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Quality Seed Production Techniques of Newly Released Wheat Varieties under North West Plain Zone Conditions

Quality seed plays crucial role in realising true genetic potential of the any variety and transferring genetic gain to the farmers. New varieties developed by breeders backed by apt seed production programme leads to rapid spread of new varieties at farmers' doorstep. It is well proven fact that, use of quality seed of improved varieties contributes towards 15-20% increase in agricultural productivity. Therefore, it is imperative that quality seed production at farmers' field to be strengthened and maximum number of farmers to be encouraged for quality seed production at own farm. These will results in assured seed supply of newly released varieties at faster pace and genetic gain achieved by plant breeding can be effectively transformed up to farmers' field. However, farmer's awareness towards use of quality seed needs to be improved in order to achieve higher Seed Replacement Rate (SRR) and varietal Replacement Rate (VRR) of the country. Efforts are being made by various Govt. agencies, State Department of Agriculture, ICAR Institutes and SAU's to engage farmers through participatory seed production programme and extension programme and disseminate know-how of quality seed production at faster rate.

INTRODUCTION

Seed is considered as a vital input, having a crucial role in assuring

food security. Seed always decides fate of all other agricultural inputs *viz.,* land, irrigation, fertilizer, labor etc. and efficacy of all above inputs revolves around viability and vigour of the seed. It becomes imperative to use quality seeds of improved varieties by the farmers to assure uniform field establishment and potential yield. As wheat is self-pollinated crop and quality seed produced by farmer on his own farm with due precautions could be effectively utilized for three consecutive years, leading to rapid multiplication and enhanced availability of quality seed of newly released varieties to the farming community. These will ensure seed exchange among wheat growers at faster pace and will reduce dependency on external sources for timely availability of quality seeds of improved varieties.

PACKAGE OF PRACTICES MAY BE FOLLOWED BY FARMERS FOR QUALITY SEED PRODUCTION OF WHEAT

SOURCE OF SEED

Truthfully labeled Seed supplied by ICAR-IIWBR, Karnal or certified seed supplied by ICAR Institutes, SAU's, KVK's, State Department of Agriculture, State Seed Corporation/National Seed Corporation of following wheat varieties under north western plain zone conditions.

Name of variety	Duration	Seed rate (Kg/acre)
Irrigated Early Sown (20th Oct.-5 the Nov.)		
DBW-303	155 days	40
DBW-187	150 days	40
Irrigated Timely Sown (01st Nov. -25th Nov.)		
DBW-222	145 days	40
DBW-187	150 days	40
HD 3226	142 days	40
HD 3086	143 days	40
WB 2	142 days	40
Irrigated late sown conditions (10th Dec. – 25th Dec.)		
DBW 173	122 days	50
PBW 752	120 days	50
Irrigated Very late sown conditions (25th Dec. – 15th Jan.)		
PBW 757	104 days	50
Restricted irrigation Timely sown conditions (25th Oct.-20th Nov.)		
HI 1620	146 days	40
HD 3237	145 days	40

DBW-187

DBW-222

DBW-303

FIELD SELECTION

For seed production of wheat, plot needs to be selected where wheat crop is not grown or cultivated in previous year. This is will prevent contamination from other varieties or volunteer crops. Selected field should be fertile, leveled and well drain type for quality seed production of wheat.

ISOLATION DISTANCE

Wheat is self-pollinated type crop and it is mandatory to maintain 3 meter of isolation distance between adjacent wheat seed/ grain production plot to avoid any mechanical mixture or contamination from other varieties. However, for loose smut infected plots, it is recommended to maintain 150 meters of isolation distance.

PREPARATION OF FIELD

After harvesting of *kharif* crop, it is recommended to plough the selected land and at least two- three times harrowing to be done for optimum sowing conditions. To avoid any infestation of termites, at the

time of harrowing, Chloropyriphos 20 EC @ 2.5 liter mixed in 50 kg of soil or sand and may be applied to control termites.

SEED TREATMENT

For control of seed borne disease, seed treatment with Vitavax or Carbendazim @ 1.25 gram/kg of seed for control of loose smut may be done or in the termite prone areas, seed treatment with Chlorpyriphos @ 4.5 ml product dose/kg seed, may be taken up.

SOWING

It is very essential practice to know germination of seeds before sowing of seeds in the field. 400 seeds may be selected for germination test in germination paper (paper towel method) or newspaper under moist condition for 8 days at room temperature. After completion of 8 days, number of seeds germinated needs to be counted. If germination percentage is above 85% in wheat seeds, then the seed lot is considered as fit for sowing.

SOWING TECHNIQUE

Row sowing is always preferred during seed production as it facilitates inspection and ease in rouging. Row spacing of 20-22 cm is recommended for wheat seed production. Depth of sowing in wheat is crucial for proper field establishment as deep sowing delays the seed germination and damages the emerging coleoptiles of the seedling. Therefore, wheat seed should be placed at depth of 5- 6 cm to ensure proper field stand. Timely sowing of seeds is always preferred for seed production of wheat.

IRRIGATION

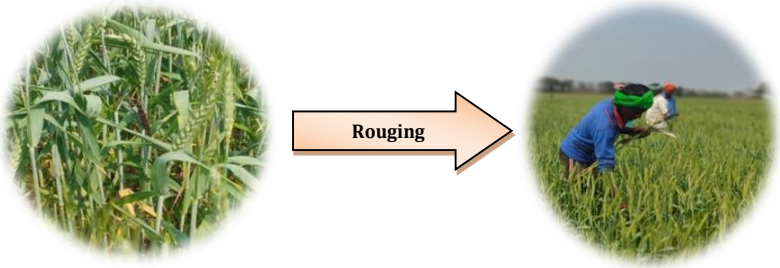
In the wheat seed production plot, normally six irrigations are recommended at following stages of crop growth.

Irrigation schedule	Days after sowing (DAS)	Stage of Crop
1st Irrigation	20-25	Crown root initiation
2nd Irrigation	40-45	First node formation
3rd Irrigation	60-65	Jointing stage
4th Irrigation	90-95	Boot stage
5th Irrigation	110-115	Milk stage
6th irrigation	120-125	Dough stage

However, crown root initiation and flowering stages are the most critical to moisture stress in wheat crop. If rainfall occurred at any of the above stages then irrigation for that particular stage may be skipped.

ROUGING OF SEED PRODUCTION PLOT

Term rouging refers to the selective removal of undesirable plants *viz.,* other varieties plants, diseased plants, off types, other crop plants or weed plants, and volunteer plants from the seed production plot. Rouging is carried out in order to maintain genetic purity, physical purity and disease free attributes of seed plot. In the wheat crop, rouging is advised at heading and maturity stage, as most of the off types and other varieties plants are easily identified during these stages of crop growth.



Identification of diseased plants/ offtypes **Rouging of wheat seed plot**

It is recommended that, inseparable other crop plants *viz.,* Barley, Oat, Triticale and Gram should be rouged out from wheat seed plot. Similarly, Wild oat/Guli danda (*Phalaris minor*) and Wild morning glory/ Hirankhuri (*Convolvulus arvensis* L) are considered as a objectionable weeds in wheat seed production, therefore efforts needs to be mounted to rogue out above mentioned weed plants. Diseased plants and offtypes may be carefully removed and dumped or destroyed in isolated place.

FERTILIZER APPLICATION

For quality seed production of wheat, timely sowing of seeds is preferred to avoid any losses due to weather vagaries during harvesting and threshing of the crop. For timely sown conditions following fertilizer dose is recommended under North Western Plain Zone conditions, well decomposed compost @ 4-5 ton per ace may be applied well before 15- 20 days of sowing. Further, fertilizers may be applied as per following schedule,

Stage	N/ acre	P/ acre	K/acre
Timely sown and irrigated condition	60 kg N	24 kg P	16 kg K
To fulfil above recommend dose, 52.0 kg Diammnouim Phoshapte (DAP) per acre; 109.0 kg Urea and 27.0 kg of Murate of Potash (MOP) per acre is required. Out of this 43.0 Kg Urea is applied at first and second irrigation respectively. Whereas, 24.0 Kg urea, 52.0 Kg DAP and 27.0 Kg MOP are applied as basal dose at the time of sowing.			

WEED MANAGEMENT

Weed seeds free seed production is pre-requisite for producing quality seeds and avoids further contamination in seed multiplication chain. Among various methods of weed control, chemical method is considered as the most effective and based on weed flora following herbicides can be applied for effective control of weeds.

Weed types	Herbicide	Product dose (ml or gram per acre)	Time of application
Broad and Grass type of weeds	Pendimethalin	1250 ml	As pre- emergence (Up to 03 days of sowing)
Grasses type Phalris minor (Mandus/ Kanaki) Wild oat/ Jangali Jau etc.	Sulfosulfuron or Isoproturon	13 gram 500 gram	30-35 DAS 30-35 DAS
Broad leaves type Chenopodium album (Bathua); Convolvulus arvensis (Hirankuri); Anagallis arvensis (Krishnaneel) and Melilotus indica (Metha) etc.	2,4-D (38 EC) or Metsulfuron	500 ml 08 gram	30-35 DAS 30-35 DAS

DISEASE AND PEST MANAGEMENT

1. LOOSE SMUT OF WHEAT

Loose smut is seed borne disease in wheat and needs to be effectively control during seed production to avoid further spread of disease in new areas. For this, seed treatment with Carbendazim (50 WP @ 2.5 gm/kg seed) or Tebuconazole (2DS @ 1.00 gm/kg seed) is recommended.

2. KARNAL BUNT

Karnal bunt infection is not desired in the seed production plot of wheat and seed standard are being suggested under Indian Minimum Seed Certification standards, 2013. Therefore following measures may be taken for effective control of karnal bunt disease.

- One spray of Propiconazole 25EC @ 0.1 percent using 200 liter of water at 50% flowering. If conditions are favourable for the disease then repeat at an interval of 15 days to control the disease.
- In KB prone areas, the seed crop can be given one spray of Propiconazole or two sprays of *Trichoderma viride* at tillering and ear head emergence stage.

3. YELLOW RUST

Spraying the crop with Propiconazole (0.1 per cent), or Tebuconazole (@ 0.1%) at stripe rust initiation using 200 liter of water/ha is recommended. Usually, it is done in the first half of February.

4. APHIDS

For the management of aphids, foliar spray of Imidacloprid 17.8 SL@40ml per acre is recommended.

HARVESTING AND THRESHING

Generally in India, harvesting is carried out manually however recently combine harvesters are being deployed for ease in harvesting and threshing. Therefore, it is essential to clean properly all combine machines to avoid any admixtures/ mechanical mixtures of different varieties.

STORAGE

It is recommended that seeds should be dried properly before storage to avoid storage losses due to high moisture in seeds. Seed crop is subjected to sun drying for 3- 4 days to reduce the moisture content at safe level i.e. less than 12%. It is suggested that, always use new bags for storage of seed to avoid mixture, further storing the seed bags, it is recommended to use wooden pallets to avoid take up of moisture by seeds from floor. Stored seeds can be effectively fumigated to control infested pests using Aluminum phosphide @ 3 gram per ton of seed. For this process, seed are covered in polythene sheets/ tarpaulin and aluminum phosphide is applied to release phosphine gas and kept as such for at least 4-5 days without any disturbances. Fumigation effectively control storage grain pest, however precaution need to be taken to avoid over dosage as it may severely affect seed quality parameters *viz.,* seed germination and vigour.

SEED CERTIFICATION

As per Indian seed Act, 1966, seed certification is voluntary whereas labeling is compulsory. Seed certification is allowed in those varieties which are notified under Section 5 of the Indian Seed Act, 1966. As per Indian Minimum Seed Certification Standards, 2013 published by Central Seed Certification Board, Ministry of Agriculture Cooperation and farmers Welfare, Govt. Of India, following field and seed standards to be followed for production of foundation and certified seed of wheat.

A. Field standards

Class of seed	Minimum	Maximum permissible level (%)				Remarks
	Isolation (meter)	No. of field inspections	Off types	Inseparable other crop plants	Plants/heads affected by designated diseases	
FS	3 (150)*	2	0.05	0.010	0.10	*Fields of wheat , triticale and rye with infection of loose smut in excess of 0.10% and 0.50% for FS and CS
CS	3 (150)*	2	0.20	0.050	0.50	

B. Seed standards

Class of seed	Minimum		Maximum permissible level (%)			Remarks
	Purity (%)	Germination (%)	Total weed seed (No./kg)	Objectionable weed seeds (No./kg)	Seeds infected by disease	
FS	98	85	10	2	0.050*%	*Karnal bunt
CS	98	85	20	5	0.25 %	

CONCLUSION

By adoption of techniques for quality seed production of the recent wheat varieties farmers can produce healthy seeds for their own use and reduce dependency on external sources for seed input.

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