

WH 1105: A new wheat variety for timely sown irrigated conditions in north western plains zone of India

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ABSTRACT

A new high yielding wheat (*Triticum aestivum*) variety 'WH 1105' has been developed for timely sown cultivation, in high fertility and irrigated conditions in the North Western Plain Zone (NWPZ) of India during 2012. It has 100cm plant height, dark green foliage; erect compact plant-type bearing parallel-dense, whitish long ear-heads, and distinctly developed anthocyanin pigmentation of auricles. It is medium early (142 days) in maturity, having wide adaptability and good yield potential of 71.6 q ha⁻¹. It exhibited excellent degree of resistance to yellow and brown rusts, flag smut, leaf blight and powdery mildew diseases prevalent in the area. It is better in quality characters. WH 1105 is also better in nutrient. It is physiologically efficient genotype having desirable CTD, canopy temperature, chlorophyll fluorescence (Fv/Fm) and SPAD chlorophyll content; thus, indicating its suitability under terminal heat stress conditions. It also depicts good percentage of extraction rate (69.1%) and the protein content (12.4%) with better *chapatti* making score (7.60).

Keywords: Wide adaptability, high yielding variety, wheat quality, diseases resistance

The wide spread cultivation of the wheat (*Triticum aestivum* L.em.Thell) crop enable its adaptation to different agro climatic conditions. It is one of the major sources of energy, protein and fibre in human diet (Arya *et al.*, 2012). Wheat is the second most important crop after rice in India and achieved a record wheat production of 94.88 million tons during 2011-12 (Anonymous, 2012).

Present day, there is no possibility to increase the area under wheat cultivation due to limitation of land and water resources. Therefore, the development of high yielding wheat varieties for different agro-climatic conditions is the only way to increase further production. In order to meet the challenges of temperature ahead of global warming, concerted efforts are needed to evaluate, identify and develop genotypes suitable for terminal heat stress environment. As increase in temperature during grain filling is the main cause of low productivity. Current estimates indicate that wheat crop grown on around 13.5 million hectare in India is affected by heat stress (Sareen *et al.*, 2012). It is also reported that the cool period for wheat crop in India is shrinking, while the threat of terminal heat stress is expanding (Joshi *et al.*, 2007).

Yield superiority: WH 1105 is a derivative of 'MILAN/S87230//BABAX'. It has been developed through selection from CIMMYT material and have been tested in All India Co-ordinated trial conducted during (2009 – 12) The weighted mean basis analysis (2009-10 to 2011-12) indicated that the variety, 'WH 1105' out yielded all the check varieties (except 'DPW 621-50') such as 'PBW 343' (by 8.69%), 'DBW 17' (by 1.54%), 'PBW 550' (by

5.62%) and 'HD 2967' (by 0.95%) (Table 1). 'WH 1105' exhibited remarkable adaptation being placed in the top 1st non-significant group with the highest frequency (23/57) against all the check varieties. 'WH 1105' recorded the potential yield of 71.6 q ha⁻¹ at Shikopur (Haryana) during 2011-12 in NWPZ.

Morphological characteristics: The heading and maturity period of WH 1105 is 100 days and 142 days, respectively. 'WH 1105' has plant height (100 cm), dark green foliage; erect compact plant-type bearing parallel-dense, whitish long ear-heads, and distinctly developed anthocyanin pigmentation of auricles. It is semi-erect in growth habit. Anthocyanin pigmentation is absent in coleoptiles but it is very strong on auricles. Foliage colour at boot stage is dark green. Its flag leaf attitude is erect, medium hairs present on auricles. Waxiness of culm/peduncle is strong but it is very strong on sheath and leaf blade. Flag leaf length is long and breadth is broad and its auricles have medium hairs. Emergence of heading (75%) takes 96 days. Its peduncle length is 18 cm having straight attitude. Its ears are dense, 14 cm long (excluding awn) having parallel profile shape which turns white and drooping at maturity. Its outer glumes have no pubescence. Its lower glumes' shoulders are very narrow and medium having round and moderately covered beak. Its awns are white, medium and spreading type. Its grain is hard, amber coloured, ovoid in shape having medium brush hairs, medium crease width and round cheeks. Its 1000-grain weight is 41g.

Reaction to major diseases and insect pest: The variety 'WH 1105' exhibited excellent degree of resistance to yellow and brown rusts, flag smut, leaf blight and powdery

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Table 1. Average performance of grain yield (q/ha) of wheat variety 'WH 1105'

Parameter	Year of testing	No. of trials	WH 1105	PBW 343	DBW 17	PBW 550	HD 2967	DPW 621-50	CD
Mean of grain yield (q ha ⁻¹)	2009-10	NIVT (9)	47.5	46.4	47.5	-	-	-	2.8
	2010-11	AVT-I (24)	51.4	46.9*	50.3*	49.8*	52.1	50.1*	0.9
	2011-12	AVT-II (24)	55.5	50.5*	54.7	-	-	55.4	0.9
Weighted mean			52.5	48.3	51.7	49.8	52.1	52.7	-
Per cent superiority over mean			-	+8.69	+1.54	+5.62	+0.95	-0.37	-
Total frequency in top non-significant group			23/57	16/57	17/57	9/24	12/24	20/48	

* Significant at 5% level of significance,

Source: Progress Report of All India Coordinated Wheat & Barley Improvement Project, 2010, 2011 and 2012, DWR, Karnal

mildew diseases prevalent in the area. It showed high seedling resistance reaction against the predominant pathotypes of yellow as well as brown rusts. It is free from major pests and diseases (under natural and artificial conditions).

Quality of grain: The variety 'WH 1105' possesses better quality characters in term of the higher sedimentation value (53 ml), gluten index (71) and good biscuit quality spreading factor (7.80). 'WH 1105' is also better in nutrient uptake possessing the maximum content of Iron (32.7 ppm), Zinc (32.3 ppm) and Copper (5.26 ppm) than all the check varieties *i.e.* 'DPW 621-50', 'PBW 343' and 'DBW 17'. The variety 'WH 1105' also depicts good percentage of extraction rate (69.1%) and the protein content (12.4%) with better *chapatti* making score (7.60) comparable to the check varieties 'DPW 621-50', 'PBW 343' and 'DBW 17'. In grain appearance and the test weight also, WH 1105 shows consistency with the checks. A nutritive quality cultivar is required over the problems of malnutrition.

Reaction to heat stresses: The variety 'WH 1105' distinguished from the checks as the physiological efficient genotype having desirable CTD (8.6), canopy temperature (21.7), chlorophyll fluorescence (Fv/Fm) (0.702) and SPAD chlorophyll content (46.4); thus, indicating its suitability under terminal heat stress conditions. The genotypes having high grain yield under heat stress conditions also had high expression of photosynthetic rate and high transpirational efficiency. The genotypes having high photosynthetic rate also had high expression of transpirational efficiency (Arya *et al.*, 2012).

Wide adaptation: On the mean basis during 2011-2012 in Agronomic trials the variety 'WH 1105' displayed excellent adaptation by its significant superiority over all

the check varieties *i.e.*, DPW 621-50, PBW 343, DBW 17 and PBW 550. Under both, normal as well as late sown conditions, 'WH 1105' with yields of 58.29 and 44.14 q ha⁻¹, respectively, placed at 1st Rank amongst all the varieties.

It is concluded that the variety 'WH 1105' is having wide adaptability and good yield potential (71.6 q ha⁻¹) in North Western Plan Zone of India. Varieties with such a high yield potential coupled with high degree of disease resistance and better grain quality will provide much needed diversification in curtailing the disease spread in the country.

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