

# WHEAT (KANAK/GEHU)



## GENERAL INFORMATION

Wheat is grown on 13 percent of the cropped area of India. Next to rice, wheat is the most important food-grain of India and is the staple food of millions of Indians, particularly in the northern and north-western parts of the country.

It is rich in proteins, vitamins and carbohydrates and provides balanced food. India is the fourth largest producer of wheat in the world after Russia, the USA and China and accounts for 8.7% of the world's total production of wheat.

## CLIMATE

### Temperature

21-26°C

### Rainfall

75 cm (max)

20-25 cm (min)

## **Sowing Temperature**

**18-22°C**

## **Harvesting Temperature**

**20-25°C**

## **SOIL**

Soils with a clay loam or loam texture, good structure and moderate water holding capacity are ideal for wheat cultivation. Heavy soil with good drainage is suitable for wheat cultivation under dry conditions.

## **POPULAR VARIETIES WITH THEIR YIELD**

**PBW 1 Zn:** The plant of this variety attains the height of 103 cm. the crop is ready to harvest in 151 days. It gives an average of 22.5 qtl/acre of crop yield.

**UNNAT PBW 343:** Suitable for irrigated and timely sown areas. Ready to harvest in 155 days. It is resistant to lodging, water logging conditions. It is also resistant to karnal bunt and tolerant to blight. It gives average yield of 23.2 qtl/acre.

**WH 542:** It is suitable for timely sown, irrigated areas. Ready to harvest in 135-145 days. It is resistant to stripe rust, leaf rust and karnal bunt. It give average yield of 20 qtl/acre.

**PBW 725:** It is dwarf variety, released by Punjab Agriculture University. It is suitable for timely sown irrigated areas. It is resistant to yellow and brown rust. Its grains are amber, hard and medium bold. It is ready to harvest in 155 days. It gives average yield of 23 qtl/acre.

**PBW 677:** Ready to harvest in 160 days. It gives average yield of 22.4 qtl/acre.

**HD 2851:** This variety is suitable for timely sowing and is grown in irrigated areas. The variety matures in 126-134 days and the plant attains the height of 80-90cm.

**WHD-912:** It is a double dwarf Durum variety which is used for Bakery in Industry. Protein content 12%. Resistant Yellow & Brown and rust as well as karnal bunt. The yield is near about 21 qtl/ acre.

**HD 3043:** Gives average yield of 17.8 qtl/acre. It has shown a high level of resistance against stripe rusts and leaf rust. It has the higher value of bread loaf volume (cc), bread quality score."

**WH 1105:** Developed by Punjab Agriculture University. It is a double dwarf variety with an average plant height of 97 cm. Its grains are amber, hard, medium bold and lustrous. It is resistant to yellow rust and brown rust but susceptible to karnal bunt and loose smut diseases. It matures in about 157 days and its average grain yield is 23.1 quintals per acre.

**PBW 660:** Developed by Punjab Agriculture University released for cultivation under rain fed conditions in the Punjab state. It is a dwarf variety with an average plant height of 100 cm. Its grains are amber, hard, bold and lustrous with very good chapatti quality. It is resistant to yellow and brown rusts but susceptible to loose smut disease. It matures in about 162 days and its average grain yield is 17.1 quintals

per acre.

**PBW-502:** Developed by Punjab Agricultural University. Suitable for timely sown irrigated conditions. It is resistant to leaf rust and stripe rust.

**HD 3086(PusaGautam):** It gives average yield of 23 qtl/acre. It is resistant to yellow rust and brown rust. It meets all the criteria for superior bread making qualities.

**HD 2967:** It is double dwarf variety with an average plant height of 101 cm. The ears are medium dense. It is resistant to yellow and brown rust but susceptible to karnal bunt and loose smut diseases. It takes about 157 days to mature. The yield is 21.5 qtl/acre.

**DBW17:** The height of the plant is 95 cm. Grains are amber hard, medium bold and lustrous. It is susceptible to new races of yellow rust and moderately resistant to brown rust. It matures in 155 days. The average yield is 23 qtl/acre.

**PBW 621:** It is grown in all areas of Punjab. It gets ready for harvesting within 158 days. It is resistant to yellow and brown rusts diseases. It has an average height of 100cm.

**UNNAT PBW 550:** It is grown in all areas of Punjab. It gets ready for harvesting within 145 days. It is resistant to yellow and brown rusts diseases. It has an average height of 86 cm. It gives an average yield of 23 qtl/acre.

**TL 2908:** It is grown in all areas of Punjab. It gets ready for harvesting within 153 days. It is resistant to mostly all major diseases. It has an average height of 113 cm.

**PBW 175:** It is grown in all areas of Punjab. It gets ready for harvesting within 165 days. It is resistant to Rust and Karnal bunt diseases. It has an average height of 110 cm.

**PBW 527:** It is grown in all areas of Punjab. It gets ready for harvesting within 160 days. It is resistant to yellow and brown rust diseases. It has an average height of 100 cm.

**WHD 943:** It is grown in all areas of Punjab. It gets ready for harvesting within 154 days. It is resistant to yellow and brown rust diseases. It has an average height of 93 cm.

**PDW 291:** It is grown in all areas of Punjab. It gets ready for harvesting within 155 days. It is resistant to yellow and brown rust, loose smut and flag smut diseases. It has an average height of 83 cm.

**PDW 233:** It is grown in all areas of Punjab. It gets ready for harvesting within 150 days. It is resistant to yellow and brown rust, loose smut and karnal bunt diseases. It has an average height of 98 cm.

**PBW 590:** It is grown in all areas of Punjab. It gets ready for harvesting within 128 days. It is resistant to yellow and brown rusts diseases. It has an average height of 80cm.

**PBW 509:** It is grown in all areas of Punjab except sub-mountainous region. It gets ready for harvesting within 130 days. It is resistant to yellow and brown rusts diseases. It has an average height of 85cm.

**PBW 373:** It is grown in all areas of Punjab. It gets ready for harvesting within 140 days. It is resistant to brown rusts diseases. It has an average height of 90 cm.

#### **OTHER STATE VARIETIES:-**

**RAJ-3765:** It matures in 120-125 days. Heat tolerant and suitable for zero tillage, Susceptible to brown rust, moderately susceptible to stripe rust and karnal bunt. The yield is near about 21 qtl/ acre.

**UP-2338:** It matures in 125-130 days. It is susceptible to leaf rust and moderately susceptible to stripe rust. Susceptible to karnal bunt and tolerant to blight. The yield is near about 21 qtl/acre.

**UP-2328:** It matures in 130-135 days. Ear heads are hard, sarbati colour & medium size grains. It is suitable for irrigated areas. The yield is near about 20-22 qtl/acre.

**Sonalika:** Early maturing single dwarf wheat with wide adaptation and attractive amber grains. It is suitable for late sowing and resistant to rusts.

**Kalyansona:** A double dwarf wheat with wide adaptation recommended for cultivation all over India. This variety is very vulnerable to rust. It is, therefore, advisable to grow it only in rust free regions.

**UP-(368):** High yielding variety developed by Pantnagar. It is resistant to rust and karnal bunt.

**WL-(711):** It is single dwarf, high yielding and medium maturing variety. It is moderately susceptible to powdery mildew and karnal bunt.

**UP-(319):** It is triple dwarf wheat with high level of rust resistance. To avoid losses to shattering, it should be harvested at appropriate time.

**Late varieties of wheat** - HD-2932, RAJ-3765, PBW-373, UP-2338, WH-306,1025

#### **LAND PREPARATION**

After harvest of previous crop, the field should be ploughed with disc or mould board plough. Field is usually prepared by giving one deep plough with iron plough followed by two or three times local plough and planking. Carried out plough in evening time and kept furrow open whole night to absorb some moisture from dew. Planking should be done after each plough early in the morning.

#### **SOWING**

### TIME OF SOWING

Wheat must be sown at the optimum time. Delayed sowing causes a gradual decline in the yield of wheat. The time of sowing is 25 October – November.

### SPACING

For normal sown crop a spacing of 20 - 22.5 cm between rows is recommended. When sowing is delayed a closer spacing of 15-18 cm should be adopted.

### SOWING DEPTH

The sowing depth should be 4-5 cm.

### METHOD OF SOWING

1. Seed drill
2. Broadcasting method
3. Zero tillage drill
4. Rotavator

### SEED

#### SEED RATE

Use seed rate of 45 kg per acre. The seed should be cleaned and graded thoroughly before sowing.

#### SEED TREATMENT

For seed treatment use any one fungicide from the following:

Fungicide/Insecticide Name	Quantity (Dosage) Per Kg Seed
Raxil	2 gm
Thiram	2 gm
Vitavax	2 gm
Tebuconazole	2 gm

### FERTILIZER

#### Fertilizer Requirement (kg/acre)

UREA	DAP or SSP		MOP	ZINC
110	55	155	20	-

### Nutrient Requirement (kg/acre)

NITROGEN	PHOSPHORUS	POTASH
50	25	12

### WEED CONTROL

**CHEMICAL WEED CONTROL:** Preferred because of less labour requirement and no mechanical damage during manual weeding. As pre-emergence, apply Pendimethalin (Stomp 30 EC) @1 Ltr at 0-3 days before sowing in 200 litres of water/acre. Use 2, 4-D @250 ml in 150 ltr water for controlling broad leaf weeds.

### IRRIGATION

Recommended time of irrigations is as below in the table:

NUMBER OF IRRIGATIONS	INTERVAL AFTER SOWING (IN DAYS)
1st irrigation	20-25 days
2nd irrigation	40-45 days
3rd irrigation	60-65 days
4th irrigation	80-85 days
5th irrigation	100-105 days
6th irrigation	115-120 days

The number of irrigations required will vary depending upon soil type, water availability etc. Crown root initiation and heading stages are the most critical to moisture stress. For dwarf high yielding varieties, give pre sowing irrigation. For heavy soils, four to six irrigations are required whereas for light soils 6-8 irrigations are necessary. Under limited water supply apply irrigation only at critical stage. When water is available for only one irrigation, then apply at crown root initiation stage. When two irrigations are available then apply at crown root initiation and flowering stage. Where three irrigations are possible, 1st irrigation should be given at CRI stage and 2nd at late jointing (boot) and 3rd at milking stage. CRI stage is most important stage for irrigation. It has been found that each week delay in 1st irrigation from

CRI stage results in yield reduction of 83-125kg per acre.

First irrigation should be given 20-25 days after sowing. This is crown root initiation stage and moisture stress at this stage will lead to yield loss. At tillering stage within 40-45 days after sowing, apply second irrigation. Third irrigation within 60-65 DAS at late jointing stage. At flowering stage (within 80-85 days) give fourth irrigation. Fifth irrigation at dough stage (within 100-105 DAS).

## PLANT PROTECTION



- **Insect Pests And Their Control**

**Aphids:** These are nearly transparent, soft-bodied sucking insects. When present in sufficient numbers, aphids can cause yellowing and premature death of leaves. Infestation usually occurs during second fortnight of January till crop harvesting.

For management of Aphid, use chrysoperla predators 5-8 thousand/acre or use 50 ml/Ltr neem concentrate. In cloudy weather infestation of aphid is occurred. Spray with Thiamethoxam@80gm or Imidacloprid 40-60 ml/ acre in 100 Ltr of water.



**Termite:** Termites attack the crop at various growth stages, from seedlings to maturity. The severely damaged plants can be easily uprooted and look wilted and dried. In case roots are partially damaged, the plants show yellowing. To control broadcast 1 Ltr of Chlorpyriphos 20 EC mix with 20 kg sand/acre then applies a light irrigation.



- **Diseases And Their Control**

**Flag smut:** It is seed borne disease. Infection spread through wind. It is favoured by cool, humid conditions during flowering period of the host plant. Treat the seed with fungicides like carboxyl (Vitavax 75 WP @ 2.5 gm/kg of seeds), Carbendazim(Bavistin 50 WP)@2.5 gm/kg seed), Tebuconazole(Raxil 2 DS)@1.25 gm/kg of seed) if the disease level in the seed lot is high. If it is low to moderate, treat the seed with a combination of Trichoderma viride@4 gm/kg seed and half the recommended dose of Carboxin(Vitavax 75 WP)@1.25 gm/kg seed.



**Powdery mildew:** Greyish white powdery growth appears on the leaf, sheath, stem and floral parts. Powdery growth later become black lesion and cause drying of leaves and other parts. When incidence of disease is observed, spray with wettable sulphur@2 gm/ Ltr of water or Carbendazim @400gm/acre. In case of high incidence, spray with Propiconazole@2 ml/ Ltr of water.



**Brown rust:** It is favoured by warm temperatures (15-30° C) and humid conditions. Brown rust is characterized by reddish- brown spores that occur in oval or elongated pustules. The disease can develop rapidly when free moisture is available and temperatures are near 20° C. Successive generations of urediospores can be produced every 10-14 days if conditions are favourable.

For control of this disease, follow mixed cropping with suitable crops. Avoid excessive use of Nitrogen fertilizer. Spray Zineb Z-78@400 gm/acre or Propiconazole@2ml/Litre of water.



**Stripe/Yellow rust:** The ideal growth conditions for yellow rust are temperatures of between 8-13° C for spore germination and penetration, and 12-15° C for further development and with free water. The yield penalties from yellow rust in wheat can range from 5% to as high as 30% in high disease pressure scenarios. The pustules of stripe rust, which, contain yellow to orange-yellow urediospores, usually form narrow stripes on the leaves.

For control of this disease, use rust resistant variety. Follow crop rotation and adopt mix cropping pattern. Avoid excess use of Nitrogen. When symptom observed, do dusting of Sulphur @5-10 kg/acre or take spray of Mancozeb @ 2 gm/Ltr or spray the crop with Propiconazole (Tilt) 25 EC @2 ml / litre of water.



**Karnal bunt:** It is seed and soil borne disease. Infection occurs at flowering stage. Cloudy weather condition during spike emergence to grain filling stage of crop leads to development of disease. If the rains occur during the month of February in north Indian plains (disease-prone areas), the disease is likely to come with higher severity.

For control of this disease use karnal bunt resistant varieties. For management of this disease, take one spray of Propiconazole (Tilt 25 EC) @2ml/ Ltr of water at ear head emergence stage.

## **HARVESTING**

Harvesting of high yielding dwarf variety is carried out when leaves and stem turn yellow and become fairly dry. To avoid loss in yield crop should be harvested before it is dead ripe. Timely harvesting is needed for optimum quality and consumer acceptance. The right stage for harvesting is when moisture in grain reaches to 25-30%. For manual harvesting use serrate edge sickles. Combines harvester are also available which can do harvesting, threshing and winnowing of wheat crop in single operation.

## **POST-HARVEST**

After manual harvesting, dried crops for three to four days on threshing floor so that moisture content of grain comes down to 10-12% and then threshing is done by trampling bullocks or thresher attached to bullocks. Direct sun drying and excessive drying should be avoided and the grains should be packed in sound clean gunny bags to minimize the losses. The Hapur tekka is a cylindrical rubberized cloth structure supported by bamboo poles on a metal tube base, and has a small hole in the bottom through which grain can be removed. Large scale grain storage is done in CAP (Cover and Plinth) and silos. To keep away several pest and disease during storage, use 1% malathion solution for disinfection of gunny bags. Properly clean the storage house, remove the cracks and fill the rat burrows with cement. White wash the storage house before storing grains and spray Malathion 50 EC @ 3 Ltr/100 Sq. meters. Place the heap of bags 50 cm away from wall and in between the heaps give some gaps. Also there should be a gap between the roof and the bags.

## **REFERENCES**

- 1.Punjab Agricultural University Ludhiana
- 2.Department of Agriculture
- 3.Indian Agricultural Research Institute, New Delhi
- 4.Indian Institute of Wheat and Barley Research
- 5.Ministry of Agriculture & Farmers Welfare