:15 (N: P: K) |
| **DATE OF SOWING** | : | CZ: RF – October 15-31<br>RI – October 25 – November 10<br>PZ: October 15-31 |
| **SEED REQUIREMENT** | : | 5.0 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Northern Hills Zone** |
| **Production Condition** | : | IR-TS-TAS |
| **No. of Trial Centres** | : | 5 |
| **State** | **No.** | **Centres** |
| H.P. | 3 | Shimla, Dhaulakuan, Malan |
| UTK | 1 | Hawalbagh |
| J & K | 1 | Rajouri |
| No. of Varieties including Checks | : | 10 (6+4) |
| **Contributing Centres** | **No.** | **Entries** |
| CSKHPKV, Palampur | 1 | HPW 349 |
| PAU, Ludhiana (Triticale) | 2 | TL 2969*, TL 2975 |
| VPKAS, Almora | 1 | VL 941 |
| Shimla | 2 | HS 514*, HS 526 |
| **Checks** | 4 | HS 240, VL 804, TL 2942, HS 507 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Six |
| Plot Size | : | Gross : 4m × 1.38m (6 rows)<br>Net : 4m × 0.92m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:30 (N:P:K) |
| Date of sowing | : | November 1-15 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 12 kg per entry (including AVT-Rainfed) |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Northern Hills Zone** |
| **Production Condition** | : | RF-TS-TAS |
| **No. of Trial Centres** | : | 12 |
| **State** | **No.** | **Centres** |
| H.P. | 5 | Shimla, Malan, Berthin, Bajaura, Chamba (KVK) |
| Uttarakhand | 3 | Hawalbagh, Majhera, Ranichauri (KVK) |
| J & K | 1 | Rajouri |
| Manipur | 1 | Mantripukhari |
| Sikkim | 1 | Gangtok |
| West Bengal | 1 | Kalimpong |
| No. of Varieties including Checks | : | 10 (6+4) |
| **Contributing Centres** | **No.** | **Entries** |
| CSKHPKV, Palampur | 1 | HPW 349 |
| PAU, Ludhiana (Triticale) | 2 | TL 2969*, TL 2975 |
| VPKAS, Almora | 1 | VL 941 |
| Shimla | 2 | HS 514*, HS 526 |
| **Checks** | 4 | HS 240, VL 804, TL 2942, HS 507 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Six |
| Plot Size | : | Gross : 4m × 1.38m (6 rows)<br>Net : 4m × 0.92m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:0 (N:P:K) |
| Date of sowing | : | October 15-31 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 12 kg per entry (including AVT-irrigated) |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Northern Hills Zone** |
| **Production Condition** | : | RF-ES-TAS |
| **No. of Trial Centres** | : | 8 |
| **State** | **No.** | **Centres** |
| H.P. | 3 | Shimla, Malan, Bajaura |
| UTK | 2 | Hawalbagh, Ranichauri |
| J & K | 1 | Shalimar |
| Sikkim | 1 | Gangtok |
| West Bengal | 1 | Kalimpong |
| No. of Varieties including Checks | : | 13 (10+3) |
| **Contributing Centres** | **No.** | **Entries** |
| IARI, Reg. Station, Shimla | 3 | HS 541, HS 542, HS 543 |
| CSKHPKV, Malan | 2 | HPW 360, HPW 361 |
| VPKAS, Almora | 3 | VL 955, VL 956, VL 957 |
| GPBUA&T, Pantnagar | 1 | UP 2832 |
| SKAUST, Srinagar | 1 | SKW 441 |
| **Checks** | 3 | HS 277, VL 829, HPW 251 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 3m × 1.38m (6 rows)<br>Net : 3.0m × 0.92m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:00 (N:P:K) |
| Date of sowing | : | October 1-10 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 5 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Northern Hills Zone** |
| **Production Condition** | : | RI-LS-TAS |
| **No. of Trial Centres** | : | 7 |
| **State** | **No.** | **Centres** |
| H.P. | 5 | Shimla, Malan, Bajaura, Dhaulakuan, Sundernagar |
| UTK | 2 | Hawalbagh, Majhera |
| No. of Varieties including Checks | : | 13 (10+3) |
| **Contributing Centres** | **No.** | **Entries** |
| IARI, Reg. Station, Shimla | 2 | HS 544, HS 545 |
| CSKHPKV, Malan | 4 | HPW 347, HPW 348, HPW 370, HPW 371 |
| VPKAS, Almora | 3 | VL 946, VL 958, VL 959 |
| GPBUA&T, Pantnagar | 1 | UP 2833 |
| **Checks** | 3 | HS 295, VL 892, HS 490 |
| Experimental Design | : | R.B.D. |
| Replication | : | Six |
| Plot Size | : | Gross : 4m × 1.08m (6 rows)<br>Net : 4m × 0.72m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:0 (N:P:K) |
| Date of sowing | : | December 1-15 |
| Seed Rate (kg/ha) | : | 125 kg |
| Seed Requirement | : | 7 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## INITIAL VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Northern Hills Zone** |
| **Production Condition** | : | IR-TS-TAS |
| **No. of Trial Centres** | : | 3 |
| **State** | **No.** | **Centres** |
| H.P. | 2 | Dhaulakuan, Bajaura |
| UTK | 1 | Hawalbagh |
| No. of Varieties including Checks | : | 25 (23+2) |
| **Contributing Centres** | **No.** | **Entries** |
| IARI, Reg. Station, Shimla | 7 | HS 535, HS 536,HS 537,HS 538,HS 539, HD 3101, HD 3102 |
| CSKHPKV, Malan | 7 | HPW 362,HPW 363,HPW 364,HPW 365, HPW 366, HPW 367, HPW 368 |
| VPKAS, Almora | 6 | VL 949, VL 950, VL 951, VL 952, VL 953, VL 954 |
| GPBUA&T, Pantnagar | 2 | UP 2830, UP 2831 |
| SKUA&T, Srinagar | 1 | SKW 355 |
| **Checks** | 2 | HS 240, VL 804 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 4m × 1.38m (6 rows)<br>Net : 4m × 0.92m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:30 (N:P:K) |
| Date of sowing | : | November 1-15 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 6 kg per entry (including IVT-Rainfed) |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## INITIAL VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Northern Hills Zone** |
| **Production Condition** | : | RF-TS-TAS |
| **No. of Trial Centres** | : | 7 |
| **State** | **No.** | **Centres** |
| H.P. | 3 | Shimla, Malan, Dhaulakuan |
| UTK | 2 | Hawalbagh, Ranichauri |
| J & K | 1 | Shalimar |
| West Bengal | 1 | Kalimpong |
| No. of Varieties including Checks | : | 25 (23+2) |
| **Contributing Centres** | **No.** | **Entries** |
| IARI, Reg. Station, Shimla | 7 | HS 535, HS 536,HS 537,HS 538,HS 539, HD 3101, HD 3102 |
| CSKHPKV, Malan | 7 | HPW 362,HPW 363,HPW 364,HPW 365, HPW 366, HPW 367, HPW 368 |
| VPKAS, Almora | 6 | VL 949, VL 950, VL 951, VL 952, VL 953, VL 954 |
| GPBUA&T, Pantnagar | 2 | UP 2830, UP 2831 |
| SKUA&T, Srinagar | 1 | SKW 355 |
| **Checks** | 2 | HS 240, VL 804 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 4m × 1.38m (6 rows)<br>Net : 4m × 0.92m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:00 (N:P:K) |
| Date of sowing | : | October 15-31 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 6 kg per entry (including IVT-Rainfed) |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Western Plains Zone** |
| **Production Condition** | : | IR-TS-TAS |
| **No. of Trial Centres** | : | 27 |
| **State** | **No.** | **Centres** |
| Punjab | 5 | Ludhiana, Gurdaspur, Bathinda, Kapurthala, Rauni |
| Haryana | 7 | Hisar, Karnal, Uchani, Kaul, Bawal, Faridabad, Shikopur |
| Uttarakhand | 2 | Pantnagar, Kashipur |
| U.P. | 6 | Bulandshahar, Nagina, Modipuram, Barielly, Hardoi, Ujhani |
| Rajasthan | 4 | Durgapura, Tabiji, Alwar, Sri Ganganagar |
| Delhi | 1 | Delhi |
| J & K | 1 | Chatha |
| H.P. | 1 | Dhaulakuan |
| No. of Varieties including Checks | : | 17 (12+5) |
| **Contributing Centres** | **No.** | **Entries** |
| Ludhiana | 2 | PBW 648, PBW 651 |
| Chatha | 1 | JAUW 584 |
| Durgapura | 3 | RAJ 4228, RAJ 4229, RAJ 4230 |
| Hisar | 2 | WH 1105, WH 1107 |
| New Delhi | 3 | HD 3055, HD 3058, HD 3059 |
| Varanasi | 1 | HUW 640 |
| **Checks** | 5 | PBW 343, DBW 17, PBW 550, HD 2967(I), DBW 50 / PBW 621 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 m × 6.0m ( 12 rows)<br>Net : 2.30 m ×6.0m ( 10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:30 (N:P:K) |
| Date of sowing | : | November 5-20 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 30 kg per entry |
| Last Date of Seed Receipt | : | October 5 |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Western Plains Zone** |
| **Production Condition** | : | IR-TS-TDM |
| **No. of Trial Centres** | : | 14 |
| **State** | **No.** | **Centres** |
| Punjab | 4 | Ludhiana, Gurdaspur, Kapurthala, Rauni |
| Haryana | 4 | Hisar, Uchani, Karnal, Kaul |
| Uttarakhand | 1 | Pantnagar |
| U.P. | 2 | Bulandshahar, Modipuram |
| Rajasthan | 1 | Durgapura |
| Delhi | 1 | Delhi |
| J&K | 1 | Chatha |
| No. of Varieties including Checks | : | 15 (9+6) |
| **Contributing Centres** | **No.** | **Entries** |
| PAU, Ludhiana | 2 | PDW 322*, PDW 324 |
| Hisar | 2 | WHD 946*, WHD 948 |
| IARI, Indore | 2 | HI 8703*, HI 8714 |
| Kota | 1 | RKD 214 |
| Pune | 1 | MACS 3828 |
| DWR, Karnal | 1 | DDW 19 |
| **Checks** | 6 | PDW 233, PDW 291, DBW 17, PDW 314, PDW 315 (I), WHD 943 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 × 6.0 m (12rows)<br>Net : 2.30 × 6.0 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:30 (N:P:K) |
| Date of sowing | : | November 1-15 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 20 kg per entry |
| Last Date of Seed Receipt | | October 5 |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Western Plains Zone** |
| **Production Condition** | : | IR-LS-TAS |
| **No. of Trial Centres** | : | 22 |
| **State** | **No.** | **Centres** |
| Punjab | 4 | Ludhiana, Gurdaspur, Bathinda, Kapurthala |
| Haryana | 5 | Hisar, Uchani, Kaul, Rohtak, Karnal |
| Uttarakhand | 2 | Pantnagar, Kashipur |
| U.P. | 6 | Bulandshahar, Nagina, Modipuram, Barielly, Hardoi, Ujhani |
| Rajasthan | 3 | Durgapura, Tabiji, Sri Ganganagar |
| Delhi | 1 | Delhi |
| J & K | 1 | Chatha |
| No. of Varieties including Checks | : | 11 (8+3) |
| **Contributing Centres** | **No.** | **Entries** |
| PAU, Ludhiana | 2 | PBW 639*, PBW 658 |
| DWR, Karnal | 1 | DBW 71 |
| HAU, Hisar | 1 | WH 1100 |
| Durgapura | 1 | RAJ 4237 |
| Delhi | 3 | HD3059, HD 3065, HD 3066 |
| **Checks** | 3 | PBW 373, WH 1021, PBW 590 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.16 x 6.0 m (12rows)<br>Net : 1.80 x 6.0m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 100:60:30 (N:P:K) |
| Date of sowing | : | December 15-25 |
| Seed Rate (kg/ha) | : | 125 kg |
| Seed Requirement | : | 25 kg per entry |
| Last Date of Seed Receipt | : | October 5 |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Western Plains Zone** |
| **Production Condition** | : | RF-TS-TAS |
| **No. of Trial Centres** | : | 12 |
| **State** | **No.** | **Centres** |
| Punjab | 4 | Ludhiana, Gurdaspur, Kapurthala, Balachaur |
| Haryana | 2 | Hisar, Ambala |
| Uttarakhand | 1 | Pantnagar |
| U.P. | 1 | Modipuram |
| Delhi | 1 | Delhi |
| J & K | 1 | Chatha |
| H.P. | 1 | Dhaulakuan |
| Rajasthan | 1 | Diggi |
| No. of Varieties including Checks | : | 13 (9+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Ludhiana | 2 | PBW 644*, PBW 660 |
| Hisar | 2 | WH 1097, WH 1098 |
| Karnal | 1 | DBW 74 |
| Dharwad | 1 | UAS 326 |
| Niphad | 1 | NIAW 1594 |
| Sabour | 1 | RW 3688 |
| Pune | 1 | MACS 6354 |
| **Checks** | 4 | C 306, PBW 175, PBW 396, WH 1080 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 x 6.0 m (12 rows)<br>Net : 2.30 x 6.0 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:0 N:P:K |
| Date of sowing | : | October 20-31 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 17 kg per entry |
| Last Date of Seed Receipt | : | October 5 |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Western Plains Zone** |
| **Production Condition** | : | RI-TS-TAS |
| **No. of Trial Centres** | : | 7 |
| **State** | **No.** | **Centres** |
| Uttarakhand | 1 | Pantnagar |
| Haryana | 2 | Hisar, Uchani |
| Punjab | 2 | Ludhiana, Bathinda |
| Rajasthan | 1 | Diggi |
| Delhi | 1 | Delhi |
| No. of Varieties including Checks | : | 17 (13+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Ludhiana | 3 | PBW 644*, PBW 659, PBW 660 |
| Delhi | 3 | HD 3043*, HD 3070, HD 3071 |
| Hisar | 1 | WH 1097 |
| Karnal | 1 | DBW 74 |
| Faizabad | 1 | NW 5013 |
| Indore | 1 | HI 1579 |
| Niphad | 1 | NIAW 1594 |
| Sabour | 1 | RW 3688 |
| Pune | 1 | MACS 6416 |
| **Checks** | 4 | C 306, PBW 175, PBW 396, WH 1080 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 x 6.0 m (12 rows)<br>Net : 2.30 × 6.0 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 60:30:15 (N:P:K) |
| Date of sowing | : | October 20-31 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 11 kg per entry |
| Last Date of Seed Receipt | : | October 5 |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Eastern Plains Zone** |
| **Production Condition** | : | IR-TS-TAS |
| **No. of Trial Centres** | : | 15 |
| **State** | **No.** | **Centres** |
| Uttar Pradesh | 7 | Barabanki, Varanasi, Faizabad, Kanpur, Araul, Deegh, Saini |
| Bihar | 2 | IARI-Pusa, Sabour |
| West Bengal | 4 | Coochbehar, Kalyani, Burdhwan, Malda |
| Jharkhand | 1 | Ranchi |
| Assam | 1 | Shillongani |
| No. of Varieties including Checks | : | 7 (2+5) |
| **Contributing Centres** | **No.** | **Entries** |
| Durgapura | 1 | RAJ 4229 |
| Kanpur | 1 | K 0906 |
| **Checks** | 5 | K 0307, PBW 343, HD 2733, DBW 39, HD 2967(I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 x 6.0 m (12 rows)<br>Net : 2.30 × 6.0 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:30 (N:P:K) |
| Date of sowing | : | November 10-25 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 20 kg per entry |
| Last Date of Seed Receipt | : | October 10 |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Eastern Plains Zone** |
| **Production Condition** | : | IR-LS-TAS |
| **No. of Trial Centres** | : | 16 |
| **State** | **No.** | **Centres** |
| Uttar Pradesh | 8 | Barabanki, Varanasi, Araul, Faizabad, Kanpur, Mau, Deegh, Saini |
| Bihar | 2 | IARI-Pusa, Sabour |
| West Bengal | 4 | Burdman, Coochbehar, Kalyani, Mohitnagar |
| Jharkhand | 1 | Ranchi |
| Assam | 1 | Shillongani |
| No. of Varieties including Checks | : | 7 (3+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Kanpur | 1 | K 0911 |
| Bilaspur | 1 | CG 8001 |
| Delhi | 1 | HD 3065 |
| **Checks** | 4 | DBW 14, NW 2036, HUW 234, HI 1563 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.16 x 6m (12 rows)<br>Net : 1.80 x 6.0 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 100:60:30 (N:P:K) |
| Date of sowing | : | December 10-25 |
| Seed Rate (kg/ha) | : | 125 kg |
| Seed Requirement | : | 22 kg per entry |
| Last Date of Seed receipt | : | October 10 |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **North Eastern Plains Zone** |
| **Production Condition** | : | RF-TS-TAS |
| **No. of Trial Centres** | : | 13 |
| **State** | **No.** | **Centres** |
| Uttar Pradesh | 7 | Barabanki, Varanasi, Faizabad, Kanpur, Araul, Deegh, Saini |
| Bihar | 2 | IARI-Pusa, Sabour |
| West Bengal | 2 | Coochbehar, Kalyani |
| Jharkhand | 1 | Ranchi |
| Assam | 1 | Shillongani |
| No. of Varieties including Checks | : | 5 (2+3) |
| **Contributing Centres** | **No.** | **Entries** |
| Ludhiana | 1 | PBW 660 |
| Delhi | 1 | HD 3070 |
| **Checks** | 3 | C 306, K 8027, HD 2888 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 x 6.0 m (12 rows)<br>Net : 2.30 × 6.0 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:00 (N:P:K) |
| Date of sowing | : | Oct 25 to Nov 10 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 15 kg per entry |
| Last Date of Seed Receipt | : | Sept. 30 |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Central Zone** |
| **Production Condition** | : | IR-TS-TAD |
| **No. of Trial Centres** | : | 21 |
| **State** | **No.** | **Centres** |
| Gujarat | 8 | Anand, Amreli, Bardoli, Junagarh, Vijapur, SK Nagar, Sanosara, Porda |
| MP | 7 | Gwalior, Indore, Powarkheda, Rewa, Bhopal, Jabalpur, Sagar |
| UP | 1 | Mauranipur |
| Chhattisgarh | 2 | Bilaspur, Raipur |
| Rajasthan | 3 | Banswara, Kota, Udaipur |
| No. of Varieties including Checks | : | 14 (9+5) |
| **Contributing Centres** | **No.** | **Entries** |
| Vijapur | 1 | GW 418 |
| Indore | 3 | HI 8704* (d), HI 8713 (d), HI 8715 (d) |
| Sagar | 1 | JWS 135 |
| Pune | 1 | MACS 3828 (d) |
| Powarkheda | 1 | MP 1246 |
| Hisar | 1 | WHD 948 (d) |
| Durgapura | 1 | RAJ 4235 |
| **Checks** | 5 | Lok-1, GW 322, HI 1544, HI 8498 (d), MPO 1215 (d) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 x 6 m (12 rows)<br>Net : 2.30 m x 6 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:30 (N:P:K) |
| Date of sowing | : | November 10-25 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 24 kg per entry |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Central Zone** |
| **Production Condition** | : | IR-LS-TAS |
| **No. of Trial Centres** | : | 17 |
| **State** | **No.** | **Centres** |
| Gujarat | 6 | Anand, Bardoli, Junagarh, Vijapur, SK Nagar, Porda |
| MP | 5 | Indore, Jabalpur, Gwalior, Powarkheda, Rewa |
| Chattisgarh | 3 | Bilaspur, Jagdalpur, Ambikapur |
| Rajasthan | 3 | Banswara, Udaipur, Kota |
| No. of Varieties including Checks | : | 9 (5+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Jabalpur | 2 | MP 3304*, MP 3336 |
| Varanasi | 1 | HUW 648 |
| Bilaspur | 1 | CG 8001 |
| Durgapura | 1 | RAJ 4238 |
| **Checks** | 4 | DL 788-2, MP 4010, HD 2864, HD 2932 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.16 x 6 m (12 rows)<br>Net : 1.80 m x 6 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 80:40:20 (N:P:K) |
| Date of sowing | : | December 5-25 |
| Seed Rate (kg/ha) | : | 125 kg |
| Seed Requirement | : | 18 kg per entry |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Central Zone** |
| **Production Condition** | : | RF-TS-TAD |
| **No. of Trial Centres** | : | 09 |
| **State** | **No.** | **Centres** |
| Gujarat | 3 | Arnej, Dhandhuka, Tancha |
| MP | 4 | Indore, Jabalpur, Sagar, Damoh |
| Rajasthan | 2 | Kota, Pratapgarh |
| No. of Varieties including Checks | : | 15 (11+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Sagar | 1 | JWS 134 |
| Powarkheda | 2 | MP 1242, MPO 1243(d) |
| Karnal | 2 | DDW19 (d), DBW 74 |
| Kota | 1 | RKD 216 (d) |
| Kanpur | 1 | KD 0921(d) |
| Indore | 4 | HI 1572*, HI 1579, HI 1580, HI 8722 (d) |
| **Checks** | 4 | A-9-30-1(d), HI 8627(d), HI 1500, MP 3288 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 m x 6 m (12 rows)<br>Net : 2.30 m x 6 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:00 (N:P:K) |
| Date of sowing | : | October 15-31 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 14 kg per entry |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Central Zone** |
| **Production Condition** | : | RI-TS-TAD |
| **No. of Trial Centres** | : | 13 |
| **State** | **No.** | **Centres** |
| Gujarat | 2 | Dhanduka, Arnej |
| MP | 4 | Indore, Jabalpur, Sagar, Bhopal |
| Chattisgarh | 3 | Bilaspur, Ambikapur, Jagdalpur |
| Rajasthan | 4 | Kota, Banswara, Pratapgarh, Udaipur |
| No. of Varieties including Checks | : | 15 (11+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Sagar | 1 | JWS 134 |
| Powarkheda | 2 | MP 1242, MPO 1243(d) |
| Karnal | 2 | DDW19 (d), DBW 74 |
| Kota | 1 | RKD 216 (d) |
| Kanpur | 1 | KD 0921(d) |
| Indore | 4 | HI 1572*, HI 1579, HI 1580, HI 8722 (d) |
| **Checks** | 4 | A-9-30-1(d), HI 8627(d), HI 1500, MP 3288 (I) |
| Replication | : | Four |
| Plot Size | : | Gross : 2.76 m x 6 m (12 rows)<br>Net : 2.30 m x 6 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 60:30:15 (N:P:K) |
| Date of sowing | : | Oct 25 to Nov 10 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 16 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Peninsular Zone** |
| **Production Condition** | : | IR-TS-TAD |
| **No. of Trial Centres** | : | 15 |
| **State** | **No.** | **Centres** |
| Maharashtra | 10 | Niphad, Pravaranagar, Pune, Karad, K.Digraj, Akola, Parbhani, Nasik, Savalvihir, Amaravati |
| Karnataka | 5 | Dharwad, Ugar, Arbhavi, Kalloli, Mudhol |
| No. of Varieties including Checks | : | 11 (7+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Dharwad | 3 | UAS 428*(d), UAS 320* (d)@, UAS 328 |
| Ludhiana | 1 | PDW 325(d) |
| Lok Bharti | 1 | LOK 62* |
| Hisar | 2 | WHD 948 (d), WH 1102 |
| **Checks** | 4 | NIDW 295(d), HI 8663(d), GW 322, MACS 6222 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 6.00 × 2.76 m (12 rows)<br>Net : 6.00 × 2.30 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Date of sowing | : | November 1-15 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 18 kg per entry |

* Final year entry @ Based on quality traits

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Peninsular Zone** |
| **Production Condition** | : | IR-LS-TAS |
| **No. of Trial Centres** | : | 10 |
| **State** | **No.** | **Centres** |
| Maharashtra | 7 | Niphad, Pravaranagar, Karad, Pune, Akola, Amaravati, Savalvihir |
| Karnataka | 3 | Ugar, Dharwad, Kalloli |
| No. of Varieties including Checks | : | 9 (6+3) |
| **Contributing Centres** | **No.** | **Entries** |
| Delhi | 2 | HD 3040*, HD 3068 |
| PDKV, Akola | 1 | AKAW 4210-6* |
| PAU, Ludhiana | 1 | PBW 655 |
| IARA, Indore | 1 | HI 1571* |
| Pantnagar | 1 | UP 2792 |
| **Checks** | 3 | NIAW 34, RAJ 4083, HD 2932 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 6.00 × 2.16 m (12 rows)<br>Net : 6.00 × 1.80 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 80:40:20 (N:P:K) |
| Date of sowing | : | December 1-15 |
| Seed Rate (kg/ha) | : | 125 kg |
| Seed Requirement | : | 15 kg per entry |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Peninsular Zone** |
| **Production Condition** | : | RF-TS-TAD |
| **No. of Trial Centres** | : | 8 |
| **State** | **No.** | **Centres** |
| Maharashtra | 4 | Niphad, Pune, Parbhani, Washim, |
| Karnataka | 4 | Dharwad, Annegiri, Bijapur, Bagalkot |
| No. of Varieties including Checks | : | 10 (6+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Karnal | 1 | DDW 19 |
| Pantnagar | 1 | UP 2797 |
| Indore | 1 | HI 8722 |
| ARI, Pune | 1 | MACS 3815 |
| Jabalpur | 1 | MP 3299* |
| Kanpur | 1 | KD 0921 |
| **Checks** | 4 | NI 5439, AKDW 2997-16(d) , MACS 1967 (d), NIAW 1415 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 6.00 × 2.76 m (12 rows)<br>Net : 6.00 × 2.30 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 60:30:15 (N:P:K) |
| Date of sowing | : | October 15-31 |
| Seed rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 11 kg per entry |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Peninsular Zone** |
| **Production Condition** | : | RI-TS-TAD |
| **No. of Trial Centres** | : | 5 |
| **State** | **No.** | **Centres** |
| Maharashtra | 3 | Niphad, Pune, Akola |
| Karnataka | 2 | Dharwad, Bailhongal |
| No. of Varieties including Checks | : | 10 (6+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Karnal | 1 | DDW 19 |
| Pantnagar | 1 | UP 2797 |
| Indore | 1 | HI 8722 |
| ARI, Pune | 1 | MACS 3815 |
| Jabalpur | 1 | MP 3299* |
| Kanpur | 1 | KD 0921 |
| **Checks** | 4 | NI 5439, AKDW 2997-16(d) , MACS 1967 (d), NIAW 1415 (I) |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 6.00 × 2.76 m (12 rows)<br>Net : 6.00 × 2.30 m (10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 60:30:15 (N:P:K) |
| Date of sowing | : | October 15-31 |
| Seed rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 8 kg per entry |

* Final year entry

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## ADVANCE VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Southern Hills Zone** |
| **Production Condition** | : | RI-MF-TS-LS-TAS |
| **No. of Trial Centres** | : | 5 |
| **State** | **No.** | **Centres** |
| Tamilnadu | 4 | Wellington (TS), Wellington (LS), Paiyur, Thalawadi |
| Karnataka | 1 | Mandya |
| No. of Varieties including Checks | : | 6 (4+2) |
| **Contributing Centres** | **No.** | **Entries** |
| Wellington | 2 | HW 5216, HW 5224 |
| IARI, New Delhi | 2 | HD 3072, HD 3075 |
| **Checks** | 2 | HW 2044, CoW (W) 1 |
| Experimental Design | : | R.B.D. |
| Replication | : | Six |
| Plot Size | : | Gross : 6.00 × 1.38 m(6 rows)<br>Net : 6.00 × 0.92 m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 100:60:30 (N:P:K) |
| Date of sowing | : | TS – Nov 15 - Dec 15<br>LS – Dec 25 - Jan 15 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 4 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## INITIAL VARIETAL TRIAL (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Southern Hills Zone** |
| **Production Condition** | : | RI-MF-TS-LS-TAS |
| **No. of Trial Centres** | : | 4 |
| **State** | **No.** | **Centres** |
| Tamilnadu | 3 | Wellington, Paiyur, Thalawadi |
| Karnataka | 1 | Mandya |
| No. of Varieties including Checks | : | 19 (17+2) |
| **Contributing Centres** | **No.** | **Entries** |
| Wellington | 8 | HW 1111, HW 2072, HW 2073, HW 2068, HW 4206, HW 5223, HW 5232, HW 5234 |
| New Delhi | 1 | HD 3103 |
| Pune | 2 | MACS 6471, MACS 6509 |
| Indore | 2 | HI 1586, HI 1587 |
| Dharwad | 2 | UAS 340, UAS 341 |
| Niphad | 1 | NIAW-1788 |
| Shimla | 1 | HS 540 |
| **Checks** | 2 | HW 2044, CoW (W) 1 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 6.00 × 1.38 m (6 rows)<br>Net : 6.00 × 0.92 m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 100:60:30 (N:P:K) |
| Date of sowing | : | TS – Nov 15 - Dec 15<br>LS – Dec 25 - Jan 15 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 3 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## SPECIAL TRIAL (TRITICALE) (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **Northern Hills Zone** |
| **Production Condition** | : | RF-TS |
| **No. of Trial Centres** | : | 4 |
| **State** | **No.** | **Centres** |
| H.P | 3 | Bajaura, Malan, Dhaulakuan |
| Karnataka | 1 | Ranichauri |
| No. of Varieties including Checks | : | 6 (4+2) |
| **Contributing Centres** | **No.** | **Entries** |
| Ludhiana | 4 | TL 2980, TL 2981, TL 2982, TL 2983 |
| **Checks** | 2 | VL 804, TL 2942 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 4.00 × 1.38 m (6 rows)<br>Net : 4.00 × 0.92 m (4 middle rows) |
| Fertilizer Dose (kg/ha) | : | 40:20:0 (N:P:K) |
| Date of sowing | : | October 15-31 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 3 kg per entry |
| Last Date of Seed Receipt | : | September 25 |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## SPECIAL TRIAL (DICOCCUM) (2010-11)

| | | |
|---|---|---|
| **Zone** | : | **All Zones** |
| **Production Condition** | : | IR-TS |
| **No. of Trial Centres** | : | 13 |
| **State** | **No.** | **Centres** |
| Maharashtra | 3 | Pune, Karad, Kothapur |
| Karnataka | 5 | Dharwad, Kalloli, Ugar, Mudhol, Arbhavi |
| Gujarat | 2 | Junagarh, Vijapur |
| Tamil Nadu | 3 | Wellington, Paiyur, Thalawadi |
| No. of Varieties including Checks | : | 9 (5+4) |
| **Contributing Centres** | **No.** | **Entries** |
| Pune | 2 | MACS 2997, MACS 5012 |
| Dharwad | 2 | DDK 1040, DDK 1041 |
| Wellington | 1 | HW 1098 |
| **Checks** | 4 | DDK 1009, MACS 2971, HI 8663(d), MACS 2496 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 6.00 × 2.76 m(12 rows)<br>Net : 6.00 × 2.30 m ( 10 middle rows) |
| Fertilizer Dose (kg/ha) | : | 120:60:40 (N:P:K) |
| Date of sowing | : | November 1-15 |
| Seed Rate (kg/ha) | : | 100 kg |
| Seed Requirement | : | 15 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

## SPECIAL TRIAL (2010-11)
## SALINITY/ALKALINITY TOLERANCE VARIETAL TRIAL

| | | |
|---|---|---|
| **Zone** | : | **All Zones** |
| **Production Condition** | : | IR-TS-TAS |
| **No. of Trial Centres** | : | 10 |
| **State** | **No.** | **Centres** |
| UP | 4 | Dalipnagar, Kanpur, Faizabad, Lucknow |
| Rajasthan | 2 | Vanasthali (Durgapura), Bhilwara |
| Haryana | 3 | Hisar, Bawal, Karnal (CSSRI) |
| Gujarat | 1 | Bharuch |
| No. of Varieties including Checks | : | 10 (7+3) |
| **Contributing Centres** | **No.** | **Entries** |
| Faizabad | 1 | NW 5029 |
| CSSRI, Karnal | 3 | KRL 283, KRL 302, KRL 304 |
| Durgapura | 1 | Raj 4211 |
| Hisar | 1 | WH 1083 |
| DWR, Karnal | 1 | DBW 94 |
| **Checks** | 3 | Kharchia 65, KRL 19, KRL 210 |
| Experimental Design | : | R.B.D. |
| Replication | : | Four |
| Plot Size | : | Gross : 6.00 x 2.76 m (12 rows)<br>Net : 6.00 x 2.30 m (10 middle rows) |
| Fertilizer Dose | : | NPK: 120:60:30 kg/ka (N:P:K) + 10 kg $ZnSO_4$ |
| Date of sowing | : | November 5-20 (or as recommended in each zone) |
| Seed Rate (kg/ha) | : | 125 kg |
| Seed Requirement | : | 15 kg per entry |

***Note: Change in test sites, date of sowing, trial entries etc. will be invalid if not approved by the Project Director***

# Allocation of breeder seed production during *Rabi* 2010-11

The tentative allocation of indent for breeder seed of wheat and barley varieties received from the Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Government of India for the year 2011-12 was discussed and following final allocation of breeder seed production was made to the co-operating centres on the basis of following guidelines.

1. The allocation of breeder seed production for Rabi 2010-11 has been made on priority basis to the coordinating centres where an effective nucleus seed production programme exists.
2. The quantity of breeder seed was allocated considering the quantity of nucleus seed produced by the centre as per their Nucleus Seed Production (BNS-IV) report.
3. With a view to minimize the cost of transportation, the indent allocation was preferred to an institute relatively nearer to the indenting agency.

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| **Production Centre** | **Variety** | **Year of release** | **DAC Indent** | **Breeder seed Allocation** | **Nucleus seed allocation** |
| **ARI, Pune (Maharashtra)** | MACS 2496 | 1991 | 45.00 | 45.00 | 1.50 |
| | HD 2189 | 1980 | 273.30 | 100.00 | 3.00 |
| | MACS 3125 | 2003 | 20.00 | 20.00 | 1.00 |
| | MACS 6145 | 2005 | 2.00 | 2.00 | 1.00 |
| | Lok 1 | 1982 | 1297.80 | 50 | 1.00 |
| | | | | **217.00** | **7.50** |
| **BHU, Varanasi** | HUW 234 | 1986 | 59.00 | 30.00 | 10.00 |
| | HUW 468 | 1999 | 325.00 | 50.00 | 5.00 |
| | HUW 510 | 2001 | 415.00 | 30.00 | 15.00 |
| | | | | **110.00** | **30.00** |
| **CCS HAU, Hisar** | WH 711 | 2002 | 970.40 | 700.40 | 20.00 |
| | WH 147 | 1978 | 234.30 | 54.40 | 2.00 |
| | WH 1021 | 2008 | 147.00 | 37.40 | 2.00 |
| | WH 896 | 1995 | 100.00 | 30.00 | 1.00 |
| | WH 283 | 1985 | 43.80 | 30.00 | 1.00 |
| | RAJ 3765 | 1996 | 1160.60 | 7.20 | 1.00 |
| | WH 542 | 1992 | 103.60 | 28.20 | 1.00 |
| | C 306 | 1969 | 105.60 | 8.20 | 1.00 |
| | WH 1025 | 2010 | 65.20 | 25.60 | 1.00 |
| | WH 1080 | | | | 1.00 |
| | WHD 943 | | | | 1.00 |
| | | | | **921.40** | **32.00** |
| | BH-393 | 2002 | 51.10 | 51.10 | 2.00 |
| | BH-902 | 2010 | 22.60 | 22.60 | 1.00 |
| | | | | **73.70** | **3.00** |
| **CSAUAT, Kanpur** | K 9423 (Unnat Halna) | 2005 | 377.00 | 377.00 | 15.00 |
| | PBW 343 | 1996 | 1170.40 | 201.00 | 5.00 |
| | PBW 443 | 2000 | 215.00 | 50.00 | 2.00 |
| | RAJ 3765 | 1996 | 1160.60 | 50.00 | 2.00 |
| | UP 2425 | 1999 | 370.00 | 100.00 | 3.00 |
| | NW 2036 | 2003 | 316.00 | 75.00 | 3.00 |
| | HD 2643 (Ganga) | 1997 | 320.00 | 230.00 | 10.00 |
| | K 9107 (Deva) | 1996 | 40.00 | 40.00 | 2.00 |

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| | K 8434 (Prasad) | 2001 | 100.00 | 100.00 | 3.00 |
| | K 9162 (Gangotri) | 2001 | 100.00 | 100.00 | 3.00 |
| | K 9351 (Mandakni) | 2006 | 105.00 | 105.00 | 3.00 |
| | K 9465 (Gomati) | 1998 | 100.00 | 100.00 | 3.00 |
| | K 9533 (Naina) | 2006 | 112.00 | 112.00 | 3.00 |
| | PBW 373 | 1997 | 793.20 | 100.00 | 4.00 |
| | PBW 502 | 2004 | 2047.40 | 300.00 | 10.00 |
| | UP 2338 | 1995 | 317.00 | 100.00 | 3.00 |
| | K 7903 (Halana) | 2001 | 125.00 | 100.00 | 3.50 |
| | HD 2733 (VSM) | 2001 | 700.00 | 150.00 | 5.00 |
| | K 0307 (Shatabdi) | 2007 | 234.00 | 200.00 | 7.00 |
| | NW 1014 | 1998 | 202.00 | 52.00 | 2.00 |
| | RAJ 3077 | 1989 | 396.40 | 20.00 | 1.00 |
| | UP 2382 | 1999 | 274.00 | 24.00 | 1.00 |
| | HD 2824 (Poorva) | 2004 | 122.00 | 10.00 | 1.00 |
| | HUW 234 | 1986 | 59.00 | 29.00 | 2.00 |
| | CBW 38 | 2009 | 359.20 | 150.00 | 7.00 |
| | DBW 17 | 2006 | 445.40 | 25.00 | 0.00 |
| | RAJ 4120 | 2009 | 115.00 | 5.00 | 1.00 |
| | | | | **2905.00** | **104.50** |
| | K 409 (Priti) | 2001 | 61.00 | 61.00 | 2.00 |
| | K 1149 (Gitanjali) | 1997 | 50.00 | 50.00 | 2.00 |
| | K 508 (Pragati) | 1998 | 40.00 | 40.00 | 1.50 |
| | K 551 (Ritambhra) | 1998 | 10.00 | 10.00 | 0.50 |
| | Jagriti | 1985 | 4.00 | 4.00 | 0.10 |
| | | | | **165.00** | **6.10** |
| **CSSRI, Karnal** | KRL 19 | 2000 | 100.00 | 30.00 | 4.00 |
| | | | | 30.00 | 4.00 |
| **Dr. PDKV, Akola (Maharashtra)** | AKAW 3722 (Vimal) | 2005 | 20.00 | 20.00 | 1.00 |
| | | | | | |
| | | | 20.00 | 20.00 | |
| **DSR, Kushmaur, Mau.** | HD 2733 (VSM) | 2001 | 700.00 | 65.00 | 4.00 |
| | | | | | |
| | | | 0.00 | 65.00 | 4.00 |
| **DWR, Karnal** | DBW 17 | 2006 | 445.40 | 230.00 | 10.00 |
| | DBW 16 | 2006 | 66.00 | 22.00 | 2.00 |
| | DBW 14 | 2002 | 3.00 | 3.00 | 1.00 |
| | CBW 38 | 2009 | 359.20 | 75.00 | 3.00 |
| | DBW 50 | | | | 1.00 |
| | DWR 73 (Barley) | | | | 1.00 |
| | | | | 330.00 | 17.00 |
| **GBPUAT, Pantnagar** | PBW 502 | 2004 | 2047.40 | 310.00 | 10.00 |
| | WH 711 | 2002 | 970.40 | 200.00 | 5.00 |
| | PBW 373 | 1997 | 793.20 | 246.60 | 5.00 |
| | DBW 17 | 2006 | 445.40 | 50.00 | 5.00 |
| | UP 2338 | 1995 | 317.00 | 128.20 | 3.00 |
| | RAJ 3765 | 1996 | 1160.60 | 150.00 | 5.00 |
| | PBW 343 | 1996 | 1170.40 | 40.00 | 1.00 |
| | UP 2382 | 1999 | 274.00 | 100.00 | 4.00 |
| | HD 2687 (Shresth) | 1999 | 260.00 | 110.00 | 3.00 |

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| | UP 2628 | 2010 | 10.00 | 10.00 | 1.00 |
| | UP 262 | 1978 | 53.60 | 28.60 | 1.00 |
| | DBW 16 | 2006 | 66.00 | 40.00 | 2.00 |
| | UP 2425 | 1999 | 370.00 | 115.00 | 3.00 |
| | UP 2572 | 2007 | 49.60 | 49.60 | 2.00 |
| | WH 542 | 1992 | 103.60 | 25.40 | 1.00 |
| | PBW 550 | 2008 | 1430.80 | 270.00 | 9.00 |
| | Sonalika | 1969 | 51.30 | 51.30 | 2.00 |
| | PBW 154 | 1988 | 52.80 | 22.80 | 1.00 |
| | UP 2554 | 2007 | 17.00 | 17.00 | 1.00 |
| | UP 2526 | 2007 | 68.00 | 68.00 | 2.00 |
| | UP 2565 | 2006 | 29.00 | 29.00 | 1.00 |
| | PBW 226 | 1989 | 48.20 | 10.00 | 1.00 |
| | HD 2932 (Pusa Wheat 111) | 2008 | 350.00 | 5.00 | 2.00 |
| | WH 1021 | 2008 | 147.00 | 79.60 | 2.00 |
| | UPB 1008 (Barley) | | | | 1.00 |
| | | | | **2156.10** | **73.00** |
| **HPKVV, Palampur (HP)** | HPW 147 (Palam) | 2004 | 10.00 | 10.00 | 0.30 |
| | HPW 155 (Onkar) | 2006 | 5.00 | 5.00 | 0.20 |
| | HPW 184 (Chandrika) | 2005 | 10.00 | 10.00 | 0.30 |
| | HPW 251 | 2008 | 10.00 | 10.00 | 0.10 |
| | HPW 89 (Surbhi) | 1998 | 5.00 | 5.00 | 0.20 |
| | HPW 42 (Aradhana) | 1992 | 2.00 | 2.00 | 0.10 |
| | SKW 196 (Shalimar Wheat) | 2005 | 10.00 | 10.00 | 0.30 |
| | | | | **52.00** | **1.50** |
| | HBL 316 (Gopi) | 1995 | 0.75 | 0.75 | 0.10 |
| | Sonu (HBL 87) | 1982 | 0.35 | 0.35 | 0.10 |
| | Dolma | 1982 | 0.10 | 0.10 | 0.10 |
| | | | | **1.20** | **0.30** |
| **Wheat Research Station, IARI, Indore** | HI 8498 (Malav Shakti) | 1999 | 333.00 | 225.00 | 8.00 |
| | HW 2004 (Amar) | 1997 | 352.00 | 352.00 | 12.00 |
| | HI 1500 (Amrita) | 2003 | 102.00 | 102.00 | 4.00 |
| | HI 1418 | 2000 | 80.00 | 80.00 | 3.00 |
| | HD 4672 (Malav Ratna) | 2000 | 110.00 | 100.00 | 4.00 |
| | DL 788-2 (Vidisha) | 1997 | 25.00 | 15.00 | 0.50 |
| | HI 1544 | 2008 | 207.00 | 107.00 | 4.00 |
| | HI 8627 (Malav Kirti) | 2007 | 24.00 | 24.00 | 1.00 |
| | HD 2932 (Pusa Wheat 111) | 2008 | 350.00 | 100.00 | 4.00 |
| | HI 1479 (Swarna) | 2003 | 150.00 | 150.00 | 5.00 |
| | HI 1531 (Harshita) | 2006 | 110.00 | 110.00 | 4.00 |
| | HI 1563 | | | | 1.00 |
| | HI 8663 (Posan) | 2008 | 20.00 | 20.00 | 2.00 |
| | | | | **1385.00** | **52.50** |
| **IARI, Karnal** | HD 2733 (VSM) | 2001 | 700.00 | 158.20 | 8.00 |
| | HD 2851 (Pusa Vishesh) | 2005 | 229.60 | 200.00 | 7.00 |
| | HD 2329 | 1985 | 121.40 | 50.00 | 2.00 |
| | HD 2687 (Shresth) | 1999 | 260.00 | 50.00 | 3.00 |
| | HD 2894 (Pusa Wheat109) | 2008 | 776.20 | 250.00 | 8.00 |

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| | HD 2285 (Gobind) | 1984 | 19.20 | 19.20 | 1.00 |
| | Pusa Gold (WR 544) | 2005 | 124.00 | 74.00 | 3.00 |
| | HD 2932 (Pusa Wheat 111) | 2008 | 350.00 | 60.00 | 3.00 |
| | HS 277 | 1992 | 5.00 | 5.00 | 0.10 |
| | HS 295 | 1992 | 45.00 | 45.00 | 2.00 |
| | HS 365 | 1998 | 22.00 | 22.00 | 1.00 |
| | HS 240 | 1989 | 10.00 | 10.00 | 0.50 |
| | HS 507 | | | | 1.00 |
| | HD 420 (Shivalik) | 2003 | 5.00 | 5.00 | 0.50 |
| | DL 153-2 (Kundan) | 1985 | 5.00 | 5.00 | 0.20 |
| | | | | **953.40** | **40.30** |
| **IARI, New Delhi** | HD 2894 (Pusa Wheat 109) | 2008 | 776.20 | 75.00 | 4.00 |
| | HD 2932 (Pusa Wheat 111) | 2008 | 350.00 | 120.00 | 5.00 |
| | HD 2733 (VSM) | 2001 | 700.00 | 50.00 | 4.00 |
| | DL 788-2 (Vidisha) | | 25.00 | 5.00 | 1.00 |
| | HD 2687 (Shresth) | 1999 | 260.00 | 50.00 | 2.00 |
| | HD 4713 | 2008 | 5.00 | 5.00 | 1.00 |
| | Pusa Gold (WR 544) | 2005 | 124.00 | 50.00 | 2.00 |
| | HD 2851 (Pusa Vishesh) | 2005 | 229.60 | 29.60 | 2.00 |
| | HD 2329 | 1985 | 121.40 | 15.00 | 1.00 |
| | | | | **399.60** | **22.00** |
| **IARI, Pusa** | HD 2733 (VSM) | 2001 | 700.00 | 251.80 | 10.00 |
| | HD 2824 (Poorva) | 2004 | 122.00 | 112.00 | 5.00 |
| | HD 2888 (Pusa Wheat 107) | 2006 | 29.00 | 22.00 | 1.00 |
| | HW 2045 (Kaushambi) | 2002 | 16.00 | 16.00 | 1.00 |
| | HP 1633 (Sonali) | 1992 | 7.00 | 7.00 | 0.50 |
| | HP 1731 (Raj Laxmi) | 1995 | 6.00 | 6.00 | 0.50 |
| | | | | **414.80** | **18.00** |
| **IARI, Wellington** | HD 2833 (Pusa Wheat 105) | 2006 | 35.00 | 5.00 | 0.50 |
| | | | | **5.00** | **0.50** |
| **IGKVV, Raipur** | HI 617 (Sujata) | 1982 | 95.00 | 90.00 | 3.00 |
| | GW 273 | 1998 | 1247.00 | 50.00 | 2.00 |
| | | | | **140.00** | **5.00** |
| **JNKVV, Jabalpur** | GW 322 | 2002 | 1124.00 | 725.00 | 20.00 |
| | GW 273 | 1998 | 1247.00 | 618.00 | 20.00 |
| | Lok 1 | 1982 | 1297.80 | 100.00 | 4.00 |
| | MP (JW) 3173 | 2009 | 300.00 | 300.00 | 10.00 |
| | WH 147 | 1978 | 234.30 | 57.60 | 2.00 |
| | C 306 | 1969 | 105.60 | 42.00 | 2.00 |
| | JW 3020 | 2005 | 279.00 | 279.00 | 10.00 |
| | JW/MP 1142 (Snehil) | 2007 | 285.00 | 285.00 | 10.00 |
| | HD 2864 (Urja) | 2005 | 428.20 | 200.00 | 8.00 |
| | JWS 17 (Swapnil) | 1997 | 61.00 | 61.00 | 2.00 |
| | MPO/JW 1106 (Sudha) | 2003 | 242.00 | 244.00 | 8.00 |
| | MP 1203 | 2009 | 255.00 | 255.00 | 10.00 |
| | MP 3288 | | | | 1.00 |
| | GW 366 | 2007 | 656.20 | 447.00 | 15.00 |

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| | | | | **3615.60** | **122.10** |
| | JB 110 (Jawahar Barley-1) | 2010 | 2.00 | 2.00 | 0.10 |
| | | | | **2.00** | **0.10** |
| **Lok Bharti, Sanasora, Bhavnagar (Guj)** | Lok 1 | 1982 | 1297.80 | 550.00 | 20.00 |
| | | | | **550.00** | **20.00** |
| **ARS, MPKV, Niphad** | HD 2189 | 1980 | 273.30 | 100.00 | 3.00 |
| | NIAW 301 (Trimbak) | 2002 | 30.00 | 30.00 | 1.00 |
| | NIAW 917 (Tapovan) | 1973 | 20.00 | 20.00 | 0.75 |
| | NIAW 1415 | | | | 1.00 |
| | NIDW 15 (Panchwati) | 2005 | 15.00 | 15.00 | 0.50 |
| | NIDW 295 (Godavari) | 2007 | 5.00 | 5.00 | 0.20 |
| | | | | **170.00** | **6.45** |
| **MAF, MPUA&T, Ummedganj, Kota.** | Lok 1 | 1982 | 1297.80 | 365.00 | 10.00 |
| | RAJ 3777 | 2006 | 475.40 | 300.00 | 10.00 |
| | RAJ 4037 | 2004 | 780.80 | 360.00 | 12.00 |
| | RAJ 3765 | 1996 | 1160.60 | 482.40 | 15.00 |
| | RAJ 1482 | 1983 | 243.80 | 174.60 | 5.00 |
| | RAJ 3077 | 1989 | 396.40 | 178.20 | 5.00 |
| | WH 147 | 1978 | 234.30 | 122.30 | 5.00 |
| | PBW 343 | 1996 | 1170.40 | 393.00 | 5.00 |
| | GW 496 | 1969 | 530.00 | 30.00 | 2.00 |
| | C 306 | 1998 | 105.60 | 55.40 | 3.00 |
| | GW 273 | 1998 | 1247.00 | 190.00 | 8.00 |
| | UP 2338 | 1995 | 317.00 | 88.80 | 3.00 |
| | GW 322 | 2002 | 1124.00 | 54.00 | 3.00 |
| | HI 617 (Sujata) | 1982 | 95.00 | 5.00 | 1.00 |
| | GW 173 | 1994 | 94.00 | 20.00 | 1.00 |
| | HI 8498 (Malav Shakti) | 1999 | 333.00 | 108.00 | 4.00 |
| | PBW 502 | 2004 | 2047.40 | 293.00 | 10.00 |
| | RAJ 4120 | 2009 | 115.00 | 30.00 | 1.00 |
| | HD 4672 (Malav Ratna) | 2000 | 110.00 | 10.00 | 1.00 |
| | HI 1544 | 2008 | 207.00 | 100.00 | 4.00 |
| | | | | **3359.70** | **108.00** |
| **NDUA&T, Kumarganj, Faizabad** | NW 2036 | 2003 | 316.00 | 68.00 | 3.00 |
| | PBW 502 | 2004 | 2047.40 | 100.00 | 3.00 |
| | NW 1012 | 1998 | 254.00 | 254.00 | 10.00 |
| | NW 1014 | 1998 | 202.00 | 50.00 | 10.00 |
| | PBW 443 | 2000 | 215.00 | 50.00 | 2.00 |
| | PBW 154 | 1988 | 52.80 | 30.00 | 1.00 |
| | PBW 373 | 1997 | 793.20 | 50.00 | 3.00 |
| | HD 2329 | 1985 | 121.40 | 56.40 | 2.00 |
| | K 7903 (Halana) | 2001 | 125.00 | 25.00 | 1.00 |
| | UP 2382 | 1999 | 274.00 | 50.00 | 2.00 |
| | UP 2425 | 1999 | 370.00 | 100.00 | 3.00 |
| | UP 262 | 1978 | 53.60 | 25.00 | 1.00 |
| | K 0307 (Shatabdi) | 2007 | 234.00 | 34.00 | 2.00 |
| | NW 1067 | 2005 | 5.00 | 5.00 | 1.00 |
| | CBW 38 | 2009 | 359.20 | 50.00 | 3.00 |
| | DBW 17 | 2006 | 445.40 | 25.00 | 1.00 |
| | PBW 550 | 2008 | 1430.80 | 59.20 | 2.00 |

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| | | | | **1031.60** | **50.00** |
| | NDB 209 (N.Barley -1) | 2001 | 50.00 | 50.00 | 2.00 |
| | NDB 940 (N.Barley -2) | 2001 | 91.00 | 91.00 | 3.00 |
| | NDB 1020 (N.Barley -3) | 2002 | 50.00 | 50.00 | 2.00 |
| | | | | **211.00** | **8.00** |
| **PAU, Ludhiana** | PBW 502 | 2004 | 2047.40 | 964.40 | 30.00 |
| | PBW 550 | 2008 | 1430.80 | 1071.60 | 35.00 |
| | PBW 343 | 1996 | 1170.40 | 536.40 | 15.00 |
| | PBW 373 | 1997 | 793.20 | 294.60 | 10.00 |
| | PBW 509 | 2005 | 479.40 | 473.40 | 15.00 |
| | PBW 396 | 2000 | 281.00 | 281.00 | 10.00 |
| | PBW 443 | 2000 | 215.00 | 115.00 | 4.00 |
| | DBW 17 | 2006 | 445.40 | 100.40 | 10.00 |
| | PBW 533 | 2006 | 87.00 | 87.00 | 3.00 |
| | WH 542 | 1992 | 103.60 | 50.00 | 2.00 |
| | PBW 226 | 1989 | 48.20 | 38.20 | 2.00 |
| | PBW 299 | 1993 | 10.40 | 10.40 | 1.00 |
| | PBW 527 | 2003 | 10.80 | 10.80 | 1.00 |
| | PBW 590 | 2009 | 277.00 | 105.00 | 3.50 |
| | PBW 596 | 2009 | 49.80 | 49.80 | 2.00 |
| | PBW 175 | 1989 | 10.40 | 10.40 | 1.00 |
| | PBW 621 | | | | 1.00 |
| | PDW 291 | 2005 | 7.40 | 7.40 | 1.00 |
| | PDW 274 | 2003 | 1.20 | 1.20 | 1.00 |
| | PDW 315 | | | | 1.00 |
| | | | | **4207.00** | **148.50** |
| | PL 426 | 1996 | 122.30 | 122.30 | 5.00 |
| | PL 751 | 2007 | 10.90 | 10.90 | 1.00 |
| | | | | **133.20** | **6.00** |
| **RAU, Bikaner** | RAJ 4037 | 2004 | 780.80 | 420.80 | 15.00 |
| | RAJ 6560 | 2005 | 110.00 | 110.00 | 5.00 |
| | PBW 502 | 2004 | 2047.40 | 5.00 | 2.00 |
| | RAJ 3777 | 2006 | 475.40 | 175.40 | 5.00 |
| | RAJ 3765 | 1996 | 1160.60 | 406.00 | 15.00 |
| | RAJ 1482 | 1983 | 243.80 | 69.20 | 4.00 |
| | RAJ 4083 | 2007 | 50.00 | 50.00 | 3.00 |
| | DBW 16 | 2006 | 66.00 | 4.00 | 1.00 |
| | PBW 590 | 2009 | 277.00 | 10.00 | 1.00 |
| | RAJ 4120 | 2009 | 115.00 | 30.00 | 1.00 |
| | WH 1021 | 2008 | 147.00 | 30.00 | 1.00 |
| | RAJ 3077 | 1989 | 396.40 | 198.20 | 10.00 |
| | | | | **1508.60** | **63.00** |
| | RD 2035 | 1994 | 357.50 | 357.50 | 10.00 |
| | RD 2552 | 2000 | 315.30 | 315.30 | 10.00 |
| | RD 2592 | 2004 | 150.00 | 150.00 | 5.00 |
| | RD 2668 | 2007 | 86.20 | 86.20 | 3.00 |
| | RD 2660 | 2006 | 86.00 | 86.00 | 3.00 |
| | RD 2052 | 1991 | 95.60 | 95.60 | 3.00 |
| | RD 2715 | 2009 | 25.00 | 25.00 | 2.00 |
| | RD 2624 | 2005 | 60.00 | 60.00 | 3.00 |

| 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|
| | RD 2503 | 1997 | 5.00 | 5.00 | 1.00 |
| | RD 2508 | 1997 | 5.00 | 5.00 | 1.00 |
| | | | | **1185.60** | **41.00** |
| **SDAU, Vijapur, Distt. Mehasana (Gujrat).** | GW 496 | 1990 | 530.00 | 300.00 | 10.00 |
| | GW 273 | 1998 | 1247.00 | 389.00 | 13.00 |
| | GW 366 | 2007 | 656.20 | 209.20 | 15.00 |
| | GW 173 | 1994 | 94.00 | 14.00 | 1.00 |
| | Lok 1 | 1982 | 1297.80 | 82.80 | 1.00 |
| | GW 322 | 2002 | 1124.00 | 345.00 | 10.00 |
| | | | | **1440.00** | **50.00** |
| **SFCI, Farm Bhavan, N. Delhi-19** | HUW 510 | 2001 | 415.00 | 385.00 | |
| | VL 804 | 2002 | 38.00 | 38.00 | |
| | HUW 468 | 1999 | 325.00 | 275.00 | |
| | VL 616 | 1986 | 40.00 | 40.00 | |
| | MP 4010 | 2003 | 102.00 | 102.00 | |
| | PBW 590 | 2009 | 277.00 | 162.00 | |
| | PBW 373 | 1997 | 793.20 | 90.00 | |
| | NW 2036 | 2003 | 316.00 | 173.00 | |
| | | | | **1265.00** | |
| **SKUA&T, Chatha (Jammu)** | PBW 550 | 2008 | 1430.80 | 30.00 | 3.00 |
| | PBW 502 | 2004 | 2047.40 | 25.00 | 2.00 |
| | PBW 396 | 2000 | 281.00 | 1.00 | 1.00 |
| | PBW 373 | 1997 | 793.20 | 12.00 | 2.00 |
| | PBW 509 | 2005 | 479.40 | 6.00 | 1.00 |
| | RAJ 3765 | 1996 | 1160.60 | 15.00 | 2.00 |
| | DBW 17 | 2006 | 445.40 | 15.00 | 5.00 |
| | | | | **104.00** | **16.00** |
| **SVPUA&T, Meerut** | RAJ 3765 | 1996 | 1160.60 | 50.00 | 2.00 |
| | WH 711 | 2002 | 970.40 | 70.00 | 3.00 |
| | PBW 373 | 1997 | 793.20 | 50.00 | 2.00 |
| | PBW 502 | 2004 | 2047.40 | 50.00 | 2.00 |
| | | | | **220.00** | **9.00** |
| **UAS, Dharwad** | DWR 162 | 1993 | 79.50 | 79.50 | 3.00 |
| | DWR 195 | 1995 | 11.00 | 11.00 | 1.00 |
| | DDK 1025 | 2006 | 2.00 | 2.00 | 0.50 |
| | DDK 1029 | 2007 | 5.00 | 5.00 | 0.50 |
| | Lok 1 | 1982 | 1297.80 | 150.00 | 5.00 |
| | DWR 1006 | 2007 | 2.00 | 2.00 | 0.50 |
| | HD 2189 | | 273.30 | 73.30 | 2.00 |
| | | | | **322.80** | **12.50** |
| **VPKAS, Almora (Uttranchal)** | VL 802 | 2005 | 35.00 | 35.00 | 1.50 |
| | VL 892 | 2008 | 27.00 | 27.00 | 1.00 |
| | VL 738 | 1997 | 45.00 | 45.00 | 2.00 |
| | VL 829 | 2003 | 45.00 | 45.00 | 2.00 |
| | | | | **152.00** | **6.50** |
| | VL 56 | 2005 | 6.00 | 6.00 | 0.20 |
| | | | | **6.00** | **0.20** |
| **Grand Total** | | | **29691.60** | **27605.60** | **999.85** |
| | | | **1777.70** | **1775.70** | **66.60** |

Partial breeder seed production of wheat varieties CBW 38, DL 788-2 (Vidisha), GW 173, HD 2643 (Ganga), HD 2687 (Shresth), HD 2733 (VSM), HD 2833 (Pusa Wheat 105), HD 2864 (Urja), HD 2888 (Pusa Wheat 107), HD 2894 (Pusa Wheat 109), HD 2932 (Pusa Wheat 111), KRL 19, NW 1014, RAJ 4120, UP 2382, UP 2425, WH 1025, WH 283 and WH 896 was allocated due to insufficient nucleus seed availability.

# Wheat Physiology Programme

## 1. Multilocation Heat Tolerance Trial

***There will be two sets of trials, one will be repeat of 2009-10 trial for confirmation of results and other has been constituted afresh.***

**Centres :** Hisar, Karnal, Sagar, Kanpur, Niphad, Faizabad, Ludhiana, Pantnagar and Indore

**Genotypes :** To be selected from final year entries of AVT

**Replications:** 2

**Conditions:** Two (timely and late sown)

**Design:** Lattice

**Time of Sowing:** Timely (mid Nov.) and Late (mid Dec.)

**Plot Size :** 6 rows with row length of 3m spaced 30cm apart

**Observation to be recorded**

1. Germination (%)
2. Days to heading
3. Days to anthesis
4. Days to maturity
5. Plant height (cm)
6. Biomass/$m^2$
7. Productive tillers/metre
8. Test weight (g)
9. Grain number per spike
10. Grain weight per spike
11. Grain yield/$m^2$

**Physiological parameters to be recorded (Emphasis to be given for these traits)**

i) CTD
ii) Chlorophyll flouresence
iii) Chlorophyll content

## 2. Drought and Heat Tolerance Screening Nursery (DHTSN)

Centres: Akola, Bardoli, Dharwad, Hisar, Indore, Kanpur, Karnal, Kota, Pune, Ranchi, Cooch Behar and Sagar

Replications 2

Conditions 2 (drought & irrigated)

No. of rows: 2

Row length: 2m

Spacing: 30cm

**Observations to be recorded :**

**Main observations**

1. Germination (%)
2. Days to heading
3. Days to maturity
4. Plant height
5. Productive tillers/metre
6. Test weight (g)
7. Grain wt/plot
8. Chlorophyll content
9. CTD

**Additional observations may be recorded**

1. Soil moisture content at sowing, heading and maturity
2. Excised leaf water loss at 15 days after heading

# Research Planning Meeting
# Crop Protection

**August 27, 2010**

**Chairman : Dr. AK Sharma**
**Co-Chairman : Dr. M Prashar**
**Rapporteurs : Drs. MS Saharan & MC Jat**

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At the outset, Chairman Dr. AK Sharma extended welcome to all the participants for joining important session for formulating the programme of work (2010-11). Dr. Sharma appreciated the co-operators for executing the programme of work (2009-10) successfully. Dr. AK Sharma conveyed his pleasure on the good comments made by Dr. S. N. Shukla, former ADG (FFC) and Dr. SS Singh, Project Director, DWR, Karnal about significant contribution of crop protection scientists in wheat record production in 2009-10 in the first session in the morning. Dr. Sharma told that as now yield gain is low so our responsibility is more than earlier. Dr. Sharma also appreciated the full support of Project Director, DWR for executing the programme in 2009-10 successfully. He also emphasized for putting more efforts in creation of artificial epiphytotics of diseases and insect pest so that there should not be any escape.

The programme for the crop season 2010 –11 was discussed and the needful changes in the programme were made to make it more effective. Chairman emphasized the importance of host resistance in wheat improvement in India. Following decisions were taken to revise the technical programme for 2010-11 crop season. The experiments on Adult Plant Resistance (APR) for rusts and other diseases (IPPSN, PPSN, EPPSN) will be continued. APR (race specific), slow rusting and postulation of rust resistance genes will be continued. For APR (race specific), the group felt the use of following yellow, leaf and stem rusts pathotypes for evaluation.

**Leaf rust:** 77-5 and 104-2
**Yellow rust:** 46S119 and 78S84 **Stem rust:** 40A, 117-6
Discussion was held for use of rust pathotypes for screening of IPPSN, PPSN nurseries at all co-operating centres. It was suggested that DWR Regional Station, Flowerdale (Shimla) and Mahabaleshwar centres will provide the same pathotypes during 2010-11 crop season to all co-operating centres. It was decided to include the following pathotypes in the inoculum supplied for evaluation of IPPSN and PPSN nurseries.
**Leaf rust:** 77-2, 77-5, 12-2 and 104-2
**Yellow rust:** 46S119 and 78S84
**Stem rust:** 11, 40A, 42, 122 and 117-6

For proper screening for stripe rust in IPPSN and PPSN nurseries, Chairman suggested to include PBW 343 in the infectors due to its susceptiblity to new stripe rust pathotype, 78S84.

Identification of slow rusters in AVT lines based on Area Under Disease Progress Curve (AUDPC) will continue for yellow, stem and leaf rusts. For leaf blight screening, it was emphasized that the recording should be made in double-digit scale at three growth stages, *viz.* Flowering, dough and hard dough stages. The trial for monitoring and management of seedling rot problem in early sown wheat crop concluded as studies have already been taken for two years at Karnal, Ludhiana and Pantnagar in NWPZ. This experiment will continue for second year in NEPZ at Varanasi, Faizabad, Pusa and Coochbehar. Disease screening nurseries for leaf blight, Karnal bunt, loose smut, powdery mildew, head scab, flag smut, foot rot and hill bunt will be continued. Basic studies on loose smut will be conducted at Karnal, Hisar and Ludhiana centres.

Dr Sharma emphasized the importance of crop health monitoring and dissemination of information on crop health through Wheat Crop Health Newsletter. Experiment on assessment of losses due to powdery mildew disease was concluded as this experiment has already been conducted successfully for two years at multilocations. Earlier chemical control of rusts was not felt necessary but now due to susceptibility of PBW 343 to stripe rust, the group felt the need of management of wheat rusts through chemical fungicides as a contigent plan. Thus, experiments on chemical management of yellow rust (4 centres in NWPZ-Karnal, Ludhiana, Bajaura, Pantnagar) and stem rust (3 centres in PZ-Mahabaleshwar, Niphad, Dharwad) will be conducted this year also. It was decided to conduct the experiment on biological control of leaf blight at Karnal, Faizabad, Varanasi and Coochbehar centres in 2010-11 crop season.

Dr JB Singh raised the issue of increasing IARI Quota in IPPSN. Dr Sharma informed that IARI should adjust number of entries within its centres. Dr. UD Singh suggested for undertaking studies on virulence of leaf blight isolates isolated presently and 10 years earlier.

Dr CD Mayee, Chairman, ASRB, New Delhi also joined the session. Dr Sharma apprised the crop protection programme in brief. Dr Mayee appreciated the wheat pathologists work on rusts, Karnal bunt etc. Dr Mayee emphasized that crop protection scientists should keep pace with new tools of biotechnology to harness the benefits in shorter time. He congratulated the group for their significant contribution to national food security.

Teams of plant protection scientists were constituted for effective monitoring of crop health with special focus on rusts (Yellow, leaf and stem rust) as well as rusts data recording in PPSN at various centres in NWPZ. All the centres associated with the crop protection programme will supply the information on crop health to the PI (CP), fortnightly during the crop season for compiling Wheat Crop Health Newsletter.

In view of the zero tillage spreading on a large scale, the pest situation will be monitored at Karnal, Pantnagar, Coochbehar, Kanpur and Faizabad. Other experiments on IPM will continue with need based changes in treatments.
Programme of work for Entomology and Nematology for the coming 2010-11-crop season was also finalized.

The following changes were made in Entomology Programme for crop season 2010-2011. For controlling the termites through seed treatment, a new trial was added (Pilot trial) at three centres *viz.*, Ludhiana, Durgapura and Vijapur only. The dosages of Acetamipride 20 SP was decreased from 50 g a .i./ ha to 20 g a.i./ha in the experiment of chemical control of foliage feeding aphids. For basic studies for development of IPM, two insects (Thrips & H*elicoverpa armigera*) were also added at Pantnagar centre. For screening against stored grain pests, Ludhiana centre was deleted.

# PROGRAMME OF WORK 2010-11

The programme for the crop year 2010-11 was chalked out in the 49th All India Wheat and Barley Research Workers Meet held PAU, Ludhiana during August, 27-30, 2010. The various activities to be executed at respective centres are given below:

## PROGRAMME 1: HOST RESISTANCE: IPPSN AND PPSN

### Adult Plant Resistance for rusts & other diseases

**i. Initial Plant Pathological Screening Nursery (IPPSN)**

**Objectives**

To evaluate breeding materials generated at various centres against rusts and foliar blights for promoting to coordinated multi-location trials. (Under artificial inoculated conditions)

**(a) Rusts:**

**North:**

**Leaf Rust:** Delhi, Hisar, Karnal, Durgapura, Ludhiana (5)

**Yellow Rust:** Gurdaspur, Dhaulakuan, Malan, Karnal, Durgapura, Ludhiana (6)

**South:** No. of Centres, 5

**Stem Rust + Leaf Rust:** Mahabaleshwar, Wellington, Powarkheda, Niphad and Indore

**(b) Leaf Blight:** No. of centres: 6

Faizabad, Pusa (Bihar), Varanasi, Kalyani, Ranchi and Coochbehar

**ii. Plant Pathological Screening Nursery (PPSN)**

**Objectives**

Promotion of entries from one stage to the other in the coordinated trials and identification of varieties after AVT level on the basis of their level of disease resistance.

**Rusts:**

**North:**

**Yellow Rust:** Dhaulakuan, Gurdaspur, Malan, Bajaura, Karnal, Ludhiana, Pantnagar, Durgapura (8)

**Leaf Rust :** Delhi, Hisar, Jammu, Kanpur , Karnal, Ludhiana, Pantnagar, Durgapura (8)

**South:** No. of Centres, 9

**Leaf and Stem Rusts:** Wellington, Mahabaleshwar, Niphad, Vijapur, Pune, Junagarh, Powarkheda, Dharwad and Indore

Note: The samples of leaves of AVT IInd year entries in PPSN showing rust severity of 40S or more at any of the centres, should be sent immediately to R.S. Flowerdale, Shimla for pathotype analysis, with information to P.I. (Crop Protection).

**Monitoring of PPSN**

A team of Plant Pathologists was constituted during the work-planning meeting for effective monitoring and data recording in PPSN at various locations in NWPZ. The team consists of Dr. M. S. Saharan (DWR, Karnal), Dr. Rashmi Aggarwal (IARI, New Delhi), Dr. M. K. Pandey (SKUAST-Jammu). The team will visit the centres in NWPZ during the middle of March, 2010. The visit will be coordinated by P.I. (Crop Protection)

**iii AUDPC based identification of slow rusters in AVT material:**

Leaf and yellow rusts - DWR, Karnal; stem and leaf rusts – Mahabaleshwar; stem rust - Indore; Yellow rust – Ludhiana.

## PROGRAMME 2: RUSTS (BROWN, YELLOW AND BLACK)

**A. APR : Race specific and slow rusting**

i. Leaf rust : New Delhi (Dr. U. D. Singh and J. B. Sharma) and Ludhiana (Dr. Indu Sharma) under field conditions and Flowerdale (under controlled conditions); AVT entries of NWPZ, NHZ and NEPZ, alongwith the check entries of the respective zones.

ii. Stem rust : Indore, Pune, Powarkheda and Mahabaleshwar; AVT of CZ and PZ, along with the check varieties of the respective zone.

iii. Yellow rust: Ludhiana (Dr. Indu Sharma), N. Delhi (Dr. U.D. Singh) and Karnal (DWR) under field conditions and Flowerdale (under controlled condition), AVT entries of NWPZ and NHZ alongwith the checks of the respective zones.

Race inoculum to be supplied by Flowerdale with intimation to the P.I. (Crop Protection). Races should be the same for all the respective centres.

(i) Leaf rust: 77-5 and 104-2
(ii) Yellow rust: 46S119 and 78S84
(iii) Stem rust: 40A and 117-6

**B. Seedling Resistance Tests and postulation of Rust Resistance Genes**

i. Leaf, Stem and Yellow rusts (All races): DWR, Regional Station, Flowerdale, Shimla for AVT's (aestivum) entries. Flowerdale centre to generate data on rust resistance genes of all the AVT entries. Besides, this, identification of Rust Resistance genes to be done in selected entries of MDSN, MPSN and EPPSN.

ii. Stem and Leaf rusts : Mahabaleshwar for SRT on AVT entries of CZ, PZ and NIVT, durum entries.

## PROGRAMME 3 : LEAF BLIGHT

i. **Leaf Blight Screening Nursery (LBSN):** No. of Centres : 16
This nursery will consist of earlier identified resistant materials as well as the AVT's and special trials.

**NWPZ:** Pantnagar, Ludhiana, Karnal, Kaul and Hisar.
**NEPZ:** Varanasi, Faizabad, IARI Pusa, Coochbehar, Shillongani, Ranchi and Kalyani.
**PZ:** Dharwad
**NHZ:** Almora
**SHZ:** Wellington

ii. **Monitoring of seedling mortality due to seed and soilborne diseases in early sown crop of wheat and its management using seed treatment:** The seedborne and soil borne infection of *B. sorokiniana* and other pathogens will be monitored in early sown crop and managed using seed treatment.
**NEPZ:** Varanasi, Faizabad, Pusa and Coochbehar

iii. **Basic studies on foliar blights:** These will be undertaken at Karnal, Faizabad, Varanasi and Delhi.

iv. **Biological control of leaf blight :** Formulations will be provided by Dr. Rashmi Aggarwal, IARI, New Delhi
**Centres:** Karnal, Coochbehar, Varanasi, Faizabad

## PROGRAMME 4: KARNAL BUNT

i. **Karnal Bunt Screening Nursery (KBSN):** This nursery will consist of the earlier identified resistant materials and the AVT-II year entries of 2010-2011. These evaluations will be done under artificially inoculated conditions.

No. of Centres, 7
Dhaulakuan, Ludhiana, Delhi, Pantnagar, Hisar, Karnal and Jammu.
Karnal will also evaluate AVT-Ist year entries. Ludhiana and DhaulaKuan will evaluate AVT-I and NIVT entries also.

ii. **Basic studies in Karnal bunt:** Ludhiana and Karnal

**PROGRAMME 5: LOOSE SMUT**

i. **Loose smut Screening Nursery:** It will contain resistant materials identified in the past and AVT Ist year entries.
Centres: Ludhiana, Almora, Durgapura and Hisar.

ii Basic studies: Ludhiana, Hisar, Karnal

**PROGRAMME 6: POWDERY MILDEW**

i. **Powdery Mildew Screening Nursery:** No. of Centres , 10
Almora, Pantnagar, Ranichauri, Shimla, Malan, Bajaura, Dhaulakuan, Majhera (Pantnagar), Wellington and Kaul.

**PROGRAMME 7: REGION SPECIFIC DISEASES**

Disease Screening Nurseries of the region specific diseases will include resistant materials identified during the past, along with AVT entries at the locations given below:

i. **Head scab:** Karnal and Dhaulakuan (AVT). At Gurdaspur, evaluation for head scab will be done under natural conditions. Basic studies will be done at Karnal.
ii. **Flag smut:** Ludhiana, Hisar and Durgapura.
iii. **Foot rot:** Sagar and Dharwad.
Iv **Hill bunt:** Malan, Bajaura and Almora.

**PROGRAMME 8: CROP HEALTH**

i **Crop Health Monitoring: Pre harvest surveys**

- All the centres associated with Crop Protection Programme will supply information fortnightly on crop health from the areas of their jurisdiction to P.I. Crop Protection starting from November 2010 till the harvest of crop.
- 'Wheat Crop Health Newsletter' will be issued on monthly basis from DWR, Karnal, during the crop season.

**Monitoring of new virulences of rusts in NWPZ by specially constituted teams:**
Specially constituted teams will visit the areas as per the schedules given below for effective monitoring of crop health in general and appearance and spread of yellow rust in particular, along the areas near the western border in NWPZ.

**Team 1**: Last week of December 2011 (Drs Indu Sharma, M. S. Saharan and S. K. Rana )
**Team 2**: Mid January, 2011 (Drs. U. D. Singh, M. Prashar and Madhu Meeta)
**Team 3:** Mid February, 2011 (Drs. S. S. Karwasara, Rakesh Devlash and S. K. Jain). Visits in March will be arranged as per need).

Teams will cover the following area: Ropar, Hoshiarpur, Mukerian, Pathankote, RS Pura, Gurdaspur, Dera Baba Nanak, Ajnala, Attari, Harike, Ferozepur, Fazilka, Abohar

and Sri Ganganagar. The visit will be coordinated by P.I.(Crop Protection). The exact dates will be decided depending upon the weather conditions.

Monitoring of yellow rust in hills will be undertaken by a team of Plant Pathologists (Drs. S. S. Karwasara, S C Bhardwaj and S. K. Rana) in 1st week of August, 2011.

**Monitoring the pathotype distribution of rust pathogens:** It will be undertaken by DWR, Regional Station, Flowerdale, Shimla (all three rusts from all zones) and Rust Research Station, Mahabaleshwar (brown and black rust from CZ and PZ)
All the cooperating centres are required to send the rust infected samples (natural infection) for pathotype analysis to the concerned centres.

**Wheat Disease Trap Plot Nursery, TPN (To be co-ordinated by Flowerdale, Shimla):** TPN will be planted at 35 locations. Samples from this nursery be sent regularly to R.S. Flowerdale, Shimla for virulence analysis and information.

**Off-season TPN (To be coordinated by DWR Reg. Station, Flowerdale)**: This nursery will be planted in Dalang Maidan, Kukumseri, Sangla, Sarahan (HP) and Leh (J&K). High altitude varieties and one hulless barley variety will also be included in this nursery.

**SAARC- Nursery (To be co ordinated by Flowerdale, Shimla):** Nursery will be planted at 15 Indian locations, *viz.*, Ludhiana, Delhi, Dhaulakuan, Gurdaspur, Dera-Baba-Nanak, Abohar, Sri Ganganagar, Chattha, Kathua, Rajouri, Almora, Durgapura, Faizabad, Pantnagar and Wellington.

**Monitoring of Karnal bunt and blackpoint in harvested grains**
Post harvest monitoring will be undertaken by cooperating centres by analysing samples from grain *mandies* in each district of their respective states. Centres from C.Z. (Indore, Sagar, Powarkheda, Vijapur, Jabalpur) and PZ (Pune, Niphad and Dharwad) may also supply grain samples to DWR Karnal for analysis.

**Monitoring of Mealy bug on wheat in cotton-wheat system:** survey will also be conducted to monitoring the situation of mealy bug in wheat under cotton-wheat system.

**Monitoring of Nematodes:** *Anguina tritici*: Pusa (Bihar), Hisar, Ludhiana, Karnal, Jammu and Durgapura centres.
CCN: Durgapura, Delhi, Hisar, Karnal and Ludhiana centers.

**Soil-borne nematodes:** Surveys will be conducted in Bihar (RAU, Pusa center), Varanasi commissionery (BHU Varanasi) parts of NWPZ (Karnal), parts of Rajasthan (Durgapura center), southern Haryana (Hisar Centre), Chattha (Jammu), Delhi (western U.P. including Meerut, Aligarh, Gaziabad, Baghpat, etc and Sonipat, Rohtak etc), Punjab (Ludhiana Centre) and Kangra region (CSKVV, Malan centre)

**PROGRAMME 9: IPM IN WHEAT**

**A. GENETICAL (HOST RESISTANCE)**

**(a) Elite Plant Pathological Screening Nursery (EPPSN) :**
**North:** No. of Centres, 8
Delhi, Karnal, Ludhiana, Pantnagar, Durgapura, Hisar, Almora and Ranichauri.
**South:** No. of Centres, 4
Wellington, Mahabaleshwar, Dharwad and Indore.

**(b) Multiple Disease Screening Nursery (MDSN):** It will be subjected to artificial epiphytotics as detailed below:-

(i) DISEASES

**North:** No. of Centres, 14

**Yellow rust:** Karnal, Ludhiana, Dhaulakuon, Pantnagar

**Brown rust:** Karnal, Ludhiana, Delhi

**Karnal Bunt:** Karnal, Ludhiana, Dhaulakuon

**Powdery mildew:** Dhaulakuan, Almora, Pantnagar, Kaul, Udheywala

**Foliar blights:** Kaul, Faizabad, Varanasi, Coochbehar

**Loose smut**: Hisar, Durgapura, Almora, Ludhiana

**Flag smut:** Hisar, Durgapura, Ludhiana

**South:** No. of Centres, 3

**Leaf and Stem rust:** Mahabaleshwar, Indore and Wellington

**(ii)Nematodes (CCN) :** Durgapura, Hisar, Ludhiana

(c) **Contribution to NGSN:** The resistant entries to major diseases identified after multilocation & over years of testing will be contributed to NGSN for the use of breeders in crossing programme. (Centre : Karnal)

**B. MANAGEMENT OF DISEASES**

**(a) Chemical control of Yellow Rust :** Karnal, Ludhiana, Bajoura, Pantnagar

**(B) Chemical control of Stem rust :**Mahabaleshwar, Niphad, Powarkheda, Dharwad)

**C. SYSTEMS BASED RESEARCH**

(i) **Population dynamics of Plant Parasitic Nematodes under diverse cropping systems**

**Rice-Wheat:** Ludhiana, Karnal, Pusa (Bihar), Chattha (Jammu), Varanasi, Malan (HP) and Delhi.

**Cotton-Wheat:** Hisar and Ludhiana

**Maize-Wheat** : Chattha (Jammu)

**Bajra-Wheat** : Durgapura and Hisar

**Groundnut-Wheat** : Durgapura

**Til-Wheat :** Pusa (Bihar)

**Cowpea-Wheat**: Durgapura

**Wheat-Moong**: Durgapura

(ii) **Diversification in existing wheat based systems for CCN management - Durgapura**

(iii) **Evaluation of ecofriendly approaches in management of CCN**

Hisar (in pot), Ludhiana (in pot), Durgapura (in field) and Karnal (in pots).

(b) **Development of IPM module for management of wheat crop health problems: Centres: Niphad, Kanpur, Faizabad, Varanasi and Karnal**

This trial will involve management of diseases and insect pests problems through host resistance, biocontrol agents and judicious use of chemicals. This will be taken under farmers' fields at Karnal and other cooperating centres

(c) **Tillage options and Pest situation**

(i) Monitoring of diseases, insects and nematodes under new tillage options in rice-wheat system at farmers' fields (Centres : Karnal, Coochbehar, Ludhiana and Faizabad)

(ii) Plant parasitic nematode including CCN and *M. graminicola* studies in different tillage systems at Ludhiana.

**PROGRAMME 10: RESISTANCE AGAINST NEMATODES :**

a. *Heterodera avenae*: Evaluation of CCNSN at Durgapura, Hisar, Ludhiana, Delhi and Karnal.

b. Screening against *M. graminicola* of AVT entries of NWPZ and NEPZ at Pusa (Bihar) and Ludhiana.

c. Biochemical studies of *M. graminicola* population of Pusa (Bihar), Hisar and Ludhiana will be done at Delhi.

d. 2nd Cereal Cyst Nematode Host Differential Set, CCNHD 1982 , 2nd Soil Borne Plant Pathogen Spring Wheat Nursery (SBPSWN) and 2nd Soil Borne Plant Pathogen Spring Wheat Nursery (SBPWWN) supplied by CIMMYT, Turkey will be evaluated at Ludhiana, Delhi, Hisar, Karnal and Dugapura centres.

## PROGRAMME 11: WHEAT ENTOMOLOGY

### (A) HOST PLANT RESISTANCE

### EXPT.1. ENTOMOLOGICAL SCREENING NURSERY FOR

(a) Shoot fly (Durgapura, Dharwad, Kanpur and Ludhiana)
(b) Brown wheat mite (Durgapura, Niphad, Kanpur and Ludhiana)
(c) Wheat Aphids (Niphad, Ludhiana, Shillongani, Karnal, Kanpur and Jammu)
(d) Root aphid (Entkhedi, Ludhiana and Karnal)

### EXPT.2. MULTIPLE PEST SCREENING NURSERY

(a) Shoot fly (Dharwad, Durgapura, Ludhiana and Kanpur)
(b) Brown wheat mite (Durgapura and Ludhiana)
(c) Foliar aphids (Ludhiana, Karnal, Kanpur and Niphad)
(d) Root aphid (Entkhedi, Ludhiana and Karnal)

### (B) CHEMICAL CONTROL

**EXPT.3.** Effect of insecticidal seed treatment on germination, termite damage and yield (Centres: Niphad, Durgapura, Kanpur, Ludhiana, Jammu and Vijapur)

**EXPT.4.** Management of termites through new molecules (Centres: Ludhiana, Durgapura, and Vijapur) (New trial).

**EXPT.5.** Eco-friendly management of termites through biorationals (Centres: Vijapur only)

**EXPT.6.** Chemical control of foliage feeding wheat aphids (Centres: Niphad, Ludhiana, Pantnagar, Karnal, Jammu and Kanpur)

**EXPT.7.** Biorationals for the management of foliage feeding aphids (Centres: Niphad, Ludhiana, Pantnagar and Karnal)

### (C) INTEGRATED PEST MANAGEMENT

**EXPT.8.** Survey of pests infesting wheat and their natural enemies (All centres)

**EXPT.9.** Basic studies for development of IPM strategies

(a) Pest modelling for foliage aphids (Niphad, Ludhiana, Karnal and Pantnagar)
(b) Brown wheat mite( ETL) (Durgapura)
(c) Root aphid (Powarkheda / Entkhedi)
(d) Shoot fly (Kanpur)
(e) Thrips (Pantnagar)
(f) *Helicoverpa armigera* (Pantnagar)

### (D) STORED GRAIN PESTS

**EXPT. 10.** Identification of newer sources of resistance to major stored grain insect pests (Pantnagar, Karnal).

# Research Planning Meeting

## Resource Management

**August 27, 2010**

**Chairman : Dr. RKSharma**
**Co-Chairman : Dr. Randhir Singh**
**Rapporteur : Drs. BN Patil & RS Chhokar**

At the outset, after welcoming the participants Dr RK Sharma, PI Resource management, Programme and the Chairman of the session, stressed that conducting All India Coordinated varietal evaluation trials is mandatory and all the centres must conduct the allotted trials strictly as per the technical programme.

Dr RS Chhokar raised the issue of changing the row spacing in co-ordinated varietal evaluation trials under timely and late sown condition as 20 and 17.5 cm, respectively instead of the presently used spacing of 23 and 20 cm. Dr Hari Ram Saharan, of PAU was also of the view that spacing should be reduced and he further said that many farmers in Punjab are resorting to 15 cm spacing. While the discussion was going on the Project Director (Wheat) Dr SS Singh also joined the Resource Management group and suggested that before changing the spacing, trials may be conducted and based on the results the trials may be modified accordingly. However, he supported that the idea of reducing spacing by the higher productivity at many farmers field compared to experimental average due to closer spacing being adopted by the farmers. It was decided that trial should be conducted at all the locations with three leading/best varieties of the respective zone under four spacing *viz.* 15.0, 17.5, 20.0 and 22.5 cm.

Project Director further stressed the need of conducting special trials to address the zone specific problems that will help in increasing the production and productivity of the country. He also said that funds for special trials will be provided, if properly justified. Dr RK Sharma informed the house that funds for system based special trials were provided @ Rs 20,000/- per trial per year per centre during the previous year.

Dr Hari Ram Saharan proposed to initiate a trial on evaluation of competitiveness of wheat cultivar against weeds. On this issue a through discussion was held and a multi location across zone trial was formulated to address this issue. It was decided to initiate a trial with three wheat cultivars, two row spacing and two weed control measures. Eight centres (Karnal, Ludhiana, Pantnagar, Durgapura in NWPZ, Varanasi in NEPZ and Udaipur, Powarkheda and Kota in CZ) volunteered to conduct this trial. Dr BN Patil from UAS, Dharwad also proposed a trial on how best we can manipulate the source-sink relationship for attaining higher productivity. For this purpose, he proposed three dates of sowing viz. normal, late and very late with three spray schedules of 1% $KNO_3$, 2% $KNO_3$ and 2% urea.

The resource management group critically reviewed the results of the coordinated and special trials and arrived at the following;

- The trials on varietal evaluation will be formulated after receiving the entries from the breeding group.
- The group decided to conclude the special trials on new herbicides, intensification of rice-wheat system, rice residue management in rice-wheat system, use of bio-regulators and effect of RCTs on soybean/maize-wheat systems.

- The following five trials will continue;

1. Improving water use efficiency by surface rice residue retention in wheat.
2. Integrated nutrient management in soybean-wheat system in Peninsular Zone.
3. Effect of pre and post seeding irrigation on wheat establishment
4. Improving productivity of cotton-wheat through relay cropping
5. Sugarcane-wheat intercropping for increased wheat production and system productivity

To address the zone-wise issues, the group also formulated three special coordinated trials, the details of which is given below;

**1. Effect of row spacing on performance of wheat in different wheat growing zones.**

**Treatments:**
**Main plots: Row spacings-4**

1. 15.0 cm
2. 17.5 cm
3. 20.0 cm
4. 22.5 cm

**Sub plots: Varieties-3**

| Zones | Wheat varieties |
|---|---|
| NHZ | VL 804, VL 907, HS 240 |
| NWPZ | DBW 17, PBW 550, PBW 502 |
| NEPZ | K 0307, HD 2733, DBW 39 |
| CZ | GW 322, GW 366, HI 1544 |
| PZ | MACS 6222, NIAW 917, GW 322 |

**Design**: Split Plot
**Replications**: 3
**Centres**: All centres in all zones.

**2. Evaluating the competitiveness of wheat varieties against weeds**

**Treatments:**
**Main plots: Row spacing and weed control - 4**

1. 15.0 cm Weed free
2. 15.0 cm Weedy check
3. 20.0 cm Weed free
4. 20.0 cm Weedy check

**Sub plot: Varieties- 3 in each zone**

| **Zones** | **Wheat varieties** |
|---|---|
| NWPZ | DBW 17, PBW 550, PBW 502 |
| NEPZ | K 0307, HD 2733, DBW 39 |
| CZ | GW 322, GW 366, HI 1544 |

**Seed Rate:** 100 kg/ha (adjusted to 38 g per 1000 seeds)
**Design**: Split Plot
**Replications**: 3

**Centres**: Karnal, Ludhiana, Pantnagar, Durgapura in NWPZ; Udaipur, Powarkheda and Kota in CZ and Varanasi in NEPZ

**Observations**:

1. Weed density and dry weight at 60 and 120 DAS
2. Wheat yield and yield attributes

**3. To evaluate the effect of foliar application of nutrients on performance of wheat under timely and late sown conditions.**

**Treatments**

**Main plots: Sowing time-2**

1. Timely sown (45$^{th}$ standard week)
2. Late sown (48$^{th}$ standard week)

**Sub-plots: Foliar nutrients at 55 and 70 days after seeding-7**

1. 2% Urea spray
2. 2% DAP spray
3. 2% $KNO_3$ spray
4. 2% KCl spray
5. 2% NPK (19:19:19) mixture
6. Water spray
7. Control- no spray

**Variety**: NIAW 917

**Design**: split plot

**Replications**- 3

**Centres**: Dharwad and Niphad

**Work Plan of Social science**

Dr Randhir Singh, co-chairman of the session said that the wheat and barley frontline demonstrations allocated for 2010-11 will be conducted and coordinated as per the approval of the Ministry of Agriculture. In this connection, Dr Satyavir Singh raised the issue of conductance of FLDs strictly as per the guidelines issued by DAC/DWR Karnal. The technological guidelines must be followed uniformly for logical comparison of new technologies. The comparisons of treatments under FLDS should be by following similar standard recommended package of practices.

At the end of session, Dr RK Sharma thanked all the participants for valuable suggestions.

# Research Planning Meeting

## Wheat Quality

**August 29, 2010**

**Chairman : Dr. R.K. Gupta**
**Rapporteurs: Drs. Sewa Ram & R.P.Singh**

The Wheat Quality Group met on 29th August, 2010 and formulated the plan of work. The group decided to continue recording data for grain appearance score, test weight, protein content, sedimentation value and phenol test on all the entries of the three species, namely *T. aestivum, T.durum and T.diccocum* as well as triticales. Durum will also be analyzed for the incidence of yellow berry and yellow pigment in addition to the earlier mentioned traits. Yellow pigment will also be recorded on *diccocum*. The allocation of the work will be as under:

1. Ludhiana laboratory will analyze NIVT 1A samples from Ludhiana, Hisar, Durgapura, Delhi, Pantnagar, Kanpur, Pusa and Sabour.
2. The Quality laboratory at Durgapura will undertake the analytical work for NIVT 1B samples from all those centers, which have been identified for Ludhiana laboratory (NIVT 1A).
3. NIVT 2 samples will be analyzed by the laboratory at Vijapur for all the traits related to bread wheat. The centres to send the samples are Indore, Kota, Vijapur, Junagarh, Powarkheda, Dharwad, Pune and Niphad.
4. NIVT 3 work will be looked after by Pantnagar quality laboratory. The samples from Pusa, Sabour, Kanpur, Pantnagar, Hisar, Ludhiana, Durgapura, Delhi, Vijapur, Indore, Powarkheda, Junagarh, Dharwad, Niphad and Pune will be analyzed for the five quality traits related to bread wheat.
5. The samples of irrigated timely sown durum trial NIVT 4 will be analyzed by the quality laboratory at Rahuri for the traits related to durum samples from Ludhiana, Delhi, Hisar, Durgapura, Kota, Indore, Powarkheda, Junagarh, Vijapur, Pune, Dharwad and Niphad.
6. NIVT 5A entries will be analyzed at Hisar laboratory from Ludhiana, Delhi, Pusa, Kanpur, Indore, Dhandhuka, Powarkheda, Pune, Dharwad and Niphad. It will also undertake the analytical work for salinity/alkalinity trials from the centres already identified.
7. NIVT 5B durum trial samples will be analysed by the laboratory at Dharwad. The centres namely, Kota, Dhandhuka, Indore, Powarkheda, Pune, Dharwad and Niphad will send the samples to the concerned lab.
8. All diccocum samples will be analysed by Dharwad centre. The material will be from Dharwad, Pune, Arabhavi, Wellington, Vijapur and Junagarh.
9. Grain Quality Laboratory at IARI, New Delhi will analyse wheat samples of Quality Components Screening Nursery (QCSN) for grain appearance score, test weight, protein content, grain hardness index, sedimentation value, phenol test and some Promising lines for products evaluation, if grain quality is enough.
10. All the AVT samples from all those centres, which were subjected to analysis in 2009-10, will be analyzed by DWR Quality lab. All the IInd year AVT entries including checks will be analyzed for various quality parameters including baking evaluation.
11. The durum entries both from NIVT 4 and NIVT 5B will be analyzed by Pune laboratory for γ -gliadin 45.

12. The last dates for supplying the samples by respective centres were finalised as follows:

| | |
|---|---|
| NHZ & SHZ | 15th June 2011 |
| NWPZ & NEPZ | 20th May 2011 |
| CZ | 10th May 2011 |
| PZ | 30th April 2011 |

13. All the wheat grain samples, duly cleaned and properly packed in polythene bags separately, enclosed in cloth bags should be sent by registered post parcel. The *T.dicoccum* samples should be sent after dehusking.

14. All the co-operators, who are analyzing the wheat samples of various NIVTs, Special Trials and QCSN should send the data to DWR, Karnal positively by 20th July,2010, by e-mail and also hard copy with C.D.

**Recommendations :**

1. The Quality Component Screening Nursery (QCSN) would now be conducted at 12 centres (**NHZ** : Almora; **NWPZ** : Ludhiana, Durgapura, Delhi, Pantnagar & Hisar; **NEPZ** : Kanpur & IARI Regional Centre at Pusa Bihar; **CZ :** Indore & Vijapur and **PZ** : Pune & Dharwad) and DWR will continue to organise this nursery. The wheat grain samples would be analysed for 6 quality parameters and also some of the promising entries for product quality if the grain quantity is enough. The breeders are requested to : (a) provide at least 500g, for plot size 4 lines X 2.5m length), (b) mention the parentage of the entries supplied for QCSN, (c) contribute the entries only after initial quality evaluation. The breeders are also requested to ensure proper conduct of this nursery and timely supply of requisite quantity of grains to IARI, New Delhi for quality analysis. (Action: Concerned breeders and quality scientists).

2. The quality group has reported several genotypes excelling in important quality parameters including end-products. The group suggests that breeder should make use of this genetic resource and involve them in their crossing programme. The quality person at the respective center will help all in this endeavour. To start with, the Project Director suggested to attempt atleast 25 crosses involving quality donors.

3. The programme now has some centres where facility is available for grain analysis pertaining to important quality parameters. The breeders are requested to make use of this facility in germplasm screening.

4. The centres with molecular work facilities should actively utilize molecular markers, for example marker related to softness/hardness to enhance the screening efficiency of advancing progenies for the improvement of wheat quality. Likewise, there are some molecular markers available in public domain for different quality traits which should be employed in breeding.(Action : Breeders, molecular biologists and quality scientists).

5. The studies on quality/therapeutical/clinical aspects of *T.dicoccum* wheat should be further strengthened at U.A.S., Dharwad centre. (Action : Nutritionists, Biochemists, Food and Technology Scientists and Breeders at U.A.S.,Dharwad).

6. As some new scientists have joined the wheat quality programme, it is proposed to organize a short duration hands-on training programme for human resource development. (Action : DWR, Karnal).

# Research Planning Meeting

## Barley Network

**August 27, 2010** **Chairman : Dr. RPS Verma**
**Rapporteurs : Drs. PK Gupta & Selvakumar**

**Finalization of work plan and Recommendations**

The barley scientists belonging to Breeding, Agronomy and Pathology disciplines deliberated and reviewed the results of each trial series. Following the set norms on yield, disease (rust diseases), and quality parameters, the desirable test entries were promoted / retained in different trials. Finally, the constitution of various trial series in NWPZ/ NEPZ/CZ/NHZ was completed with the collective wisdom. The details of various breeding yield trials/ agronomical experiments and plant pathological nurseries/experiments finalized for conduction during 2010-11 crop season are as given hereunder:

### A) Yield Evaluation Trials

| **Name of Trial** | **AVT (Dual)-IR-NEPZ** | |
|---|---|---|
| **No. of Trial Centres** | 6 | |
| **State** | **No** | **Name of centres** |
| M.P. | 1 | Rewa |
| UP | 3 | Kanpur, Faizabad, Varanasi |
| Bihar | 1 | IARI Pusa |
| Jharkhand | 1 | Ranchi |
| No. of varieties & checks | 5 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Varanasi | 1 | HUB209 |
| Checks | 4 | RD2035, RD2552, AZAD, RD2715 |

| **Name of Trial** | **AVT-RF-NHZ** | |
|---|---|---|
| **State** | **No.** | **Name of centres** |
| Himachal | 7 | Bajaura, Berthein, Kangra, Katrain, Malan, Shimla, Sundernagar |
| Uttrakhand | 5 | Almora, Ranichauri, Majhera, Gagar, Chakrauta |
| J&K | 1 | Rajauri |
| No. of varieties including checks | 21 | |
| **Contributing Centres** | **No.** | **Name of varieties** |
| IARI,RS, Shimla | 7 | **BHS393, BHS394,** BHS397, BHS398, BHS399, BHS400, BHS401 |
| Pantnagar | 2 | UPB1016, UPB1017 |
| Almora | 6 | **VLB118,** VLB123, VLB124, VLB125, VLB126, VLB127 |
| Bajaura | 3 | HBL708, HBL709, HBL710 |
| Checks | 3 | HBL113, BHS169, BHS352 |

| **Name of Trial** | **AVT-RF-NEPZ** | |
|---|---|---|
| **No. of Trial Centres** | 8 | |
| **State** | **No.** | **Name of centres** |
| UP | 5 | Kanpur, Varanasi, Faizabad, Mirzapur, Tissuhi |
| MP | 1 | Rewa |
| Bihar | 1 | Pusa |
| Jharkhand | 1 | Ranchi |
| No. of varieties including checks | 5 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Varanasi | 1 | HUB207 |
| Checks | 4 | K 603, Lakhan, JB58, K560 |

| **Name of Trial** | **AVT-IR-NW&NEPZ** | |
|---|---|---|
| **No. of Trial Centres** | 16 (10+6) | |
| **State** | **No.** | **Name of centres** |
| Haryana | 3 | Bawal, Hisar, Rohtak |
| Punjab | 2 | Bathinda, Ludhiana |
| Uttrakhand | 1 | Pantnagar |
| Rajasthan | 4 | Durgapura, Navgaon, Tabiji, SG Nagar |
| UP | 3 | Kanpur, Faizabad, Varanasi |
| MP | 1 | Rewa |
| Jharkhand | 1 | Ranchi |
| Bihar | 1 | Pusa(IARI) |
| No. of varieties including checks | 7 | |
| **Contributing Centres** | **No.** | **Name of varieties** |
| Hisar | 1 | BH932(NWPZ) |
| Ludhiana | 2 | **PL830*(NWPZ),** PL841 (NEPZ) |
| Checks | 4 | RD 2035, RD 2552, BH902, Jyoti, |

| **Name of Trial** | **AVT-IR-CZ** | |
|---|---|---|
| **No. of Trial Centres** | 5 | |
| **State** | **No.** | **Name of centres** |
| **Rajasthan** | **3** | **Kota, Udaipur, Banswara** |
| **Gujarat** | **2** | **SK Nagar, Vijapur** |
| No. of varieties including checks | 9 | |
| **Contributing Centres** | **No.** | **Name of varieties** |
| Hisar | 1 | BH933 |
| Rewa | 2 | JB186, JB187 |
| Durgapura | 4 | RD2784, RD2785, RD2786, RD2787 |
| Kanpur | 1 | K958 |
| Checks | 1 | PL751 |

| **Name of Trial** | **AVT-IR-TS-MB-NWPZ** | |
|---|---|---|
| **No. of Trial Centres** | **11** | |
| **State** | **No.** | **Name of centres** |
| Haryana<br>Punjab<br>Rajasthan<br>U.P.<br>Uttrakhand | 3<br>2<br>3<br>2<br>1 | Hisar, Karnal, Bawal<br>Bhatinda, Ludhiana<br>Navgaon, Durgapura, SG Nagar<br>Modipuram, Mathura<br>Pantnagar |
| No. of varieties including checks | 9 | |
| **Contributing Centres** | **No.** | **Name of varieties** |
| Karnal | 5 | **DWR81*, DWR85*,** DWR88, DWR90, DWR91 |
| Checks | 4 | K551, DWRUB52, RD2668, RD2552 |

| **Name of Trial** | **AVT-IR-LS-MB-NWPZ** | |
|---|---|---|
| **No. of Trial Centres** | **8** | |
| **State** | **No.** | **Name of centres** |
| Haryana<br>Punjab<br>Rajasthan<br>U.P.<br>Uttrakhand | 2<br>2<br>2<br>1<br>1 | Hisar, Karnal,<br>Bhatinda, Ludhiana<br>Durgapura, SG Nagar<br>Modipuram<br>Pantnagar |
| No. of varieties including checks | 8 | |
| **Contributing Centres** | **No.** | **Name of varieties** |
| Karnal | 5 | **DWR81*,** DWR88, DWR91, **DWRUB64***, BH942 |
| Checks | 3 | K551, DWRUB52, RD2552 |

| **Name of Trial** | **AVT-IR- SAL / ALK-NWPZ / NEPZ** | |
|---|---|---|
| **No. of Trial Centers** | 7 | |
| **State** | **No.** | **Name of centers** |
| U.P.<br>Haryana<br>Rajasthan | 3<br>2<br>2 | Dalipnagar, Faizabad (2 sets)<br>Hisar, Bawal<br>Rampura, Bhilwara |
| No. of varieties including checks | 20 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Durgapura | 7 | **RD2794**, RD2816, RD2817, RD2818, RD2819, RD2820, RD2821 |
| Hisar | 3 | BH946, BH950, BH951 |
| Faizabad | 4 | **NDB1465**, NDB1510, NDB 1522, NDB1523 |
| Varanasi | 3 | **HUB205,** HUB115, HUB116 |
| Kanpur | 1 | K1055 |
| Checks | 2 | RD2552, NDB1173 |

| **Name of Trial** | **AVT (Dual) RF-TS-NHZ** | |
|---|---|---|
| No. of Trial Centers | 5 | |
| State | No. | Name of centers |

| | | |
|---|---|---|
| H.P.<br>Uttrakhand | 3<br>2 | Shimla, Bajaura, Palampur<br>Almora, Majhera |
| No. of varieties including checks | 19 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Shimla | 5 | BHS397, BHS398, BHS399, BHS400, BHS401 |
| Pantnagar | 2 | UPB1016, UPB1017 |
| Bajaura | 3 | HBL708, HBL709, HBL710 |
| Almora | 6 | **VLB118,** VLB123, VLB124, VLB125, VLB126, VLB127 |
| Checks | 3 | HBL276, BHS169, BHS380 |

| **Name of Trial** | **IVT-IR-TS-MB-NWPZ** | |
|---|---|---|
| **No. of Trial Centers** | 10 | |
| **State** | **No.** | **Name of centers** |
| Haryana<br>Punjab<br>Rajasthan<br>U.P.<br>Uttrakhand | 3<br>2<br>2<br>2<br>1 | Bawal, Hisar, Karnal<br>Ludhiana, Bhatinda<br>Durgapura, Navgaon<br>Modipuram, Mathura<br>Pantnagar |
| No. of varieties including checks | 20 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Hisar | 3 | BH 952, BH 953, BH 954 |
| Karnal | 5 | DWR92, DWR93, DWR94, DWR95, DWR96 |
| Durgapura | 4 | RD2822, RD2823, RD2824, RD2825 |
| Ludhiana | 4 | PL 857, PL858, PL 859, PL 860 |
| Checks | 4 | K551, DWRUB52, RD2552, RD2668 |

| **Name of Trial** | **IVT-IR-LS-MB-NWPZ** | |
|---|---|---|
| **No. of Trial Centers** | 7 | |
| **State** | **No.** | **Name of centres** |
| Haryana<br>Punjab<br>Rajasthan<br>U.P.<br>Uttrakhand | 2<br>2<br>1<br>1<br>1 | Hisar, Karnal<br>Ludhiana, Bhatinda<br>Durgapura<br>Modipuram<br>Pantnagar |
| No. of varieties including checks | 18 | |
| **Contributing Centres** | **No.** | **Name of varieties** |
| Hisar | 3 | BH956, BH957, BH958 |
| Karnal | 5 | DWR92, DWR93, DWR94, DWR95, DWR96 |
| Durgapura | 4 | RD2822, RD2823, RD2824, RD2825 |
| Ludhiana | 3 | PL861, PL862, PL863 |
| Checks | 3 | DWRUB52, K551, RD2552 |

| **Name of Trial** | **IVT-IR-TS- NWPZ/ NEPZ / CZ** | |
|---|---|---|
| **No. of Trial Centers** | 16 | |
| **State** | **No.** | **Name of centers** |
| Haryana | 1 | Hisar |
| Punjab | 1 | Ludhiana |
| Rajasthan | 5 | Durgapura, Tabiji, Banswara, Navgaon, Udaipur |
| Uttrakhand | 1 | Pantnagar |
| U. P | 3 | Kanpur, Varanasi, Faizabad |
| M. P | 1 | Rewa |
| Gujarat | 2 | Vijapur, SK Nagar |
| Bihar | 1 | Pusa |
| Jharkhand | 1 | Ranchi |
| No. of varieties including checks | 28 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Hisar | 3 | BH946, BH947, BH948 |
| Varanasi | 2 | HUB113, HUB114 |
| Rewa | 3 | JB217, JB224, JB 225 |
| Durgapura | 4 | RD 2808, RD 2809, RD 2810, RD 2811 |
| Ludhiana | 3 | PL 853, PL854, PL 855 |
| Kanpur | 4 | K1055, K1076, K1077, K1078 |
| Faizabad | 2 | NDB1506, NDB1511 |
| Pantnagar | 3 | UPB1018, UPB1019, UPB1020 |
| Checks | 4 | BH902, RD2552, Jyoti, PL751 |

| **Name of Trial** | **IVT-RF-TS-NEPZ** | |
|---|---|---|
| **No. of Trial Centers** | 8 | |
| **State** | **No.** | **Name of centers** |
| UP | 5 | Kanpur, Varanasi, Faizabad, Mirzapur, Tissuhi |
| MP | 1 | Rewa |
| Bihar | 1 | Pusa |
| Jharkhand | 1 | Ranchi |
| No. of varieties including checks | 23 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Hisar | 3 | BH943, BH944, BH945 |
| Durgapura | 4 | RD2826, RD2827, RD2828, RD2829 |
| Kanpur | 3 | K 1059, K1062, K1063 |
| Faizabad | 2 | NDB1516, NDB1517 |
| Varanasi | 2 | HUB , HUB |
| Rewa | 5 | JB209, JB211, JB212, JB213, JB216 |
| Ludhiana | 2 | PL853, PL854 |
| Checks | 2 | K 603, Lakhan |

| Name of Trial | IVT (Dual)-IR- NWPZ /NEPZ/CEN | |
|---|---|---|
| **No. of Trial Centers** | 16 | |
| **State** | **No.** | **Name of centers** |
| Rajasthan | 6 | Bikaner, Jalore, Durgapura, Kota, Udaipur, Banswara |
| M.P. | 2 | Jabalpur, Rewa |
| Haryana | 1 | Hisar |
| Punjab | 1 | Ludhiana |
| UP | 5 | Kanpur, Faizabad, Varanasi, Jhansi, Modipuram, |
| Gujarat | 2 | Anand, Vijapur |
| No. of varieties & checks | 26 | |
| **Contributing Centers** | **No.** | **Name of varieties** |
| Hisar | 2 | BH946, BH949 |
| Varanasi | 2 | HUB1132, HUB114 |
| Rewa | 4 | JB217, JB224, JB 225, JB226 |
| Kanpur | 4 | K1054, K1076, K1077, K1078 |
| Durgapura | 4 | RD2812, RD2813, RD2814, RD2815 |
| Faizabad | 2 | NDB1503, NDB1524 |
| Ludhiana | 4 | PL 853, PL854, PL 855, PL856 |
| Checks | 4 | RD2035, RD2552, AZAD, RD2715 |

**B) Crop Protection**

The group proposed to continue the experiments as last year including more treatments in chemical control of rusts and blights. Durgapura and Karnal centres will carry out multiple recording on NBDSN / EBDSN entries to identify slow rusting lines.

**1. Crop Health survey:** Different cooperating centres in their area of command will carry out the survey work. The infected samples of rust are to be sent to DWR, RS Flowerdale and of leaf blight to DWR, Karnal for further analysis. The new entries showing >40S rust reaction in AVT (IInd year), sample has to be sent to Flowerdale. The report on disease survey should be submitted to DWR, Karnal every month in time, by each cooperator.

**2. Foliar blight pathogen monitoring nursery (FBPMN) :** A trial comprising of popular barley varieties and susceptible checks will be planted in different barley centers in NEPZ and NWPZ and occurrence and severity of leaf blight will be monitored at different growth stages and date of recording also. The progress of disease will be seen in relation to weather conditions.

**3. Evaluation for status of host resistance in test entries:**

**i. Initial Barley Disease Screening Nursery (IBDSN):** The nursery will have about 300 test entries of station trial of major barley breeding centers. The entries will be screened against rusts and leaf blight.
**ii. National Barley Disease Screening Nursery (NBDSN):** This will comprise of entries of yield trials (IVT and AVTs) which will be screened against three rusts, leaf blight, covered smut and powdery mildew.
**iii. Elite Barley Disease and Pests screening nursery:** This will have resistant entries identified in NBDSN and other international nurseries for retesting at hot spot locations. The confirmed sources of resistance would later be shared with different barley breeders for their utilization.

**iv. Seedling Resistant Test (SRT) of NBDSN and elite entries:** The test would be conducted against different pathotypes of three rusts at Flowerdale Shimla.

**4. Large plot trial on Integrated Pest Management (IPM) in barley:**
The most effective IPM module identified during past two crop seasons will be evaluated on large plot (min 500 sq.m) along with non IPM.

**5. Chemical control of barley leaf blight**
a. Seed treatment with Vitavax 3g/Kg
b. ST + Tilt spray
c. Folicur spray @0.1%
d. Folicur spray @0.05%
e. ST+ Folicur spray
f. Control
Replication 3; Plot size 2x2 m;

**6. Chemical control of rusts**
a. Tilt @0.1%
b. Folicur @0.1%
c. Bayleton @0.1%
d. Folicur @0.05%
e. Bayleton @0.05%
f. Dithane M45
g. Control
Replication 4; plot size 2x2m; Ist spray first week of February.

**Entomology**
**1. Screening of NBDSN against foliar aphids**
A new nursery as national barley aphid screening nursery will be initiated. It will comprise previously identified resistant entries along with new entries of NBDSN.

2. **Chemical Control of Foliar Aphids:** This trial will continue during 2010-11 with following chemicals.

| No. | Treatments | Dosage ai/Ha |
|---|---|---|
| 1 | Confidor (Imidacloprid 200SL) | 20 |
| 2 | Actara (Thiamethoxam 25WG) | 12.5 |
| 3 | Flubendiamide | 20 |
| 4 | Ekalux (Quinolphos 25EC) | 125 |
| 5 | Rogor (Dimethoate 30EC) | 100 |
| 6 | Acetamiprid 20SP | 50 |
| 7 | Dantop (Clothianidin 50 WDG) | 15 |
| 8 | Control | |

**Nematology**

**1. Screening of NBDSN, Elite material against CCN:** The entries of NBDSN as well as of EBDSN will be tested against CCN at Ludhiana, Durgapura and Hisar centers in sick plots/field.

**C) Resource Management Experiments**

**1. Varietal Evaluation:** The trials with AVT final year entries will be conducted in respective zones using the standard checks.

**IR-TS-FB-NWPZ**

PL830 Checks: BH902, RD2035, RD2552

**IR-TS-MB-NWPZ**

DWR81, DWR85 Checks: DWRUB52, K551, RD2668

**IR-LS-MB-NWPZ**

DWR81, DWRUB64 Checks: DWRUB52, K551

**2. Special experiments on updating package of practices**

**SPL-1: N scheduling in dual purpose barley**

**Objectives**

To standardise optimum N scheduling for higher productivity of grain and fodder yield.

**Treatments**

**A. Varieties (Main Plots)**

V-I. RD 2035

V-II. RD 2552

**B. N schedule (Sub-Plots)**

1. ½ basal+ ½ immediate after cut
2. ½ basal+¼immediate after cut+ ¼ tillering after cut
3. ½ basal+1/3 immediate after cut+ 1/3 tillering after cut
4. 1/3 basal+ 2/3 immediate after cut
5. 2/3 basal+ 1/3 immediate after cut

**C: Centres:**

NWPZ (Hisar, Ludhiana, Delhi, Agra, Karnal, Durgapura)

NEPZ (Kanpur, Varanasi, Rewa)

**SPL-2 : Evaluation of barley varieties for different tillage options (NWPZ)**

**Objectives:**

1. To assess performance of barley varieties for different tillage options.
2. To study effect of tillage options on malt quality of barley.

**Treatments**

**A. Tillage Systems (Main Plots)**

1. Zero 2. Reduced 3. Conventional

**B. Varieties (Sub-Plots)**

NWPZ- 1. RD 2035 2. RD 2552 . DWRUB 52 4. RD 2668

**C: Centres:** NWPZ (Hisar, Karnal, Durgapura)

**SPL-3 Standardisation of seed and spacing for malt barley in NWPZ**

**Objectives**

To study various options of seed and spacing for increasing productivity of malt barley.

**Treatments**

**A. Seed rate (Kg/ha) (Main Plots)** 1. 80 2. 100 3. 120

**B. Spacing (Sub-Plots)** 1.18 cm 2. 23 cm

**C: Centres:** NWPZ (Hisar, Ludhiana, Agra, Karnal, Durgapura)

**SPL-4: Nutrient management in malt barley**

**Objectives**

To study the effect of various nutrient combinations on yield and grain physical quality of malt barley

**Treatments**

1. 100% RDF - Inorganic fertiliser
2. 100% RDF - Inorganic fertiliser + Zn (10kg/ha)

3. 100% RDF - Inorganic fertiliser + S (20kg/ha)
4. 100% RDF - Inorganic fertiliser + Zn (10kg/ha) + S (20kg/ha)
5. 75% RDF + FYM (5 T/ha) +Zn (10kg/ha)
6. 75% RDF + FYM (5 T/ha) +S (20kg/ha)
7. 75% RDF + FYM (5 T/ha) +Zn (10kg/ha) +S (20kg/ha)
8. 100% organic fertiliser
9. Absolute control

**C: Centres:** NWPZ (Hisar, Delhi, Agra, Karnal, Durgapura)

**SPL-5: Evaluation of dual purpose barley varieties for one irrigation condition in NHZ**

**Objectives:** 1. To assess the performance of dual purpose barley varieties under irrigation in Northern Hills zone.

**Treatments**

**A. Irrigation (Main Plots)**

1. No irrigation without cut 2. No irrigation with cut
3. Irrigation without cut 4. Irrigation with cut

**B. Varieties (Sub-Plots)**

BHS 169, HBL 276, BHS380

**C. Centres: Bajaura, Shimla, Malan, Almora**

**SPL-6 : Evaluation of barley varieties for restricted irrigation in NWPZ and NEPZ**

**Objectives:** 1. To evaluate the performance of irrigated barley varieties under restricted water supply in NWPZ and NEPZ.

**Treatments**

**A. Irrigation (Main Plots)**

1. No irrigation (only pre sowing) 2. One irrigation (Jointing stage)
3. Two irrigation (Jointing & flowering stage)
4. Three irrigation (Jointing, flowering & grain filling stage)

**B. Varieties (Sub-Plots)**

RD 2552, BH902 and DWRUB 52 for NWPZ
RD 2552, K 551and K 508 for NEPZ

**C: Centres:** NWPZ (Hisar, Karnal, Ludhiana, Agra, Durgapura)
NEPZ (Kanpur, Varanasi, Rewa, Faizabad)

**SPL-7 : Effect of nitrogen doses and time of application for dual purpose barley in NHZ under rainfed conditions.**

Objectives: To study the effect of nitrogen levels and scheduling on forage and grain yield.

Treatments:

**A. N levels Kg per ha (Main Plots)**

1. 40 2. 60 3. 80

**B. N scheduling (Sub-Plots)**

1. ½ basal+ ½ immediate after cut (70DAS)
2. ½ basal+1/4 immediate after cut (70DAS)+ ¼ tillering after cut (100DAS)
3. ½ basal+1/3 immediate after cut+ 1/3 tillering after cut
4. 2/3 basal+ 1/3 immediate after cut (70DAS)

**C: Centres: Bajaura, Malan, Almora Variety: BHS380**

**SPL-8: Effect of FYM and vermicompost on barley under rainfed condition in NHZ**

**Objectives**

To study the effect of FYM and vermicompost for enhancing barley productivity on sustainable manner

**Treatments**

1. 100% RDF– Inorganic fertiliser
2. 100% RDF– FYM
3. 100% RDF– Vermicompost
4. 75% RDF + 25% FYM
5. 75% RDF + 25% Vermicompost
6. 50% RDF + 50% FYM
7. 50% RDF + 50% Vermicompost
8. 25% RDF + 75% FYM
9. 25% RDF + 75% Vermicompost
10. Absolute control

Design: RBD
**Centres:** Bajaura, Malan, Almora Variety: HBL113

**SPL-9: Compatibility of barley varieties for different weed management options in NEPZ**

**Objectives**
To study the performance of different barley varieties under various weed management practices.
**Treatments**
**A. Weed management practices (Main Plots)**
1. Weed free – 2 manual weedings
2. Weedy check
3. Isoproturon + 2,4-D

**B. Varieties (Sub-Plots)**
RD 2552, K 551, NDB1173 and Jyoti
**C: Centres:** NEPZ (Kanpur, Varanasi, and Faizabad)

**Recommandations :**

- Based on three years of experimentation on tillage options it was concluded that reduced tillage (one harrowing + one cultivator) is enough for field preparation for barley sowing in NWPZ and NEPZ. It gives comparable yield with conventional tillage (two harrowing + two cultivators) and saves energy, labour and time.
- Line to line spacing of 18 cm can be followed in two-row malt barley for obtaining higher yield without adversely affecting the grain quality.
- Application of 75% of RDF along with 5t FYM & biofertilizer (*Azatobacter*) is recommended for obtaining equal yield on sustainable basis against the 100% inorganic fertilizer.

# SESSION III

## Crop Year Review, 2009-10

**August 28 , 2010**

**Chairman : Dr. Swapan K. Datta**
**Co-Chairmen : Drs. R.P. Dua & S.S. Singh**
**Rapporteurs : Drs. D. Mohan & S.C. Misra**

In opening remarks of the crop year review session, the chairman Dr Swapan K Datta congratulated the wheat group for the commendable achievements made in wheat research, which have ultimately resulted in record wheat production during 2009-10. He assured the house that ICAR would extend all the support to raise quality of wheat research in the country.

Dr Jag Shoran Principal Investigator, Crop Improvement, presented an overview of the various research activities pertaining to wheat improvement. While deliberating on the achievements, he mentioned that eight new varieties including two durum and two for saline conditions have been notified by CVRC. Three genetic stocks have been registered which included HS 491 for high spread factor of biscuit, AKAW 3717 for drought and heat tolerance and UP 2698 for high protein. While giving account of trial conduct, he mentioned that 500 new entries have been tested in 36 series of trials but there was rejection of about 20% trials while pooling the data. He expressed satisfaction that except Northern Hills Zone, good materials are coming in each zone for every production condition but showed concern on lack of purity seed in some checks and test entries. New germplasm lines excelling in different components like quality, yield and resistance for abiotic stress were also enlisted. He highlighted that there was no constraints in breeder seed production and many new entries have occupied major share in breeder seed production. He also highlighted that biotechnology tools have been utilized to make profile for 1B/1R, Rht and certain rust genes. He showed concern on increasing trend on leaf blight incidence in *dicoccum* in PZ.

The chairman complemented the crop improvement achievements but was critical of 20% rejection in trials and asked to take measures for improving quality standards of the trials. He expressed desire to strengthen research on hybrid wheat and explore possibilities of partnership with seed industry. He suggested to submit a good work plan for developing hybrid wheat and the council would be highly supportive in this endure. Dr R P Dua, ADG-FFC, commented that non performing centers should be discouraged and if need be, the council should be informed to take necessary measures in this regard. He advised quantification of abiotic stress while screening the germplasm for drought and heat tolerance. He also stressed to exercise no-compromise on purity of test material and checks.

Dr AK Sharma, Principal Investigator of Crop Protection presented the highlights of work done during 2009-10. He gave brief account of various activities pertaining to host resistance, survey surveillance and crop health monitoring, pest system under new cultural practices, pest management with focus on IPM and human resource development. He enlisted genotypes showing multiple disease resistance and briefed the house that such genetic resource was being shared with breeders through NGSN. He appraised the progress made by each centre in enhancing the level of resistance and expressed satisfaction over the improved resistance level against rust diseases. Dr Sharma also mentioned screening against shoot fly, brown wheat mite and nematodes. He assured the house that resistance against Ug99 is available in many Indian varieties and the genetic stocks. Dr Sharma informed that support for conduct of

SAARC nurseries was not forthcoming from some countries. He informed the house that in Punjab alone; several hundred crores of rupees were saved by taking timely action and advisories to make the wheat crop free from diseases. The chairman expressed satisfaction over the measures by the plant protection group through survey and surveillance, releasing crop health new letter and screening material against biotic stress. He also suggested to draw a clear picture for IPM for its effective promotion. Since the pathogens are also becoming more competitive under global environmental change, Dr Dutta stressed preparedness for such challenge.

Dr RK Sharma, Principal Investigator, Resource Management informed the house that research efforts are focused on refinement of resource conservation technologies, diversification/ intensification by including leguminous crops, integrated nutrient and weed management; and develop cost effective production technologies. He shared results on evaluation of Sulfosulfuraon+Carfentrazone for control of complex weed flora, improving the WUE by surface rice residue retention in wheat, intensification of rice wheat system by introducing leguminous crop, rice residue management in rice wheat system, evaluation of bio-regulator's effect on wheat productivity, integrated nutrient management in soybean wheat system in PZ; and effect of pre and post seeding irrigation on establishment of wheat crop. He appraised the house that multiple herbicide resistance has become a problem and crop residue burning contributes in reduction of herbicide efficacy. Reacting to that the chairman added that this aspect should be looked into with more details and emphasized that robust umbrella is needed to combat competition posed by weed flora especially under rice wheat system. He suggested that management should be site/ region/ season specific, therefore, a calendar has to be developed for each input.

Dr RK Gupta, Principal Investigator, Quality Improvement gave an account of varieties / germplasm excelling in end-products and important quality parameters. He informed that genetic stocks and released varieties are also available now for good biscuit quality. He also elaborated the quality improvement work being carried out at different centers through conventional as well as molecular approach. He informed that micro tests are now available for quality testing. He also shared information on antioxidants. Dr. Gupta also informed about development of RIL's for many quality parameters and the end-products. The Chairman enquired whether there is any possibility of providing premium price for superior grain quality. Dr BK Mishra and Dr Srimali shared this concerned and informed that many growers in the Central and Peninsular India are getting higher market price of their produce simply because of bold and lustrous grain.

Dr RPS Verma, Principal Investigator, presented progress on barley network. He informed that two new barley varieties have been released and some new test entries have also shown promise in initial yield evaluation. He said that the programme is in position to deliver superior malt varieties with yield matching to 6R barley. The malting facility developed at DWR was utilized to evaluate the material developed by other centers. He said that trial conduct in the hills was poor this time due to insufficient rains and problem was faced in conducting salinity trials. He expressed satisfaction over growing seed demand during the last 3-4 years. The Chairman enquired the status of malt barley varieties in the seed indent. He suggested that soil salinity test should be examined replication wise for satisfactory conduct of salinity trials. He also showed interest in activities pertaining to dual barley and advised to work out its economics. Dr Verma requested that some space should be provided for evaluation under saline conditions at CSSRI, Karnal. The chairman said that possibility could be explored for evaluation of final year entries in small plot at CSSRI.

Dr Randhir Singh Principal Investigator Social Science shared results on different FLD's and also presented ROVC (Return On Variable Cost). FLD were conducted on high yielding varieties, RCT, biofertilisers and residue management. He informed that yield gaps in NEPZ is quite wide in bread wheat as well as barley. The FLD conduct

was quite satisfactory i.e., 94.7%, however, constraints in the conduct was felt because of non-release of funds. The Chairman suggested that while conducting FLD's, the reliability should be ascertained through monitoring at various levels. Reacting to Dr Singhs presentation on rice residue management, Dr Dua enquired about the recommendation of machines out of rice straw cutter, happy seeder and turbo seeder. While concluding the session, the chairman expressed the hope that keeping an account of the results, a proper planning of ensuing crop season should be made and desired that any change in the existing programme should be thoroughly discussed in the house before its implementation.

The meeting ended with vote of thanks to Chairman by Dr Indu Sharma.

# SESSION IV

## Varietal Identification Committee Meeting

**August 28 , 2010** **Chairman : Dr. Swapan K Datta**
**Member Secretary : Dr. SS Singh**

The meeting of Varietal Identification Committee(VIC) was organized on August 28, 2010 under the Chairmanship of Dr. Swapan K Datta, DDG (CS), ICAR, New Delhi. The meeting was attended by the following members :

1. Dr. RP Dua, ADG (FFC), ICAR, New Delhi
2. Dr. SS Gosal, Director Research, PAU, Ludhiana
3. Dr.JP Tandon, former Project Director, DWR, Karnal
4. Dr. GS Nanda, Ex Director Research, PAU, Ludhiana
5. Dr. GK Choudhary, Director, Directorate of Wheat Development, Ghaziabad
6. Dr. Gurdev Singh, DGM, Sri Ram Fertilizers & Chemicals Ltd., Ludhiana
7. Sh. Prem Chand, Representative of GM (Production), NSC, New Delhi
8. Dr. SS Singh, Project Director, DWR, Karnal & Member Secretary

All the Principal investigators of the DWR, Karnal and Head, DWR Regional Station, Flowerdale also attended the meeting as non-voting members.

In all, 29 proposals of wheat varieties and 05 proposals of barley were considered in the VIC for their identification to different production conditions.

| SNo | Varieties | Recommendations |
|---|---|---|
| **A.** | **WHEAT** | |
| | **1. *Northern Hills Zone*** | |
| | **HS507**<br>IR/RF-TS-TAS | The genotype had significant yield advantage over the best check alongwith better disease resistance and quality parameters and therefore, **identified** for release. |
| | **2. *North Western Plains Zone*** | |
| | **PBW 621 & DBW 50**<br>IR-TS-TAS | Both these varieties were similar to best check HD 2967 in yield performance and better than the best check with respect to disease resistance and quality parameters. Thus, **both the varieties were identified.**<br>As these genotypes had same pedigree, phenotypic and molecular similarity and almost same disease resistance and quality parameters, it was recommended to prepare single proposal for release of both the varieties with equal sharing basis. |
| | **PDW 315,PDW 317 & WHD 943**<br>IR-TS-TDM | All the 3 proposals were considered simultaneously. PDW 315 and WHD 943 were having better yield performance and quality traits than the checks and PDW 317. On the basis of these performances, **PDW 315 and WHD 943 were identified.** |
| | **WH 1080 & UAS 315**<br>RF-TS-TAS | These genotypes were considered together for rainfed timely sown conditions of the NWPZ. Out of these, **WH 1080** had yield superiority over the best check alongwith better disease resistance and quality traits and thus, **identified.** |

| SNo. | Varieties | Recommendations |
|---|---|---|
| | **PBW 629 & WH 1081**<br>RI-TS-TAS | These genotypes were considered together for restricted irrigation conditions of the NWPZ. Both these varieties had no yield advantage and other traits were comparable to checks and therefore, not identified. |
| 3. | ***North Eastern Plains Zone*** | |
| | **HD 2997, HSP 561 & DBW 46**<br>IR-T5-TAS | All these genotypes were comparable in yield to the checks in the zone. In addition, the disease reactions and quality parameters were also comparable to the checks. Therefore, these were not identified. |
| | **NW 4035, DBW 51, DBW 52 & HI 1563**<br>IR-LS-TAS | These genotypes were considered together and among these, **HI 1563** had comparatively more yield advantage alongwith better disease resistance and quality and thus, **identified**. |
| | **HD 3016**<br>RF-TS-TAS | The genotype had no more yield advantage in breeding and agronomical trials over the best check as well as the latest release HD 2888, Therefore, this genotype was not identified. |
| 4. | ***Central Zone*** | |
| | **HW 5207-1** | HW 5207-1 had no advantage over the best bread wheat check. The disease resistance and other traits are also comparable therefore, this genotype was not identified. |
| | **HI 8691(d), MACS 3742(d) & AKDW 4021(d)**<br>IR-TS-TAD | Three durum entries, HI 8691, MACS 3742 and AKDW 4021 were considered together and these had no yield advantage over the best check. Moreover, HI 8691 and MACS 3742 had highly susceptible reactions to brown rust. Thus, none of the genotype was identified. |
| | **MP 4106**<br>IR-LS-TAS | There was no yield advantage over the checks and no superiority was found for disease resistance *and* quality components. Thus, MP 4106 was not identified. |
| | **MP 3288**<br>RF/RI-TS-TAD | It had significant yield advantage over checks, better resistance and quality traits. In addition, it did not possess *Lr24* which was present in checks, This may lead to diversification of rust resistance sources. Therefore, the genotype MP 3288 was **identified.** |
| 5. | ***Peninsular zone*** | |
| | **UAS 316 & NIAW 1415**<br>RF-TS-TAD | These two genotypes were evaluated simultaneously for rainfed as well as restricted irrigation conditions. UAS 316 had high disease reaction whereas NIAW 1415 showed yield advantage coupled with better disease resistance *and* quality traits. Therefore, the genotype **NIAW 1415 was identified** for both the conditions. |
| | **UAS 316 & NIAW 1415**<br>RI-TS-TAD | |
| 6. | **All Zone-Salinity/Alkalinity**<br>**KRL238**<br>IR-TS-TAS | There was no yield advantage and superiority *in* other traits compared to the checks and therefore, not identified. |

| SNo. | Varieties | Recommendations |
|---|---|---|
| **B.** | **Barley** | |
| 1 | **RD 2743**<br>IR-TS-NWPZ | The genotype had no yield advantage over the checks and the disease score was more as compared to the best check and thus, this variety is not identified. |
| 2 | **DWR 73**<br>IR-LS-NWPZ | The case was critically discussed and it was observed that the checks included in the trial were from timely sown condition and therefore, was not suitable for comparison. As there was no variety recommended for the late sown condition in 2-row barley and the test entry had comparatively less reduction in malt quality parameters, it was **identified** by the committee. |
| 3 | **DWR 64**<br>IR-LS-NWPZ | The entry was tested during 2005-08 in coordinated trials and on the technical basis, it was deferred. As there was gap of 2 seasons for evaluation, it was deferred again with recommendation to put it in coordinated trials as final year entry for generating more data for one year *and* then submit fresh proposal. |
| 4 | **UPB 1008**<br>RF-TS-NHZ | The genotype had clear yield advantage and better disease resistance therefore, **identified.** |
| 5 | **DWR 63**<br>RF-TS-NHZ | The genotype had only one location data for 2 years which was considered insufficient for any conclusion. Therefore, it was deferred for testing of one more year alongwith the local variety in the area. |

In this way, a total of 9 wheat and 2 barley varieties have been identified for different production conditions.

The VIC also made recommendations which are as under :

1. Addition of "W in the name of genotypes as indicative of wheat varieties.
2. Initiation of larger plot unreplicated demonstration of atleast 1/4 acres for the AVT final year entries under timely sown irrigated conditions of the NWPZ. This will generate supportive data for identification of better genotypes.
3. Joint proposal of PBW 621 and DBW 50 for release by CVRC should be made for which Project Director, DWR will coordinate the issue. In addition, there should be indication of source of material as selection from nurseries /trials of CIMMYT in the proposal.
4. In barley, there should be indication of 2-row /6-row and malt /feed/fodder type to make more clear nomenclature.

The meeting was ended with the vote of thanks by the Project Director and Member Secretary of the VIC.

**Dated: 28,08.2010**
**Place: Ludhiana**

**Chairman** **Member Secretary**

# SESSION V

## Strategies to bridge the yield gaps in wheat and barley production

**August 29, 2010**

**Chairman : Dr. P.S. Minhas**
**Co-Chairman : Dr. J.P. Tandon**
**Rapporteurs : Drs. Randhir Singh & MS Saharan**

The session – V was planned to have seven presentations , however, only six were presented.

**Strategies to bridge the yield gaps in wheat and barley production**

Dr SS Singh, Project Director, DWR, Karnal mentioned that during the last 25 years, growth rate of wheat was 2.27% but in the last 10 years it reduced to 1.77 percent. The average yield gain in wheat frontline demonstrations in NEPZ was around 51%. He highlighted the yield gap in various states maximum being in Rajasthan followed by UP and emphasized that by bridging this yield gap we can boost our production through the strengthening of the extension activities. Efforts need to be made in the NEPZ and NWPZ too having large wheat area. The Directorate has already taken initiative with the MOA and organized a planning meeting for the NWPZ for the crop season 2010-11. Similar meeting is planned for the NEPZ and CZ too in October, 2010.

He also highlighted the importance of survey and surveillance of wheat rusts as during 2009-10 crop season, yellow rust could not cause any damage in the region. He expressed his concern over the vulnerability of ruling wheat variety PBW 343 to new yellow rust race (78S84) and emphasized a dire need to replace PBW 343 with newly released resistant varieties like DBW 17 and PBW 550 on priority basis. He assured that India can achieve 90.00 mt, the target of wheat production of 2030 in next five years if the existing yield gaps in North Eastern Plain Zone, Central Zone are met with the efficient transfer of technologies. He felt concern on breaking the yield barriers and emphasized the need of concentrated efforts on pre-breeding, winter X spring hybridization, use of new plant type and hybrid wheat etc. Linkages with international organizations were also highlighted.

The salient points are as below.

- Replace the old susceptible varieties with PBW 550 and DBW 17 in the NWPZ under timely sown conditions.
- The indent of old varieties in the seed chain should be discouraged.
- Herbicide resistant *Phalaris minor*, essential inputs (seed, fertilizer, timely irrigation, use of farm machinery), infrastructure (roads, storage, market), awareness among farmers are the major constraints which need to be tackled. Storage of wheat is a great concern today.
- Pathologists are keeping a watch on pests through survey and surveillance in India and SAARC through Disease Trap Nursery.
- In resource conservation technologies, diversification needs to be taken up in the rice wheat cropping pattern to increase profitability as well as soil health by including short duration summer moong (70 days).
- In quality, the major issues include bio fortification of micro nutrients, beta carotene, reducing anti nutritional factors as phytic acid.
- Economic analysis of latest wheat production technologies including all the factors, needs to be taken up.

- Policy support for production and marketing of product specific quality wheat, rural industries and cooperatives for producing value aided products, support for HRD and strengthen the existing policy to popularize wheat production technology.

The Directorate is emphasizing work on malt, fodder and feed barley. Dual purpose barley is targeted to tackle fodder problem. There is scope of improving barley cultivation in saline, alkali and rainfed areas in UP. For these problematic areas, barley varieties like NDB 1173, RD 2552 etc. should be grown.

Mr SN Islam IASRI, proposed that expert system in wheat crop management may be used to popularize the wheat production technologies. Dr SS Singh welcomed the suggestion for using the expert system with extension programme.

Dr Gurbachan Singh, Agriculture Commissioner, GOI, briefed the house about the ongoing agricultural schemes and informed that the ministry has funds for important research related issues. He desired action oriented, specific recommendations from this workshop for the Ministry of Agriculture. He made the following suggestions.

- Varieties needed for wider adaptability – terminal heat
- Varietal diversification is a must to minimize risk and maintain production
- Water stagnation causes about 10 percent loss in ameliorated soils, so suitable varieties are needed.
- Debate is needed on promotion of wheat in south India.
- Priority should be given to develop nutrient efficient varieties.
- Why area under zero tillage is declining and the farmers are discontinuing it, the reasons need to be find out.
- Integrated Nutrient Management – should be emphasized.
- Diversification of rice wheat cropping system with maize-wheat and or inclusion of short duration pigeon pea.
- Explore use of remote sensing for survey and surveillance of diseases in wheat
- A few trials can be on System of Wheat Intensification (SWI) as done by NGO
- The scientist need to take up extension responsibility of the technologies developed by them
- Participatory mode of work should be emphasized for better transfer of technology
- Collaboration between ICAR and DAC need to be strengthened. We have already taken an initiative by holding meetings with various ICAR institutes

Dr DP Singh suggested proper monitoring of FLDs and allocation of funds should be enhanced for proper monitoring, to which Dr GB Singh agreed.

Dr Shrimali enquired about the schemes on promotion of organic farming. Dr GB Singh informed that they have such schemes for specific crops in specific areas.

Mr SN Islam desired financial support for the Expert system on wheat crop management. Dr GB Singh mentioned that the proposal may be submitted to the DAC for consideration.

Dr JS Sandhu (ADG Seeds) reported that seed is an important component to enhance wheat production. About 70-80% farmers use the same seed. Farmers' survey indicated that more than 50 percent seed stored by them is not suitable for sowing. He emphasized the importance of participatory seed production and cited the success story of MP and Dharwad. He reported that we have target of 25 % seed replacement in self pollinated crops and 35% in cross pollinated crops.

He desired that old varieties should be replaced. Work on landmark varieties is needed. The farmers require specific storage facilities and we need to strengthen it. We should train the farmers for production of quality seed.

Research on seed technological issues need to be carried out.

Dr PS Minhas made a presentation on behalf of Dr AK Singh. The following conclusions were given.

- Water and nutrients are two vital inputs in agriculture, more eco-friendly efficient technologies for their application need to be developed. Since environmental concerns have now become overriding issues, agricultural intensification has to be carried out keeping it in mind while evolving management options. (e.g. Slow release fertilizers)
- Precision agriculture is likely to play a greater role in which site-specific nutrient management has to be coupled with the temporal specific nutrient and other input needs of the crop.
- Since integrated plant nutrient management systems hold the key to soil health and sustainable agriculture production, more efficient technological innovations are needed for bio-fertilizers, crop residue management, composting etc.
- Identification and incorporation of genes (including microbes) using modern bio-technological tools for enhancing nutrient use (extraction) efficiency should be taken up on priority.
- Promotion of resource conservation technology and policy to eliminate residue burning.

Dr RD Mishra suggested the need of timely availability of seed, fertilizer and water as their efficiency is interrelated.

Dr AK Sharma highlighted the prevalent pathotypes of wheat rusts in India. He suggested that the farmers should avoid planting of susceptible varieties particularly in foot hills of Punjab, J&K to avoid epidemic in north western plains zone. He emphasized on extensive monitoring of rusts, management of yellow rust in north west plains zone with chemicals, if needed, and diversification of rust resistance genes in popular cultivars of wheat so that new pathotypes may not emerge in short time. He also informed that due to this wheat worth crores of rupees was saved in 2009-10 in Punjab.

Dr Ravi Singh, CIMMYT informed that in China the farmers apply chemicals to enhance yield by 5% even in disease free crops. Dr Sharma mentioned that we don't spray the chemicals as we have disease resistant varieties and also want clean environment.

Dr Lal from NBPGR, New Delhi suggested that ergot disease status in India may be recorded while submitting the survey report.

Dr KV Prabhu, IARI, New Delhi suggested that if a variety is susceptible at seedling stage but if it has adult plant resistance(40S), it should be promoted. Dr SS Singh supported the view.

Dr RK Gupta, CIMMYT highlighted the management of yield gap in wheat production. The yield gap in eastern UP and Bihar was 47 percent as reported by the hub centres. The yield decline drastically in Bihar, Easteen UP, West Bengal when planted late particularly after 15th November.

Nexus of low productivity, poverty and rainfall , low lands, shifting river course, droughts/floods, 14 million ha rice fallow, low quality seed, were identified as the main constraints in eastern India.

The yield obtained under zero tillage with and without crop residue out yielded Rotavator sown wheat .

No till/puddling avoidance and mulch effects on yield are additive in nature.

New wheat cultivars need to be screened for grain and fodder. Subsidy on Rotavator is an issue which is creating problem in sustainability of resources, particularly hard pan which restricts water infiltration. Relay planter developed particularly for the cotton wheat crop rotation need to be popularized as it has one million ha area under this cropping pattern. Burning of green rice residue is more detrimental to health and environment.

The Chairman thanked all the presenters, organizers and the delegates for participating in discussion.

The session ended with vote of thanks to the Chair.

# SESSION – VI

## Strengthening International collaboration for wheat and barley research

**August 29, 2010**

**Chairman : Dr. R.P. Dua**
**Co-Chairman: Drs. G.S. Nanda & S.S. Singh**
**Rapporteur : Drs. Randhir Singh & Ratan Tiwari**

Dr Gordan Cisar of Cornell University highlighted the achievements made by Borlaug Global Rust Initiative (BGRI). Durable Rust Resistant in Wheat (DRRW) programme, a component under the BGRI addresses to effective stem rust resistance genes especially against Pgt Ug99.

The other objectives of DRRW listed under the presentation were mainly planning for the threat of emerging wheat rust variants, advocating and coordinating global awareness and cooperation, tracking wheat rust pathogens, supporting critical rust screening facilities in east Africa, breeding (conventional and molecular) to produce rust resistant varieties, developing and optimizing markers for rust resistance genes, reducing linkage drag associated with rust resistance genes and discovering new sources of rust resistance in wild wheat and wild barley.

Dr SC Bhardwaj from DWR, Regional Station, Shimla mentioned that some of the genes are effective in one country but not in the other, therefore, it need to be taken into consideration in addition to resistance against Pgt Ug99.

Dr Ravi Singh, CIMMYT highlighted the achievements made by CIMMYT. He informed that CIMMYT is involved with India and other countries in the following programmes :

- Durable Rust Resistant
- CSISA
- Harvest Plus (varieties with Zn and Iron concentration in the grain)
- Australian Cereal Rust Control Program

He also mentioned that Shuttle breeding started in 2006, remains a powerful tool to make progress. Under the Human resource enhancement the visit of Indian scientists has increased recently.

The common goal is to bring together global expertise for doubling the wheat productivity by 2050 in a sustainable manner under a complex climate change. For strengthening the future collaboration. CIMMYT has decided to establish Borlaug Institute for South Asia in India, yield potential consortium, hybrid wheat consortium and seed of discovery.

Dr SS Singh suggested that the list of scientists for training visit to CIMMYT should be in consultation with DWR and Dr Ravi agreed to the suggestion made.

Dr SS Singh, Project Director, DWR, Karnal mentioned that India values collaboration with international organizations on different aspects including the biotic stresses ( stripe rust, leaf blight, stem rust, herbicide resistance) and abiotic stresses (drought, heat and suppressive soils – alkaline/saline soils).

Dr Singh also emphasized that international organisations should facilitate the sharing of the material as germplasm exchange is very important for crop improvement.

Dr Flavio Capettini from ICARDA, Syria highlighted the achievements of barley programme at ICARDA and mentioned that ICARDA looks forward for collaboration with India on germplasm exchange. He also reported that ICARDA has utilized the barley germplasm received from India in crossing programme. He emphasized that barley can become a profitable crop in the changing climatic conditions. The collaboration can be in the following areas.

- Exploitation and use of genetic resources from ICARDA, India and other origin
- Phenotyping for drought, heat, salinity, rusts, net and spot blotch
- Identification and mapping of candidate genes for drought tolerance
- Initiate a pre-breeding program
- Malting barley
- Training and visits

The Chairman thanked all the speakers, organizers and the delegates for their constructive discussion. The meeting ended with vote of thanks to the Chair.

# SESSION VII

## Wheat Research in NWPZ: A Review

**August 29, 2010**

**Chairman:** Dr. R.R. Hanchinal,VC,UAS,Dharwar
**Co-Chairman:** Dr. S.S. Gosal, DR,PAU Ludhiana
Dr. S.S. Singh,PD,DWR, Karnal
**Rapporteurs:** Dr. S.K. Sethi,CCSHAU, Hisar
Dr. R.K. Sharma,IARI, New Delhi

Welcoming the delegates in his opening remarks Chairman appreciated the system of Zonal Review System in Wheat Crop. This review enhances the understanding of wheat research workers about the activities of other zones. In all seven presentations were made from different centres, which PAU Ludhiana, CCS HAU, Hisar, SKRAU, Durgapura, IARI, New Delhi, GBPUAT Pantnagar, SKUAST, Jammu and DWR, Karnal

All the speakers briefly discussed the achievements in different disciplines, conduction of coordinated trials, breeding methods developed along with the basic/applied research undertaken at their respective centres. Detailed highlights of centres are given below:

**Punjab Agricultural University, Ludhiana: Dr. (Mrs.) Indu Sharma**

PAU, Ludhiana has developed large number of varieties of wheat out of which 15 are still popular now–a-days in different parts of the country which includes eight in NWPZ, three in NEPZ, two in PZ, one each in NHZ and CZ. Newly developed variety PBW 550 accounted for 28% area in Punjab during 2009-10. Among the coordinated trials PAU's share in NIVT is 9.8% and its share in AVT's is 39.0%.

Punjab contributed above 60 percent of wheat towards the central pool of the country during last four decades which has come down to 43.8% during 2009-10. Punjab had maximum productivity of 45.07 qt./ha. during 2007-08, which declined to 44.63 q/ha during 2008-09 and incidence of yellow rust accounted for reduction of 1% which further went down to 43.04 q/ha during 2009-10 and 4.5 % reduction in productivity was due to rise in temperature.

Strategic research activities of the PAU includes wheat x maize system of double haploid production which being handicapped due to scorching summer months for the transfer of newly developed DH's is being shifted to Keylong/Lahaul Spiti. Hybrid wheat work involving CMS and CHA system was initiated and sincere efforts are being paid towards CMS system. Heat and drought tolerant genotypes are being produced using molecular marker analysis and biochemical mechanisms integrated with conventional methods. Wide hybridization and chromosome engineering techniques were used to transfer 20 disease resistant genes from 10 different sources in the background of WL 711. Holistic approach is being followed for rust resistance. *Lr 24, Lr 28, Yr 10* and *Yr 15* genes have been pyramided in PBW 343 using marker assisted selection. Genetics of KB resistance has been explored in RIL populations and QTL's associated with resistance to KB have been identified. Work has also been carried out on mapping and transfer of novel genes from progenitor species using molecular markers for introgression of stripe rust resistance and heat tolerance related traits to bread wheat. Rust resistance genes *Lr 57, Yr 40* and *Lr 58* from non progenitor *Aegilops* species have been introgressed in the background of WL 711. Biotechnological tools have been also utilized for the production of better quality lines. Good quality work has been carried out in resource conservation technologies like zero tillage, FIRBS and residue management aspects. Recommendations have also emerged out for control of termites, aphids, armyworm, brown wheat milk and pod bores.

**CCS Haryana Agricultural University, Hisar: Dr. A.S. Redhu**

In Haryana, Wheat is grown on 24.94 lac hac. and contributes 32 % towards control pool with 22% as seed replacement rate. Total production during 2009-10 was 105 lakh tones with an average yield of 42.13 qt/ha. CCS HAU, Hisar has released 14 varieties till date and latest releases are WH 1021 for late sown conditions of NWPZ and WH 1025 for rainfed conditions of Haryana State Four genetic stocks have also been registered with NBPGR and latest one is WH 730 for heat tolerance. Wheat varieties i.e. WHD 943 for timely sown, high fertility, WH 1080 for rainfed conditions and WH 1081 for restricted irrigated conditions are in pipeline.

Large numbers of genotypes have been identified for resistance to different rusts, powdery mildew, foot rot and loose smut, heat and drought tolerance, for quality parameters, high nutrition content etc. Pre breeding work involving synthetics and butire types have been initiated. Net Work project work is being carried out for thermal tolerance in wheat involving phenotyping for adaptive mechanisms to facilitate MAS based wheat breeding. Marker assisted selection for heat tolerance in wheat is being initiated for identification of potential morpho-physiological traits, DNA markers (QTLs), molecular indices of heat tolerance having corollary with morpho-physiological levels and plant functions.

For the control of seed borne diseases, loose smut, flag smut and Karnal bunt seed treatment with Tebuconazole (Raxil – 2DS) @ 1g/kg seed has being recommended. Work is also being carried out on cereal cyst, ear cockle and rice root knot nematodes. Future priority areas of the centre are development of improved genotypes with high yield and quality traits (Protein content > 12 %, Sedimentation value > 55 ml. and Hectolitre weight > 75 Kg/hl.), to identify genotypes for the biotic and abiotic stresses and to initiate the work on gene pyramiding on rust resistance and identification of molecular markers for heat tolerance.

**SK Rajasthan Agricultural University, Bikaner: Dr. S.N. Sharma**

Four wheat varieties were released during the last five years period which include one durum wheat variety. Sixty five genotypes were contributed in different NIVT's. Breeding work is being carried with major emphasis on moisture stress, heat tolerance along with rust resistance and nematode resistance.

Technologies developed for farmers include foliar spray of Thiourea @ 500ppm or Thioglycollic acid @ 100 ppm at tillering and ear head emergence resulted in higher yield under limited irrigation. Combined foliar spray of 0.2% $ZnSO_4$ + 100 ppm ascorbic acid increased grain and straw yield of wheat under zinc deficient soils under coarse textured irrigated micro farming situations. Raxil 2DS@ 1.25 g/Kg of seed has been recommended for control of loose smut and flag smut. Spray of Tilt @ 0.1% at ear head emergence and repeated after 10-15 days has been recommended for the control of Karnal bunt. Work is also being carried for generating material rich in quality parameters.

**IARI, New Delhi: Dr. K.V. Prabhu**

The wheat research program at IARI New Delhi located is focused on wheat improvement for optimum environments, cropping system interactive situations under conventional agronomic practices, temperature and moisture stress situations, end user needs and nutritional quality and hybrid vigour.

Apart from releasing the varieties suitable for late sown irrigated conditions of central and peninsular zones, the centre has primarily produced many cultivars including the latest highest yielder variety HD 2967 that is due for an immediate release.

The role of IARI in using wild species was emphasized with examples of transfer of leaf and stem rust resistance from various diploid and tetraploid species as well as compact ear heads with multi florets. The *T. timopheevi* has been responsible in donating near immune response to leaf and stem rust races. The new dwarfing genes D1 to D4 have been characterized for their complementation in imparity dwarfing trait, which are different from common Rht 2 and Rht 1 complex. The advances made by the centre in identifying high protein, high micronutrient lines were explained along with the effort in detecting different alleles responsible for bread/biscuit and other grain qualities. Detailed description of the pioneering role the centre has played in gene tagging, mapping and MAS in India was given. The leaf rust genes *Lr 9, Lr 19, Lr 24, Lr 28, Lr 25, Lr 48* have been tagged with SSR and SCAR which have been validated and are being employed. The products developed were PBW 343 + *Lr 24+Lr 48*; PBW 343 *Lr 28+Lr 48* and PBW 343 *+Lr24+Lr 28+Lr48* which need to be converted into cultivars through the fast lane of MABD specific varietal evaluation system under seed act. Finally the success achieved in standardizing hybrid development, seed production and exploiting heterosis in wheat were discussed inviting all breeding groups to join in using the system to develop commercial hybrids.

**GBPUA&T, Pantnagar: Dr. B. S. Rawat**

During the period under report, five varieties were released through SVRC and one more variety was identified for release. Three genetic stocks were registered with NBPGR while 7 genetic stocks were submitted for registration. Seventeen genotypes in wheat and two in barley are being evaluated in AVT's.

Vivtavax @ 2.5 g/kg seed gave 100 % disease control for loose smut, Tilt (Propiconazole) 25EC @ 750 m/ha and Folicur 250 EW (Tebuconazone ) @ 250 ml/ha as single spray was found effective in controlling foliar blight. IPM modules validated in a participatory mode were found superior to farmers practice. Recommended dose of fertilizer plus 0.5% Mn application is found beneficial for wheat under rice wheat cropping system. Rice residue retention + *Sesbania* before rice have significant effect on wheat yield in DS rice-wheat system.
Damage due to pod borer on wheat was reported for first time in Pantnagar. Dr. SS Singh, PD (Wheat) suggested studying the extent of damage due to pod borer. Dr. RP Dua, ADG (F&FC), ICAR, New Delhi enquired whether the alternate host (Pigeonpea/chickpea) crop is being cultivated or not in the region. As the absence of legume crops might have forced the pod borer to infest wheat crop. Dr. S.S. Singh suggested that centre wise experiment should be conducted to study the damage in consultation with DWR.

Studies on validation of markers were also undertaken for gluten strength, grain protein content, 1000 grain wt and *Lr 19* genes at Pantnagar station. Dr. S.S. Singh advised to test the efficacy and economic analysis of Folicur and Tilt for the control of yellow rust. Quinalphos 25 EC @ 125 g a.i./ha was found effective against foliage aphids of wheat. Screening of material against *Rhyzopertha dominica* and *Sitophilus oryzae* were also undertaken

**SKUAST, Jammu: Dr. S.K. Mondal**

Jammu region shares 98.2% and 99% of wheat area and production in J&K state. Two wheat varieties RSD 303 and RSP 81 were released at state level. Under basic and applied studies, winter wheat and wild species of wheat collected and maintained are being utilized in hybridization. Dr. S. S. Singh, PD, DWR appreciated the significant work undertaken at

the centre even with limited staff. He also suggested to stop the seed production and advised to concentrate efforts on pre breeding work involving wild winter wheat. A network project will be also submitted involving work on winter wheat involving Almora, DWR, Karnal and SKUAST, Jammu scientists.

**DWR, Karnal: Dr. Jag Shoran**

During last five years i.e 2005-09, sixty three entries were entered in NIVT's and thirty one entries were promoted to AVT's of different zones. Seven entries reached the stage of final year entry and four varieties namely DBW 16, DBW 17, CBW 38 and DBW 39 were released.Twenty six genetic stocks were registered with NBPGR, New Delhi. A total of 11350 lines are being maintained in germplasm and 2250 have been characterized. 635 lines have been send outside India and 675 strains have been imported from abroad.

Work is being carried out on winter x spring hybridization in collaboration with VPKAS Almora and segregating material has been given to various centers across the country. Hybrid wheat research has been reoriented from CHA to CMS system. Various thermal tolerant genotypes have been identified using screening facilities for thermal tolerance. It was observed that increase in minimum temperature causes more reduction in grain weight. Gene Pyramided lines involving *Lr 24, Lr 28, Lr 35, Lr 37, Yr 10* and *Yr 15* genes have been developed in collaboration with PAU & IARI using Marker Assisted Selection. Genomic locations of QTLs associated with post harvest sprouting have been worked out. Molecular characterization of indigenes genotypes for yield contributing traits has been carried out. Indian land race *i.e.* NAP HAL has been utilized for the improvement of biscuit quality involving molecular marker assisted selection. Mapping populations are also available for various quality parameters and disease resistances.

Wheat varieties have been evaluated under various RCTs. Long term tillage effects on wheat productivity have been worked out using Zero tillage, Rotary tillage, conventional tillage, strip tillage and FIRBS. Studies on residue management and nitrogen levels in wheat productivity and surface residue retention and irrigation regimes in wheat productivity have been carried out. Studies have been also carried out on multiple resistances in *Phalasis minor.* IPM module has been promoted at farmers' field which resulted in 10-12% yield advantage in NWPZ and 14% in NEPZ.

RAPD profiles of Karnal bunt isolates and head scab pathogens have been worked out. 318 Indian wheat material were screened against Ug 99 at Njoro (Nakuru), Kenya and 78 genotypes were identified which exhibited resistance against this race.

Product specific varieties have been developed for various quality parameters and nutrient traits. Molecular marker assisted backcross breeding for the improvement of biscuit making quality has been done. Antioxidant activities are more in durum wheat as compared to bread wheat in NWPZ while it is reverse in other zones.

Dr JP Tandon, Ex Project Director, Wheat advised to find out the causes/barriers for not achieving the experimental yield in now-a-days experiment which is hardly around 45-50 qtl./ha. which otherwise used to be 65-75 q/ha. a decade ago. He also laid emphasis that experiments be conducted on local agronomical aspects of various states in addition to routine co-ordinated experiments.

The session ended with vote of thanks to the Chair.

# SESSION IX

## Plenary Session

**Date: August 30, 2010**

**Chairman: Dr. R.P. Dua, ADG (FFC)**
**Co-chairman: Dr. S.S. Singh, PD (DWR)**
**Rapporteurs: Drs. Gyanendra Singh & S.C. Tripathi**

At the onset of session, Chairman welcomed all the delegates and asked the Principal Investigators to present the major recommendations and work plan chalked out during the research review sessions. Dr Jag Shoran, PI Crop Improvement presented the work plan of Crop Improvement for *Rabi* 2010-11. He elaborated the constitution of different trials and nurseries in different zones and production conditions as per the quota of each centre and promotion retention norms. Dr Jag Shoran emphasized that quota is flexible depending upon performance of centre and material availability. It was mentioned that performance under rainfed (RF) conditions was essential for promotion or retention of genotypes and such performance under restricted irrigated (RI)situation only will not be enough for inclusion in trials under RF/RI conditions. Project Director suggested that the RI (Restricted irrigated) trials in NWPZ should be discontinued and hence, there would be no trial of NIVT-5A under RI condition in NWPZ from the ensuing season. Dr Jag Shoran mentioned that high altitude areas trial of NHZ has been discontinued. He also presented the allocation of breeder seed production during Rabi 2010-11 at 25-26 centres. It was also informed that Indore centre will conduct the both physiological trials.

Dr AK Sharma, PI (Crop Protection) presented the major recommendations of Crop Protection programme including constitution of IPPSN, PPSN and MDSN etc. He provided a list of varieties that were resistant to various diseases. He also presented schedule of survey teams and stated that monitoring for Karnal bunt and other seed born diseases will be continued. Dr Sharma made a mention that states should not release disease susceptible varieties through SVRC. One technical recommendation was that one to two spray of propiconazole (Tilt 25 EC @ 0.1%) was recommended for control of powdery mildew.

Dr AK Sharma highlighted the need of SAARC and Trap nurseries and stated that through SAARC nursery only, we could know about pathotypes 78S84 two years before its appearance in India. He informed that CIMMYT-Nepal office has agreed to coordinate SAARC and Trap nursery in South Asia. It was also discussed and agreed to take up ergot disease in post harvest surveys and also entomologist should keep vigil on shoot fly and aphids incidences.

Dr RK Gupta, PI (Quality) presented recommendations from Quality programme including sample analysis work. He informed the house that Quality Component Screening Nursery (QCSN) will now be conducted at 12 centres. The centers with molecular work facilities should actively utilize molecular markers. The quality work with *T. dicoccum* wheat should be strengthened at UAS Dharwad center. Dr. Gupta pointed out that dates for sending grain samples need to be strictly adhered. Dr. Jag Shoran said that whatever donors the quality group has identified including QCSN sources, should be provided to the breeders.

Dr SS Singh informed that hybridization programmes going on at centres should be further strengthened and each centre should attempt at least 20-25 fresh combinations for quality improvement. During the discussion Dr RP Singh from PAU, Ludhiana said that quality material / varieties should get some concession while retaining, promoting or identifying varieties. Dr SN Shukla, Former ADG said that last year variety HS 490 was identified and released on the basis of its quality.

Dr RK Sharma, PI (Resource Management) presented recommendations and technical plan of work from Resource Management programme. He elaborated three technical recommendations.

1. For control of complex weed flora in wheat, apply ready mix sulfosulfuron 25% + carfentrazone-ethyl 20% WDG at 45 (25+20) g a i/ha with cationic surfactant of 625-750 ml/ha at 30-35 days after sowing.
2. For higher profitability and sustainability of the rice-wheat system, direct seeded rice followed by wheat with rice residue incorporation or surface retention and 25% additional nitrogen, should be practiced.
3. Grow summer green gram or cowpea after wheat or vegetable pea after rice followed by late sown wheat in rice-wheat for greater system productivity, profitability and sustainability. For higher productivity of pulse crops, grow green gram, cowpeas and vegetable peas under bed planting or zero tillage.

During discussion Dr RP Dua, highlighted the importance of FLDs and need for their monitoring during crop season. He said that we need to do impact analysis of FLDs and for monitoring there should be some money to cross check reporting. He informed that DWR may ask for some extra funds to monitor FLDs.

Dr BN Patil from Dharwad said that high temperature around heading and anthesis is a problem and we need sprinkler / water spray at this time to get good yields. He also informed that at Udaipur centre, experiments conducted with sprinkler irrigation and spray of thio-urea have shown good results. Dr. PC Mishra said that old experiments with 2 % urea application have advantage. Dr. SS Singh told that in light of advantages of foliar sprays it will be necessary to put this as a recommendation in all the technical bulletins.

Dr RPS Verma, PI (Barley) presented recommendations and plan of work of Barley programme. He elaborated the constitution of different trials and nurseries in different zones and production conditions. He categorically mentioned the findings and work plan of Crop Protection and Resource Management programmes. Three important recommendations came from Resource Management section.

1. Based on three years experimentation on tillage options it can be concluded that reduced tillage (one harrowing + one cultivator) is enough for field preparation for barley sowing in NEPZ. It gives comparable yield with conventional tillage and saves energy, labour and time.
2. Line to line sowing of 18 cm can be followed in two –row malt barley for obtaining higher yield without adversely affecting the grain quality.
3. Application of 75% of recommended dose of fertilizer along with 5 tons FYM and biofertiliser (Azotobacter) is recommended for obtaining equal yield on sustainable basis against the 100 % inorganic fertilizer.

Dr Verma highlighted that with host resistance only, aphids can be managed. Dr Shrimali informed that they have got a genetic stock which carry aphid resistance that may be utilized in future breeding programmes to manage this pest.

Dr RP Dua said that for dual purpose barley and tillage options, B:C ratio should be worked out.

Dr SS Singh, Project Director (DWR) informed the house that following varieties of wheat and barley have been identified for different agro climatic zones and production conditions in the Varietal Identification Committee Meeting held on 28-08-2010.

| Varieties | Production condition | Zone |
|---|---|---|
| Wheat | | |
| HS 507 | IR/RF-TS-TAS | NHZ |
| PBW 621 & DBW 50 | IR-TS-TAS | NWPZ |
| PDW 315 & WHD 983 | IR-TS-TDM | NWPZ |
| WH 1080 | RF-TS-TAS | NWPZ |
| HI 1563 | IR-LS-TAS | NEPZ |
| MP 3288 | RF/RI-TS-TAD | CZ |
| NIAW 1415 | RF/RI-TS-TAD | PZ |
| Barley | | |
| DWR 73 | IR-LS | NWPZ |
| UPB 1008 | RF-TS | NHZ |

Felicitation of breeders whose varieties were released by CVRC during the last year was organized and Dr RP Dua, ADG (FFC) presented mementos to them. Besides, five scientists namely Drs. Jag Shoran, (Mrs) SK Mann, MS Beniwal, BA Kunadia and Sh VB Lokhande, who would be superannuating before the next workshop, were honoured for their contributions to the AICW&BIP.

**General Recommendations :**

1. The issue of sending direct indents for international nurseries and trials was discussed and it was agreed that the NBPGR, New Delhi should not entertain such indents also the handling and quarantine fee should not be charged from DWR being ICAR institute. Dr. RP Dua clearly stated that hence forth all the international germplasm in the country should come through DWR only.
2. Dr SS Singh informed that arbitrary nomination for CIMMYT visiting scientists is disturbing the regular schedule and thus need to be discouraged. He suggested that for all such visits nominations of scientists will be made by PD (Wheat).
3. The issue of need based contingency came up during the discussion and the Chairman was of the view that contingency is approved plan wise and thus can not be increased. He suggested that this issue be taken up in XII$^{th}$ plan. However, Project Director can give some additional money on the basis of extra experimentation.
4. The ADG said that poor performing centres should be warned in writing (three months notice) and if they do not show improvement even after written warning, we may change the centre.
5. It was agreed that in XII$^{th}$ plan document, provision for one Bhopal seed drill, plot thresher and single plant thresher be kept for each funded centre.

Three proposal namely from Durgapura, UAS Dharwad and DWR, Karnal came up for holding the next AICW&BIP workers meet. However, Dr. SS Singh stated that next Workshop being 50$^{th}$ (golden jubilee) may be organized at DWR, Karnal which was agreed upon by the house.

Dr Jag Shoran, PI (Crop Improvement) presented a formal vote of thanks to the ICAR authorities, PAU authorities, organizers, sponsors and delegates.

# ANNEXURE-I

## List of Final Year entries alongwith check varieties: 2010-2011

1. **Northern Hills Zone**
   i) Advance Varietal Trial (IR-TS-TAS)
   Varieties : HS 514, TL 2969
   Checks : HS 240, VL 804, TL 2942, HS 507(I)

   ii) Advance Varietal Trial (RF-TS-TAS)
   Varieties : HS 514, TL 2969
   Checks : HS 240, VL 804, TL 2942, HS 507(I)

2. **North Western Plains Zone**
   i) Advance Varietal Trial (IR-TS-TDM)
   Varieties : PDW 322, WHD 946, HI 8703
   Checks : PDW 233, PDW 291, DBW 17, PDW 314, PDW 315(I) & WHD 943(I)

   ii) Advance Varietal Trial (IR-LS-TAS)
   Varieties : PBW 639
   Checks : PBW 373, WH 1021, PBW 590

   iii) Advance Varietal Trial (RF-TS-TAS)
   Varieties : PBW 644
   Checks : C 306, PBW 175, PBW 396, WH 1080(I)

   iv) Advance Varietal Trial (RI-TS-TAS)
   Varieties : PBW 644, HD 3043
   Checks : C 306, PBW 175, PBW 396, WH 1080(I)

3. **North Eastern Plains Zone**
   No variety was promoted for final year test in any of the Advance Varietal Trials

4. **Central Zone**
   i) Advance Varietal Trial (IR-TS-TAD)
   Varieties: HI 8704(d)
   Checks: Lok 1, GW 322, HI 1544, HI 8498(d), MPO 1215 (d)

   ii) Advance Varietal Trial (IR-LS-TAS)
   Varieties: MP 3304
   Checks: DL 788-2, MP 4010, HD 2864, HD 2932

   iii) Advance Varietal Trial (RF-TS-TAD)
   Varieties: HI 1572
   Checks: A9-30-1(d), HI 8627(d), HI 1500, MP 3288(I)

   iv) Advance Varietal Trial (RI-TS-TAD)
   Varieties : HI 1572
   Checks: A-9-30-1(d), HI 8627(d), HI 1500, MP 3288(I)

5. **Peninsular Zone**

i) Advance Varietal Trial (IR-TS-TAD)
Varieties: UAS 428(d), UAS 320 (d)@, Lok 62
Checks: NIDW 295(d), HI 8663(d), GW 322, MACS 6222

ii) Advance Varietal Trial (IR-LS-TAD)
Varieties: HD 3040, AKAW 4210-6, HI 1571
Checks: NIAW 34, RAJ 4083, HD 2932

iii) Advance Varietal Trial (RF-TS-TAD)
Varieties: MP 3299
Checks: NI 5439, AKDW 2997-16(d), MACS 1967(d), NIAW 1415(I)

iv) Advance Varietal Trial (RI-TS-TAD)
Varieties: MP 3299
Checks: NI 5439, AKDW 2997-16(d), MACS 1967(d), NIAW 1415(I)

6. **Southern Hills Zone**

No variety was promoted for final year test in Advance Varietal Trial

*Issued by the Project Director, Directorate of Wheat Research, Karnal in the 49th All India Wheat and Barley Research Workers' Meet hosted by the Punjab Agricultural University, Ludhiana during August 27-30, 2010.*