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Phule Shashwat - Resilient, Reliable, and Ready for Late Sowing

Nilesh Madhavrao Magar[1], Bharat Malunjkar[2*] and Suresh Dodake[3]

[1]Assistant Professor, Agricultural Research Station, MPKV NiphZad Dist: Nashik, Maharashtra, India.

[2]Senior Research Assistant, Agricultural Research Station, MPKV Niphad Dist: Nashik, Maharashtra, India.

[3]Principal Scientist, Pulses Improvement Project, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist: Ahilyanagar, Maharashtra, India.

Corresponding author's e-mail: *malunjkar_bharat@rediffmail.com*

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ABSTRACT

The Agricultural Research Station, MPKV, Niphad (Maharashtra), has developed a high-yielding bread wheat variety, Phule Shashwat (NIAW 4114), specifically suited for late-sown irrigated conditions in the Peninsular Zone of India. This variety stands out for its superior grain quality and excellent chapati-making properties, meeting both farmers' and consumers' expectations. Notably, Phule Shashwat exhibits resistance to both stem and leaf rusts, making it a reliable option under disease-prone environments. The variety was identified and recommended for release during the Varietal Identification Committee Meeting held virtually on 7th October 2024, under the chairmanship of Dr. D. K. Yadava, ADG (Seed), ICAR. It was subsequently released and officially notified by the Central Sub-Committee on Crop Standards through Gazette Notification S.O. 2128(E), dated 13th May 2025, for cultivation in the target agro-climatic region.

INTRODUCTION

Wheat is one of the most important staple food crops in India, playing a pivotal role in ensuring national food and nutritional security. Grown predominantly in the northern plains during the *rabi* season, wheat cultivation has seen significant improvements over the years in terms of production and productivity. However, with changing climatic patterns, shifting cropping systems, and the increasing demand for wheat in non-traditional regions, attention has gradually expanded toward improving wheat cultivation in southern parts of the country, particularly in Peninsular India.

The Peninsular Zone, comprising states like Maharashtra, Karnataka, Andhra Pradesh, and Tamil Nadu, has unique agro-climatic challenges that differentiate it from the Indo-Gangetic Plains. One of the most prominent constraints in this region is the prevalence of late sowing, primarily due to the extended kharif season and delayed harvesting of preceding crops like soybean, cotton, and pulses. This late planting significantly shortens the wheat growing period, exposing the crop to high terminal temperatures during the grain-filling stage—a phenomenon that drastically reduces yield and grain quality.

To successfully cultivate wheat under such stressed conditions, varieties must be tailored to perform well within a compressed growing season, tolerate heat stress, and utilize available irrigation efficiently. In recent years, there has been a growing focus on breeding wheat genotypes that can thrive in late-sown, irrigated environments while offering disease resistance and desirable end-use quality. The demand is for varieties that mature quickly, withstand late-season heat, and remain productive under biotic and abiotic stresses.

It is within this context that targeted breeding efforts have been directed toward the development of climate-resilient, high-yielding wheat varieties suited to the specific needs of Peninsular India. These efforts aim to empower farmers in the region with reliable options that not only withstand the rigors of late sowing and terminal heat but also contribute to regional wheat self-sufficiency. Such advancements are crucial for expanding the wheat production frontier and optimizing the use of land and water resources in the southern agro-ecologies of India.

PERFORMANCE OF PHULE SHASHWAT IN AICRP WHEAT TRIALS

The variety *Phule Shashwat* (NIAW 4114) was rigorously evaluated under the All India Coordinated Research Project (AICRP) trials during the years 2021–22, 2022–23, and 2023–24. Across these trials, it consistently outperformed the standard check varieties of the Peninsular Zone, registering an impressive average grain yield of 47.9 q/ha and achieving a maximum yield potential of 70.2 q/ha under favorable conditions. The variety exhibited strong resistance to both black (stem) and brown (leaf) rusts, ensuring crop stability under disease-prone environments.

In addition to its agronomic advantages, *Phule Shashwat* demonstrated excellent nutritional quality, with a protein content of 12.7% and micronutrient concentrations of approximately 40

ppm each for iron (Fe) and zinc (Zn). It also scored high on end-use quality, with a chapati quality score of 8.1, indicating strong consumer acceptability.

Table 1: Package of practices along with attainable yield levels

Suitability of the variety for the area:	Irrigated late sown conditions of Peninsular Zone comprising states of Maharashtra, Karnataka, Telangana, Andhra Pradesh and Tamil Nadu (Except Nilgiris & Palani Hills.)		
Selection of field and/land preparation:	Flat fertile soil, ploughing with disc harrow followed by tiller and leveler at field capacity for optimum field conditions.		
Seed treatment:	Vitavax (Carboxin 37.5% + Thiram 37.5%) @ 2-3 g/kg seed.		
Sowing time:	5 to 15 December		
Seed rate/sowing method:	125 kg/ha line sowing with row-to-row distance of 18 cm		
Fertilizer doses:	90:60:40 (N:P:K kg/ha) + FYM @ 10 t ha^{-1} Dose of Nitrogen 1/2 at sowing and remaining at first node stage.		
Weed control:	➢ For the control of broad-leaved weeds 2, 4-D @ 500 g/ha or Metsulfuron @4g/ha or can be sprayed using about 250 liters of water/ha. ➢ For the control of grasses Isoproturon at 1 kg/ha should be used.		
Pest and Disease control:	Leaf rust	:	Spray with Mancozeb @ 0.25 % (1250 gm/500 lit water) or Propiconazole @ 0.1 % (500 ml/500 lit water) or Tebuconazole 50 % + Trifloxystrobin 25 % WG @ 0.1 % (500 mg/500 lit water) on disease infection.
	Leaf blight	:	Spray with Copper oxychloride @ 0.25% + Mancozeb @ 0.2 % (1000 g/500 liters of water) or Kresoxim methyl 44.3 % SC @ 0.1 % (500 ml/ 500 liters of water) on disease infection.
	Foliar aphids	:	Thiamethoxam 25 WG @ 1g/10 lit of water, 2 sprayings at an interval of 15 days (50g/500 liters of water per hectare). *Metarhizium anisopliae* @ 40g/10 lit of water (2 Kg in 500 liters of water/ hectare).
	Rats	:	Application of Zinc Phosphide mixed in grain mash.
Irrigation:	4-5 irrigations		
Harvesting:	Maturity 87-113 days (98 days)		
Quality:	Detailed in Table 5 and Table 5.1		
Mean Yield:	47.9 q/ha		
Potential Yield:	70.2 q/ha		

One of the standout traits of *Phule Shashwat* is its tolerance to terminal heat, enabling it to perform reliably even when sown late, a common practice in Peninsular India due to delayed harvests of preceding crops. With its combination of yield stability, disease resistance,

nutritional value, and adaptability to late-sown conditions, Phule Shashwat is poised to become a preferred choice among wheat farmers across the Peninsular Zone.

SALIENT FEATURES OF BREAD WHEAT VARIETY PHULE SHASHWAT (NIAW 4114)

- Mean yield: **47.9 q/h**
- Yield Potential: **70.2 q/ha**
- Resistant to Brown rust (Leaf rust), Black rust (Stem rust)
- 1000 grain weight: **39 g**
- Protein content: **12.7 %**
- Fe (ppm) content: **39.9**
- Zn (ppm) content: **39.5**
- Chapati quality score: **8.1**

CONCLUSION

Phule Shashwat (NIAW 4114) emerges as a promising bread wheat variety tailored for the unique challenges of late-sown irrigated conditions in Peninsular India. With its robust yield performance, resistance to major rust diseases, superior nutritional and chapati quality, and resilience to terminal heat stress, it offers a sustainable solution for wheat production in non-traditional zones. Its release and notification mark a significant step toward enhancing food and nutritional security in the peninsular India, making it a dependable choice for both farmers and consumers alike.

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