

Pusa Tejas (HI 8759):

A milestone variety boosting Indian durum wheat production

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*HI 8759 (Pusa Tejas), a high yielding, disease resistant and biofortified durum wheat (*Triticum durum* L.) variety was released in 2017 for cultivation in central wheat growing zone. It was recognised as the first naturally biofortified durum wheat variety with high protein (12%), iron (42.1 ppm) and zinc content (42.8 ppm). Alongwith yield and quality characteristics, physical grain quality traits, viz. high 1000-grain weight (53–56 g), hectolitre weight (83.1 kg/hl) and good grain appearance have fetched HI 8759 huge popularity among the durum wheat growers. HI 8759 was the only durum wheat variety among the top ten indented wheat varieties in India for last three successive years (2019–2021) which indicates its acceptance and demand among the farming community. The popularity of Pusa Tejas was boosted by the social media networks, viz. YouTube, WhatsApp and Facebook and this technology could diffuse among the different farming communities all over India making it one of the best choices among wheat varieties available.*

Keywords: Biofortification, Breeder seed, Durum wheat

DURUM wheat variety HI 8759 (Pusa Tejas) (*Triticum durum* L.) was released (notification number S.O 1007 (E) dated 30th March 2017) by ICAR-Indian Agricultural Research Institute, Regional Station, Indore, Madhya Pradesh for central wheat growing zone accounting for most of durum wheat area, production as well as productivity in the country. HI 8759 showed stable high yield, wider adaptability with high levels of resistance to stem and leaf rusts. It has a potential yield of 75.5 q/ha; and yielded more than

60 q/ha at 13 out of 34 locations over 3 years with an average yield of 56.9 q/ha in AICW&BIP trials. It has exhibited resistance to virulent and aggressive stem rust pathotypes, viz. 40A, 40-3, 117-1, 117-3, 117-4, 117-5 indicating the presence of unique stem rust resistance gene(s), and its resistance spectrum is different from other popular durum varieties HI 8498 and MPO 1215 and offers to enhance the rust resistance base under wheat cultivation in central India. Pusa Tejas grains attract millers and processing industries

as grains are bestowed with high hectolitre weight (83.1 kg/hl), good grain appearance (7.1), low mottling and overall acceptability (7.5). As the demand for durum wheat derived products is increasing due to urbanization, HI 8759 (Pusa Tejas) is serving as a dual purpose variety suitable both for making chapati and helping to diversify the durum wheat cultivation in central India. All these traits in terms of agronomy, yield and quality made HI 8759 (Pusa Tejas) the first choice for durum wheat farmers in India



Field and grain view of Pusa Tejas (HI 8759)

Table 1. Comparison of quality traits among popular durum wheat varieties

Quality Trait	HI 8759	HI 8737	HD 4728	HI 8713	HI 8498	MPO 1215
Grain appearance	7.1	7.0	7.5	6.2	6.9	7.1
1000-grain weight (g)	53.0	50.7	51.3	47.2	51.3	50.5
Hectolitre weight (kg/hl)	83.1	82.4	82.4	82.9	83.4	83.3
Protein content (%)	12.0	12.1	12.2	11.7	12.5	12.4
Yellow Pigment (ppm)	5.7	5.38	5.9	7.16	4.99	5.29
Iron content (ppm)	42.1	38.5	42.3	35.5	28.9	32.0
Zinc content (ppm)	42.8	40.0	46.0	33.6	27.9	30.7

Table 2. Performance of Pusa Tejas (HI 8759) in Front Line Demonstrations (FLDs)

Year	Location	HI 8759 yield	Check variety	Check yield	Per cent gain
2016–17	Indore	66.33	HI 8498	49.33	34.46*
2017–18	Indore	76.00	HI 8498	44.00	42.1*
2017–18	Panna	40.99	Sujata	31.98	28.17*
2018–19	Banswara	46.75	HI 8498	42.88	9.04*
2018–19	Udaipur	47.4	HI 8498	42.8	10.75**
2018–19	Indore	65.0	HI 8663	57.29	13.47*
2018–19	Harda	59.96	GW 322	49.13	22.04*
2018–19	Bilaspur	39.75	HI 8381	37.3	6.59*
2018–19	Ujjain	61.48	HI 8663	53.39	15.1*
2018–19	Ujjain	61.48	HI 8713	56.21	9.37*
2019–20	Indore	67.6	HI 8663	53.4	26.59**

Source: AICW&BIP Social Science progress reports

since its release and helped in raising productivity and profitability of durum wheat crop in the country.

Naturally biofortified durum wheat variety for Nutri Smart Villages (NSVs)

Alleviation of malnutrition through natural biofortification is found to be the most sustainable and cost-effective means for providing the desired levels of nutrients in the diet in natural form. Biofortification is a process where the nutritional quality of a crop is enhanced through genetic manipulation that includes both general breeding and transgenic approaches. In case of wheat, biofortification aims to provide wheat varieties with high iron and zinc (>40 ppm), and protein (>12%) content as these nutrients are essential for proper functioning of muscle and brain tissues, for the regulation of synthesis and degradation of nucleic acids, proteins, lipids and carbohydrates (Table 1). HI 8759 (Pusa Tejas) is the first durum wheat variety identified as naturally biofortified by ICAR in

2019.

A scheme to promote nutrition sensitive agriculture through Nutri Smart Village (NSVs) in Madhya Pradesh and Chhattisgarh aims to place nutritionally rich food, dietary diversity and food fortification for holistic nutritional security of the communities. NSV is a crop plan led nutritional security concept where nutritional gap can be reduced by minor adjustment in the dietary plan. Food products made from wheat are the important components of food diversity available in Madhya Pradesh. ATARI, Jabalpur developed this model and 57 smart villages were identified in MP and Chhattisgarh through KVKs. Under this concept HI 8759 (Pusa Tejas) was included as biofortified wheat variety in 4 districts and benefited 37 farmers. A study conducted after this intervention on the Nutri Smart Villages on the nutritional status of 0–5 year children and adolescent girls indicated a decrease in number of stunted, wasted, anemic and underweight children in these

villages as reported in note on NSV by DDG (Agriculture extension) in 2020. Thus, the naturally biofortified wheat variety, viz. HI 8759 could benefit the community in terms of nutrition if added to diet regularly.

Superior performance of HI 8759 in farmer fields

Evaluation of HI 8759 (Pusa Tejas) in farmers field has been a huge success in terms of frontline demonstrations (FLDs) by AICRP centers and KVKs. Performance of HI 8759 under FLDs is tabulated based on data available in IIWBR social science progress reports from 2016–17 to 2019–20 (Table 2). During winter (*rabi*) 2016–17, HI 8759 has shown a significant yield increase of 34.46% compared to the yield of HI 8498 at Indore location. The location specific highest varietal yield was attained by HI 8759 (76.00 q/ha) at Indore centre in central zone during winter (*rabi*) 2017–18. During 2018–19 and 2019–20, HI 8759 showed a significant average yield of 65.0 q/ha and 67.6 q/ha at Indore centres in central zone respectively (Table 2). The significant performance of this variety in demonstrations created awareness among the farmers about the new technology and attracted durum wheat farmers to take up this new technology to their fields.

Success story of farmers cultivating HI 8759 (Pusa Tejas)

HI 8759 has recorded significant high yield in FLDs conducted at Indore for 3 successive years during 2017–2019. During winter (*rabi*) 2018–19, a progressive farmer Mr Lakshmi Narayan Kumawat from Polai Jagir village, Sonkatch, Dewas district of Madhya Pradesh cultivated HI 8759 on raised bed conditions. Crop was raised under best management practices, viz. from adding vermicompost and recommended urea, preparation of land using cultivator and rotavator, and raised bed preparation. Four recommended irrigations were given, viz. after sowing, 21 days after sowing, flowering stage and soft dough stage. During tillering and soft dough stage, potassium sulfate was sprayed, and Zn was sprayed

Table 3. Seed indent and production of HI 8759 in recent years

Year	Seed Indent (q)	Seed Produced (q)
2017–18	252	380
2018–19	323	320
2019–20	356	524
2020–21	846	420

Source: Seednet India Portal

during flowering time. Harvesting of the crop was done in the presence of staff from agriculture department, revenue department, crop insurance department and villagers. They have recorded yield of $5 \times 5 \text{ m}^2$ plot which is 27.23 kg accounts for a bumper yield of 107 q/ha. HI 8759 has outyielded the record of HI 8663 (Poshan) which produced 97 q/ha in the field of progressive farmer Mr Yogendra Koushik, Badnagar, Ujjain district which fetched him Rastrapathi award. The success story of Mr Lakshmi Narayan has encouraged many durum wheat farmers to cultivate HI 8759 in their fields.

Mr Krupal Singh Dhangri from Bichia village, Shampur tehsil, Bhopal district cultivated Pusa Tejas in his farmland in November 2018. Under Irrigated conditions i.e. with 4 irrigations he could harvest about 33 q/acre of wheat which accounts for about 82 q/ha. These success stories of farmers cultivating HI 8759 were disseminated through various mass media, social media networks and raised huge demand for the seed among farmers.

High breeder seed indent and seed distribution of Pusa Tejas

HI 8759 gained huge response from farmers immediately after its release and the demand for

this variety is visible through the national seed indent from 2018–19. Pusa Tejas has been in the top ten breeder seed indent of India from last 3 successive years i.e. 2019–20 (356 q), 2020–21 (846 q) and 2021–22 (639 q) (Table 3). Nearly 1800 q of breeder seed was distributed from ICAR-Indian Agricultural Research Institute, Indore to NSC, NGOs, seed corporations and farmers. High yield, disease resistance, high 1000-grain weight, non-lodging and good grain appearance are the important traits of HI 8759 which attracted the central zone farmers and availability of quality seed and extension programs led to fast spread of this variety among the farmers.

Importance of social media in popularization of Pusa Tejas among farmers

Social media tools, viz. Facebook, WhatsApp and YouTube played a vital role in spreading wheat technologies/varieties among the farmers with greater ease, rapidity and accuracy. The YouTube videos uploaded by the farmers growing Pusa Tejas and information through WhatsApp has helped this variety to reach large number of farmers in very short period compared to early times. There are more than 25 YouTube videos which educate farmers about the yield and quality traits of HI 8759. Along with YouTube, information disseminated through WhatsApp groups and Facebook has raised huge demand for HI 8759 in the recent past. These tools helped farming community to learn and share information about recent technologies, viz. HI 8759 in multiple ways in form of texts, photos, pictures, audio, audio-

visuals. On farm experience of farmers about Pusa Tejas in YouTube videos created awareness and promoted the variety in a rapid way compared to earlier wheat varieties.

SUMMARY

Durum wheat occupies a special niche in the central wheat growing zone of the country with the highest production, productivity and area, which in turn offers economic and nutritional security for wheat farmers. After HI 8663 (Poshan) and HI 8713 (Pusa Mangal), HI 8759 (Pusa Tejas) durum wheat variety suitable for pasta industries and chapati was released in 2017 by ICAR-IARI, Regional Station, Indore. Pusa Tejas received huge attention from farmers because of high yielding capacity, resistance to biotic and abiotic stresses and superior pasta quality. Inclusion of this biofortified variety in nutri village scheme indicates its importance as biofortified variety with high protein, iron and zinc content. Huge demand for seed of HI 8759 evident through breeder seed indent, success stories of farmers growing this variety and growing demand for pasta and durum based indigenous nutritional foods indicate the potential of durum wheat varieties to ensure prosperity among the durum wheat growers of India. This variety marks another milestone in Indian durum wheat production with high seed Indent and huge popularity among wheat growers of India.

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Wheat variety released and notified

VL Gehun 2015

Area of adoption

Salient features

Uttarakhand hills Organic

- High yield + 19–88 q/ha
- High resistant to yellow and brown rust
- good chapatti making quality with good flour recovery



VL Gehun 2015