AgroScience Today

Popular Article

e-ISSN: 2583-0147

Volume 4 Issue 9
Page: 0654 – 0659

Quality Wheat Seed Production using Improved Varieties under Different Sowing Conditions in Peninsular Zone of India

Nilesh Magar[1*], Umesh Kamble[2] , C N Mishra[3] and Amit Sharma[4]

[1] Assistant Professor of Agril Botany, Agricultural Research Station, MPKV Niphad Dist: Nashik Maharashtra, India.

[2] Senior Scientist, Seed Technology, ICAR- Indian Institute of Wheat & Barley Research, Karnal, Haryana, India.

[3] Senior Scientist, ICAR- Indian Institute of Wheat & Barley Research, Karnal, Haryana, India.

[4] Principal Scientist, ICAR- Indian Institute of Wheat & Barley Research, Karnal, Haryana, India.

Corresponding author's e-mail: *magarnm@gmail.com*

Published on: September 30, 2023

ABSTRACT

According to the climatic and geographical requirements of each of the wheat growing zones, ICAR-Indian Institute of Wheat and Barley Research, Karnal and other agricultural universities produce different varieties to provide good quality seeds to the farmers. Farmers can produce good quality seed at their own field by selecting improved varieties and following standard package of practices as per sowing conditions.

INTRODUCTION

Wheat is the major crop in India. Cool and dry climate is considered favorable for the growth of this crop. In India, wheat is grown mainly in the states of Punjab, Haryana, Rajasthan, Uttar Pradesh, Madhya Pradesh, Bihar, West Bengal, Uttarakhand, Himachal Pradesh, Karnataka and Maharashtra. The wheat growing area in India is divided into five regions as per climatic conditions such as North-Western Plains, North-Eastern Plains, Northern Hill Zone, Central and

Peninsular Zone. During 2022-23, wheat crop was cultivated in 32.44 million hectares in the country, yielding 112.74 million tonnes with an average productivity of 35.43 quintals/ha. (ICAR-IIWBR 2023).

The states of Maharashtra, Andhra Pradesh, Karnataka, Goa and Tamil Nadu (except Nilgiris & Palani Hills) are included in the Peninsular Zone of India. In this zone, *sarbati* wheat (*Triticum aestivum*), *bansi* wheat (*Triticum durum*) and *khapli* wheat (*Triticum dicoccum*) are mainly cultivated as the climate is considered favorable for the same species. Wheat crop has to face high temperature especially during stalk and flowering stage in this region. Therefore, the farmer needs short duration and high temperature tolerant varieties during flowering and full growth stage. The wheat productivity of this region is slightly lower than that of the North West plains (Punjab and Haryana) but from the quality point of view the wheat of the central and peninsular regions is considered superior having export potential. Karnal Bunt, a seed-borne disease, is not commonly found in wheat produced in this region, so the wheat produced in this region can capture the international market which has become the need of the hour.

SPECIES OF WHEAT CULTIVATED IN INDIA

A) Sarbati wheat (*Triticum aestivum*): It is considered best for *chapatis*, breads, biscuits and cookies. Making *chapatis* and breads requires stronger and expanded gluten and more protein in wheat. Madhya Pradesh, Gujarat, Maharashtra, and parts of southern Rajasthan are considered suitable for cultivation of this wheat. Several new varieties of this wheat have been developed which are resistant to rust as well as high yielding.

B) Durum/Bansi wheat (*Triticum durum*): Madhya Pradesh, Gujarat, Maharashtra, Karnataka and parts of southern Rajasthan are considered suitable for cultivation of this wheat. This wheat also grows well in dry and hot climates. *Bansi* wheat has high protein content and is used to make premium *rava* or *suji*. It is the first choice for making pasta, macaroni/noodles due to its high gluten protein and uniform golden color.

C) Emmer/Khapli wheat (*Triticum dicoccum*): *Khapli* wheat has long narrow grains and is generally used to make *rava*, *kheer* and breakfast foods. It is considered a rich source of protein and carbohydrates. It has excellent grain quality characteristics and has higher dietary fiber content than other species (more than 16%). *Khapli* wheat varieties are famous for traditional food, better taste and more nutritional value. It contains protein (11.8 to 15.3%) and carbohydrates (78.7 to 83.2 %). It has a low glycemic index which makes it suitable for diabetic patients.

STANDARD PRACTICES FOR QUALITY SEED PRODUCTION OF WHEAT

While releasing new varieties in India, breeder seed is first produced through wheat breeders. ICAR Institutes or Agricultural Universities are responsible for the same. The same seed is further converted into foundation and certified seeds through National Seed Corporation, Mahabeej or different seed companies. In all these processes it may take three to four years from the time the variety is developed to reach the farmers. Once the seed of the new variety reaches the farmer, with certain precautions, the farmer can produce the seed himself or tie up

with a seed company or an organization like Mahabeej for certified seed production. Wheat is a self-pollinating crop and if some important precautions are taken, wheat farmers can self-produce wheat seeds and use these seeds for two to three years if properly stored.

QUALITY REQUIREMENTS FOR WHEAT EXPORT

- Moisture content of wheat should be less than 12.0%
- The content of other adulterants in wheat should be less than 0.70 %
- Protein content in wheat should be more than 12.0%
- The content of broken or over dried grains in wheat should be less than 4.0%
- Damaged grains should be less than 2.0% in wheat
- Grain damage should be less than 1.0%
- Wet gluten should more than 25.0%
- Falling number of grains should be more than 300 seconds
- Hectoliter weight should be more than 78.0 kg/hl

(Source: Haryana State Co-operative Supply and Marketing Federation Ltd.)

Selection of varieties: Agricultural production can be increased by 15 to 20% by using improved seeds. Rapid dissemination of improved varieties is possible only if quality seed production programs are implemented and seeds are rapidly supplied to farmers.
Major wheat varieties recommended for cultivation in Peninsular Zone of India are presented in Table 1.

Source of Seed: Always use foundation or certified seed supplied by ICAR Institute, State Agricultural University, Agricultural Seed Centre, State Agriculture Department, State Seed Corporation/National Seed Corporation or recognized Seed Company. Keep the label/tags/bills of the seed material used for sowing.

Seed Treatment: Seed treatment is necessary to prevent seed borne diseases. Seed treatment should be done with Carbendazim at the rate of 1.25 gm per kg seed or Tebuconazole 1.0 gm per kg seed.

Isolation Distance: As per Indian Seed Certification (2013) standard, 3 m isolation distance is required for wheat seed production. But if the nearby area is affected by Smut disease, then the same distance should be up to 150 meters.

Roguing: This is an important step in seed production. Genetic purity as well as physical purity of the seed depends on proper roguing. The seed certification body may reject the seed plot if the off-types in the seed production are not removed. Therefore, it is necessary to identify the plants of other varieties, plants with different characteristics like leaf color, shape, stem color, height, hairiness, shorter or longer flowering period *etc.,* should be removed completely. Diseased plants should be destroyed to maintain the genetic purity of the variety.

Irrigation: Irrigation should be given according to the stage of wheat crop growth. Depending on the availability, 4 to 5 irrigation should be given in medium to heavy soils.

Table 1. Wheat varieties recommended for cultivation in Peninsular Zone of India under different sowing conditions

Sowing Condition	Period of sowing	Species	Name of the variety	Year of release	Productivity (q/ha)	Days to maturity
Timely Sown Rainfed Condition	15 to 31 October	*Triticum aestivum*	Netravati (NIAW 1415)	2010	19.0	105
			Vimal (AKAW 3722)	2014	42.0	107
			UAS 347	2015	18.0	96
			UAS 375	2018	21.4	103
		Triticum durum	MACS 4028	2018	20.3	103
			Panchvati (NIDW 15)	2022	15.0	105
Timely Sown Restricted Irrigation condition (Max 2 irrigations)	25 October to 5 November	*Triticum aestivum*	Netravati (NIAW 1415)	2010	28.5	110
			Pusa Ujala (HI 1605)	2017	30.0	105
			Phule Satwik (NIAW 3170)	2020	33.7	107
			Phule Anupam (NIAW 3624)	2022	32.5	107
		Triticum durum	GW 1346	2019	28.5	100
			HI 8802	2020	29.5	106
			HI 8805	2020	30.9	100
			MACS 4058	2020	29.0	105
			NIDW 1149	2021	26.0	103
Timely Sown Irrigation condition	5 to 15 November	*Triticum aestivum*	UAS 304	2013	46.0	110
			MACS 6222	2014	50.0	110
			Phule Samadhan (NIAW 1994)	2016	46.1	115
			MACS 6478	2016	45.0	107
			DBW 168	2018	48.8	112
		Triticum durum	MACS 3949	2017	44.0	111
			DDW 48	2020	44.0	110
		Triticum dicoccum	MACS 2971	2009	50.2	107
			HW 1098	2013	45.5	110
Late Sown Irrigation condition	15 November to 15 December	*Triticum aestivum*	AKAW 4627	2012	39.0	112
			MACS 6222	2014	50.0	110
			Pusa Amulya (HD 3090)	2014	42.1	101
			Phule Samadhan (NIAW 1994)	2016	44.3	110
			PDKV Sardar	2016	39.2	108
			Pusa Wani (HI 1633)	2021	41.7	100

Irrigation timings as per crop growth stages

1) Crown Root Initiation stage (CRI) : 18-21 days after sowing
2) Boot stage : 40-45 days after sowing
3) Flowering and milking stage : 60-65 days after sowing
4) Grain filling stage : 80-85 days after sowing

Inter Culturing/Weed Management: Weed free seed production is essential to produce quality seed. This prevents the spread of weeds through the seed chain. The following herbicides should be used in wheat crop.

a) Pre-Emergence Application: Pendimethalin should be sprayed at the rate of 1250 ml per acre for the control of broad leaves and grass weeds up to 3 days after wheat sowing. Use 250-300 liters of water for above spraying.

b) 30-35 days after sowing: Isoproturon (50%) 500 g per acre for control of *Kanaki* (*Phalaris minor*) and for weeds like *Chandvel / Hirankhuri*, 2-4-D (38 EC) 500 ml per acre.

FERTILIZER MANAGEMENT

For timely sown irrigated condition: 58:24:16 kg N:P:K per acre should be used. Farmers should apply 52 kg DAP, 84 kg Urea and 26 kg MOP. In this, 52 kg DAP, 15 kg Urea and 26 kg MOP should be applied at the time of sowing. The rest of the nitrogen should be given in the form of urea @35 kg during the first and second irrigation.

Late sown irrigated condition: 52 kg DAP, 26 kg MOP should be applied at the time of sowing and the remaining amount of nitrogen in the form of urea should be applied @ 28 kg each during first and second irrigation.

Crop protection: Wheat crop is damaged by Rust (Stem rust and leaf rust) and leaf blight diseases. Black Rust or stem rust can reduce yield by 20 to 50 %. For control of rust, give two sprays of Propiconazole @ 0.1% + Copper Oxychloride @ 0.2%, at 15 days of interval. For control of blight, spray Copper Oxychloride @ 0.2% + Mancozeb @ 0.2% For control of pests like aphids spray Imidacloprid 17.8 % SL @ 40 ml per acre in 200-250 liters of water. For control of stem borer spray Quinalphos 25% EC 300 ml for 500 liters of water per acre.

Harvesting and Threshing: While harvesting and threshing wheat, care should be taken that seed should not be get mixed with other varieties/species. Keeping in mind the increasing use of harvesters in recent times, it is necessary to clean the machines to avoid mixing the seed of different varieties.

Seed Processing: For successful processing of certified seed, the seed has to be sent to the processing center given by the seed certification agency. The processing is carried out in following steps

a) Pre-cleaning: This separates out particles larger than seeds, such as soil, wood chips, sawdust and other materials. For this purpose, the air flow and mesh assigned by the certification agency is used.

b) Seed Grading: Grading machines, indented cylinders and seed gravity separators are used for grading. By this step; low quality seeds, lightly poached seeds, broken seeds *etc.,* are separated. For this, high quality seeds are prepared using the characteristics of wheat seed size, weight and density. Generally 10-12% of light seeds/grains (out of total weight) are separated and returned to the farmer and high quality seed is used for packing.

Germination ability and physical purity test: After the processing, the seed sample is sent to the seed laboratory for testing. In this the physical purity, germination capacity and moisture content of the seed are tested. It should have 85% of germination and 98% of physical purity. After successful testing in the laboratory, the seed is labeled as truthful or certified seed. Only then it becomes available for further sale.

Seed storage: Always choose a dry and ventilated system/place for seed storage. The processed seeds are bagged and kept for storage. To avoid damage due to moisture in the seed, the seed should be properly dried before storage *i.e.* seed moisture should be 10-12%. New bags should preferably be used for seed storage so that seeds of other varieties will not get mixed. Wooden pallets should be used for seed storage so that the seeds do not absorb moisture from the soil.

CONCLUSION

By selecting improved varieties as per sowing conditions and adopting the standard package of practices, farmer can implement a seed production programme on his own field and can produce quality seed which can be used for two to three years.

REFERENCES

ICAR- Indian Institute of Wheat and Barley Research (2023) AICRP on Wheat and Barley, Director's Report, 90p.

Arun Gupta, Charan Singh, Vineet Kumar, Sushila Kundu, Vinod Tiwari and G. P. Singh (2017) **Indian Wheat Varieties at a glance Volume II** p144.

N. M. Magar, S. S. Dodake, R. D. Lokhande and U. G. Kachole (2021) Characterization of Wheat (*Triticum Spp*.) Varieties on the Basis of Seed Morphology. **Frontiers in Crop Improvement** Vol 9: 1022-1025.