



WHEAT CULTIVATION AND IMPROVED VARIETIES FOR INDO GANGETIC PLAINS OF INDIA

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INTRODUCTION

Wheat being the staple food crop, plays the very crucial role in deciding the food security across the globe including India. This crop is most suffered from the effect of global warming with unpredictable fluctuation of temperature at the time of flowering and grain filling which hampers in sustaining and enhancing the grain productivity. The integration of better agronomy and high yielding and disease resistant improved varieties is the only way to enhance the grain yield in the Indian Indo-Gangetic plains (IGPs). The Indian

portion of the IGP comprises Punjab, Haryana, Uttarakhand, western and eastern Uttar Pradesh, Bihar, and West Bengal, which produces about the 50% of total food consumed from 20% of the total geographical area in the country. For this region (IGPs), several improved wheat varieties adapted to conservation agriculture and conventional tillage were developed and released for commercial cultivation by ICAR-IARI, Delhi, and its regional stations.

AGRONOMIC MANAGEMENT

The wheat seed can germinate between the wide regimes of temperature i.e. 4° to 37°. Therefore, Early sowing (25th -5th Nov) along with responsive genotypes under conservation agriculture may be one of the best-integrated practices, which would provide longer crop duration leading to higher yield, and chances of escape from terminal heat. For wheat production, conservation agriculture is one of the best agronomic management practices by providing prolonged availability of soil moisture and modulation of soil

temperature, provide better anchorage and nutrients. In conservation agriculture, sowing is done with minimum tillage along with residue retention of previous crop. In early sowing chances of uneven plant stand in field remains high due to rapid depletion of soil water in presence of prevailing high temperature, therefore, careful sowing with proper water retention is recommended for getting uniform proper plant stand. Moreover, farmers should sow the recommended and adapted varieties for early sown for getting the more advantage.

SEED RATE

In the most productive environment, the normal seed rate is 100 to 125 kg/ha. In late sown condition, 125 kg/ha is recommended. However, slightly lower

seed rate than average is recommended in sowing on raised beds, and for varieties having the high tiller production capacity to avoid lodging of the crop.

IRRIGATION

Irrigated-Timely sowing	Irrigated- Late sowing	Rainfed/limited irrigation
First irrigation 21 days after sowing, and then irrigation as per requirement	First irrigation 21 days after sowing, and then irrigation as per requirement	if possible, give an irrigation 30 days after sowing.

FERTILIZER APPLICATION

The use of balanced nutrients is the key to maximizing the production capacity of the improved varieties. The recommended

doses and time of application of different fertilizers is given in Table 2. In early sown condition, it is recommended that fertilizer

should be applied by 1.5 times of fertilizer doses of irrigated timely sown condition. In rice-wheat system, application of zinc @ 25

kg/ha and Sulphur also increases the grain productivity.

Fertilizer	Irrigated-timely sowing	Irrigated -late sowing	Rainfed/ limited irrigation
Fertilizer quantity (kg/hectare)	Nitrogen: 150 kg (urea @ 255 kg/ha) Phosphorus: 80 kg (DAP @ 175 kg/ha) Potash: 60 kg (MOP @ 100 kg/ ha)	Nitrogen: 100 kg (urea @ 166 kg/ha) Phosphorus: 60 kg (DAP @ 130 kg/ha) Potash: 40 kg (MOP @ 66 kg/ha)	Nitrogen: 60 kg (urea @ 96 kg/ha) Phosphorus: 40 kg (DAP @ 87 kg/ ha) Potash: 20 kg (MOP @ 33 kg/ha)
Time to give fertilizers	1/3 nitrogen with full amount of phosphorus and potash at the time of sowing; The remaining nitrogen is equally after the first and second irrigation	1/3 nitrogen with full amount of phosphorus and potash at the time of sowing; The remaining nitrogen is equally after the first and second irrigation	Full amount of nitrogen, phosphorus and potash at the time of sowing

WEED CONTROL

Weed competes with wheat plants for nutritional fulfillment. Therefore, it affects the yield of wheat. The broad-spectrum weedicides like isoproturon used by farmers for more than a decade have failed to control *Falaris minor*. The preemergence herbicide i.e. pendimethylene @ 3.5-5.0 litres/ha provide

effective grass management. The post emergence herbicide composition like Sulfosulfuron 75% + Metsulfuron 5% WG @ 16 g/acre at 35 days after sowing provides the excellent control of both *Phalaris minor* and problematic broad leaf weeds in a single application.

DISEASES AND THEIR MANAGEMENT



Wheat in India is affected by many diseases like three types of rusts such as yellow rust, black and brown rust; and Karnal bunt; kandua disease and flag smut etc. Brown rust is an important disease of wheat all over India. Black rust is mainly important in central and peninsular India. Yellow rust is rapidly grown within cold weather (2-15°) and hence are banned in hilly areas of the northern region and plains of




northwest Plain Region. The development of resistant varieties has been very effective in preventing these diseases. All rusts can be easily controlled by spray of Propiconazole 25%EC @ 200 ml in 200 liter/acre or Tebuconazole 25%EC @ 200 ml in 200 liter/acre. The Loose smut, Hill bunt, Head scab and Flag smut can be easily controlled by the seed treatment by Carboxin 75% WP 2-2.5 g/kg seed. The




Karnal bunt can be controlled by Propiconazole 20%EC @ 200 ml in 300




liter/acre or Bitertanol 25% WP @ 896 g in 300-liter water/acre.




List of improved varieties for Indo-Gangetic plains released from ICAR-IARI, Delhi and its Regional Stations


Variety	Specification	Photographs
HD3226	<p>Recommended areas: North Western Plain Zone</p> <p>Production conditions: Irrigated, Timely sown conditions</p> <p>Average yield: 57.5 q/ha</p> <p>Potential yield: 79.6 q/ha</p> <p>Characteristics: Highest mean grain protein content (12.80 %). Resistant to stripe and leaf rusts</p>	
HD CSW 18	<p>Recommended areas: NCR/Delhi state</p> <p>Production conditions: Early sown irrigated conditions under conservation agriculture</p> <p>Average yield: 62.8 q/ha</p> <p>Potential yield: 70.0 q/ha</p> <p>Characteristics: High grain number per spike (70-90).</p>	

<p>HD3117</p>	<p>Recommended areas: NCR/Delhi state</p> <p>Production conditions: Late sown irrigated conditions under conservation agriculture</p> <p>Average yield: 47.2 q/ha Potential yield: 60.0 q/ha</p> <p>Characteristics: Highly suitable for November to December sowing due to high adaptability and high yield.</p>	
<p>HD3086</p>	<p>Recommended areas: NWPZ and NEPZ</p> <p>Production conditions: Timely sown irrigated</p> <p>Average yield: 54.6 q/ha (NWPZ); 50.0 q/ha (NEPZ)</p> <p>Characteristics: Resistant to stripe and leaf rust.</p>	
<p>HI1621</p>	<p>Recommended areas: NWPZ and NEPZ</p> <p>Production conditions: very late sown conditions</p> <p>Average yield: 32.5 q/ha</p> <p>Characteristics: Resistant to stripe and leaf rust.</p>	

<p>HD 2967</p>	<p>Recommended areas: NWPZ and NEPZ</p> <p>Production conditions: Timely sown irrigated</p> <p>Average yield: 55.0 q/ha (NWPZ); 45.8 q/ha (NEPZ)</p> <p>Characteristics: Very popular variety covering more than 10 mha area under cultivation</p>	
<p>HD 3298</p>	<p>Recommended areas: North Western Plain Zone</p> <p>Production condition: Late sown irrigated conditions</p> <p>Average yield: 39.0 q/ha</p> <p>Characteristics: Micronutrient rich variety with high iron (43.1 ppm) and protein (12.12%) content</p>	
<p>HD 3271</p>	<p>Recommended areas: NWPZ</p> <p>Production conditions: Very late sown conditions</p> <p>Average yield: 32.5 q/ha</p> <p>Characteristics: Resistant to stripe and leaf rust, suitable for chapatti making</p>	

<p>HD 3237</p>	<p>Recommended areas: NWPZ</p> <p>Production conditions: Timely sown, restricted irrigated conditions</p> <p>Average yield: 48.4 q/ha</p> <p>Characteristics: Resistant to stripe and leaf rust, suitable for chapatti making</p>	
<p>HI 1620</p>	<p>Recommended areas: North Western Plain Zone</p> <p>Production conditions: Timely sown, restricted irrigated conditions</p> <p>Average yield: 48.3 q/ha</p> <p>Characteristics: Resistant to stripe and leaf rust, suitable for chapatti making</p>	
<p>HI 1628</p>	<p>Recommended areas: North Western Plain Zone</p> <p>Production condition: timely sown restricted irrigated conditions</p> <p>Average yield: 50.4 q/ha</p> <p>Characteristics: Tolerant to drought</p>	

<p>HD 3249</p>	<p>Recommended areas: North Eastern Plain Zone</p> <p>Production conditions: Timely sown irrigated conditions</p> <p>Average yield: 48.7 q/ha</p> <p>Characteristics: Resistant to stripe and leaf rust, suitable for chapatti making</p>	
<p>HD 3293</p>	<p>Recommended areas: North Eastern Plain Zone</p> <p>Production condition: timely sown, restricted irrigated</p> <p>Average yield: 39.0 q/ha</p> <p>Characteristics: Resistant to stripe and leaf rust</p>	
<p>HI 1633</p>	<p>Recommended areas: North Eastern Plain Zone</p> <p>Production condition: timely sown rainfed</p> <p>Average yield: 41.7 q/ha</p> <p>Characteristics: Micronutrient rich variety with high iron (41.6 ppm), Zn (41.1 ppm) and protein (12.4%) content</p>	

<p>HD 3171</p>	<p>Recommended areas: North Eastern Plain Zone</p> <p>Production condition: timely sown rainfed conditions</p> <p>Average yield: 29.5 q/ha</p> <p>Characteristics: Micronutrient rich variety with high iron (47.1 ppm), Zn (45 ppm)</p>	
<p>HD 3118</p>	<p>Recommended areas: North Eastern Plain Zone</p> <p>Production condition: late sown irrigated conditions</p> <p>Average yield: 41.7 q/ha</p> <p>Characteristics: Resistant to stripe and leaf rust</p>	