

Wheat

Botanical Name: *Triticum aestivum*

Family: Gramineae

Origin: South West Asia

Economic Importance:

1. Wheat is the **staple food** crop of the world.
2. It is consumed in the form of '**Chapatis**', **Puri**, **Upma**, **Rawa**, **Sewaya**.
3. Wheat is also consumed in various other preparations such as **dalia**, **halwa**, **sweet meals etc.**
4. It has **excellent baking quality** due to its strong **gluten** contents and used in making breads, cakes, biscuits etc. Flour of other cereals lacking gluten are, therefore, not good for bread making.
5. It contains proteins, Carbohydrates, Cellulose, Fat and mineral matter.
6. It has **higher protein content than any other cereal**. Wheat has a relatively high content of **niacin and thiamine**.
7. By-products of wheat flour mills particularly bran are used as cattle feed.
8. Besides staple food for human beings, wheat straw is a good source of feed for cattle.

Area & Distribution:

Wheat is the **world's most important** grain crop. Wheat ranks **first** position in the world among the cereals both in respect to the area and production. In India, it is the second important food crop being next to rice.

The most important wheat growing countries are the USSR, USA, China, India, Canada, Argentina, Australia and a number of European countries. Maximum area under wheat is in China followed by India, Russian fed. and USA. In production **China rank first and India rank second.**

Uttar Pradesh, Madhya Pradesh, Punjab, Rajasthan, Bihar, Maharashtra, Haryana and Karnataka are major wheat growing states of India. **The maximum area and production of wheat in Uttar Pradesh but Punjab gives highest average yield per hectare.**

Classification:

The most important cultivated wheat species are

T. monococcum	(diploid)	n= 7
T. durum	(Tetraploid)	n=14
T. dicoccum	(Tetraploid)	n=14
T. aestivum	(hexaploid)	n=21
T. sphaerococcum	(hexaploid)	n =21

T. aestivum, the common bread wheat is the most important spp. occupying about 85% area and 87% of the total wheat production. It is grown all over the country.

T. durum, the macaroni (& Suzi) wheat is the 2nd most imp spp. of wheat occupying about 14% of wheat area and 12% of total production. Its cultivation is confined to central and southern India only.

T. dicoccum or emmer wheat is grown in very restricted areas (1% of area and production) of Gujarat, Maharashtra, A.P and T. Nadu. It is preferred for granular preparations.

T. sphaerococcum has now practically gone out of cultivation because of its low productivity and high susceptibility to diseases.

Climatic Requirements:

Wheat is grown in a wide range of climatic conditions. It is cultivated in **tropical, sub-tropical, temperate** zone and the cold tracts. Cool weather during vegetative growth and warm weather for maturity is ideal for wheat. The optimum temperature for **germination is between 20-22⁰C**. The ideal temperature for **vegetative growth ranges from 16-22⁰C**. During early growth stage, wheat requires cool temperature it favors tillering. **Temperature above 25⁰C reduces the grain weight due to hastened maturity**. Wheat is grown in areas with annual rainfall vary in from 375-1750 mm but optimum annual rainfall required by crop is 750-1000 mm

Soil requirements:

Wheat is grown in variety of soils; Soils with **clay loam or loam texture**, good structure and moderate water holding capacity are ideal for wheat cultivation. Heavy soils with poor structure and poor drainage are not suitable as wheat is **sensitive to water logging**. So, waterlogged soils should be avoided for wheat cultivation. Soil should be **neutral in reaction**.

Preparatory cultivation :

Wheat requires a well pulverized but compact seed bed for good and uniform germination. In rainfed areas soil moisture conservation is most important for successful cultivation of wheat crop. The land is ploughed with mould board plough in summer for soaking rainwater into deep layers. After monsoon all possible efforts are made to conserve soil moisture by removing weeds, avoid cracking evaporation with repeated cultivations.

In irrigated areas, the wheat is sown after harvesting of Kharif crop. Field preparation depends upon the type of Kharif crop grown. After harvesting of Kharif crop one deep ploughing followed by 2-3 harrowing's are done. Then planking should be done. Sara's of convenient size are prepared with help of *sara yantra*.

Seed and sowing:

a. Seed treatment :

1. **Solar heat seed treatment:** Seeds are soaked in cold water for 4 hours at morning and thoroughly dried in hot sun on iron sheet in the afternoon for controlling of loose smut disease of wheat.
2. **Thiram or Agrosan or Vitavax @ 2.5-3 gm./kg** of seeds for controlling of flag smut, foot rot and wilt disease if wheat.
3. Azotobactor @ 250 gm /10 kg of seeds.

b. Time of Sowing: Rainfed condition- second fortnight of October to early November. Irrigated condition- 10th to 15th November.

c. Sowing method : Drilling (Line sowing)

d. Seedrate: 100 kg/ha under normal sowing, 125 kg/ha in case of late sowing. Sown by dibbler 25-30 Kg/ha.

e. Spacing: 22.5 cm in between two rows.

f. Depth of Sowing : depth of sowing is a very important aspect in successful cultivation of high yielding dwarf varieties of wheat. **The coleoptile length shorter in case of high yielding Mexican wheat as compared to tall varieties. The coleoptile length of Mexican varieties is about 5 cm. so seeds of dwarf varieties are not sown deeper than 4 cm.**

g. Method of Sowing: Wheat is sown by four methods:

1. Broadcasting
2. Behind local plough
3. Drilling
4. Dibbling

Manures and Fertilizers:

Manures and fertilizers both play important roles in wheat cultivation. Use of manure improves the physical condition and structure of the soil and its capacity to hold water. About 10-15 tons of well-rotted farm yard manure or compost should be applied in the field before sowing.

Application of fertilizers should be varies according to fertility status of soil by soil test values. If soil test data are not available fertilizers should be applied as following doses:

Irrigated Timely sown crop : 120:60:40 Kg NPK/ha.

Irrigated late sown crop : 80:40:20 Kg NPK/ha.

Rainfed crop : 40:20:20 Kg NPK/ha.

Apply full dose of P and K and half dose of N at the time of sowing and remaining half dose of nitrogen will be applied at the time of first irrigation i.e. at CRI stage (21 DAS).

Irrigation and Water management:

Adequate soil moisture is required for normal development of the Wheat plant at all the stages of growth. The crown root initiation stage and heading stage are critical stages when plant suffers most due to moisture stress.

First irrigation : 18-21 DAS i.e. at **crown root initiation** stage.

Second irrigation: At **jointing stage**, within 40-45 DAS

Third irrigation : At **flowering stage**, within 60-65 DAS.

Fourth irrigation: At **Grain filling stage**, within 80-85 DAS.

Under limited supply of water the following schedule of irrigation should be adopted for best utilization of available quantity of irrigation water.

1. Where, only single irrigation is available, apply at crown root initiation stage i.e. 18-21 DAS.
2. Where two irrigations were available, first irrigation should be given at CRI stage and second at flowering stage.
3. Where three irrigations are available, first irrigation at should be given at CRI stage, second at jointing stage and third at milking stage.

It has been observed that each week delay in first irrigation from CRI stage results in yield reduction of 2-3 quintals per hectare.

Weed control:

Weeds emerge with the emerging crop seedlings and if not controlled in the early stages of growth these may cause reduction in yield varying from 10 to 40 per cent depending upon the intensity and kind of weeds present in area.

Generally, weeds are eradicated with the help of hoe, khurpi etc. However now a days it has become difficult due to labour cost and unavailability of labour. Today, numbers of herbicides available in market for controlling of weeds effectively. The most common and effective herbicide used in wheat is 2,4-D Na salt @ 0.5 gm/ha. Mixed in 500-600 lit o water and sprayed in field after 30 DAS.

Phalaris minor and Wild oat is important mimicry weed observed in wheat for controlling of that sparay Isoproturon 50% @ 1.5 kg a.i. /ha. Pre emergence spray of Pendamethalin (Stomp) 30 EC @ 1 kg @ 1.0 kg a.i./ha have been found effective in controlling weeds.

Insect pest and Diseases:

Termites, Gujhia weevil, Army worm, Aphids and Jassids are the common pest occur on wheat crop.

Commonly occurring diseases on wheat crop are Rusts, Brown rust, Yellow rusts, Black rust, Loose Smut, Karnal bunt, Alternaria leaf blight, and Powdery mildew.

Harvesting and Threshing:

High yielding dwarf varieties of wheat should be harvested when the leaves and stems turn yellow and become fairly dry .To avoid loss in yield crop should be harvested before it is dead ripe. Timely Harvest the crop as soon as If delayed, grain may be lost due to damage by rats, birds, insects, shattering and lodging. Timely

harvesting ensures good grain quality, consumer acceptance. Right stage for harvesting is when about 25-30% moisture in grains. Generally harvesting is carried out early in morning or before morning. Harvesting is done with serrate edged sickle by hand. Today combine harvesters are available for harvesting, Threshing, and winnowing of wheat crop in single operation.

After harvesting of the crop it is dried for three to four days on the threshing floor and threshing is done by trampling bullocks or use of power driven threshers.

Yield:

When cultivation of high yielding dwarf varieties of wheat is done with improved scientific methods the yield is produce as given below:

- 1. Irrigated condition : 45-55 q ha⁻¹.**
- 2. Rainfed condition : 20-25 q ha⁻¹.**

For safe storage, grain should be cleaned and dried well in sun for few days so that moisture content of the grain comes down to 10-12 per cent.

Varieties:

Kalyan Sona, Sonalika, NI-59, NI-146, HY-65 NIAW 301 (Trimbak), NIAW 917 (Tapovan), NIAW 295 (Godavari), NIDW 15 (Panchvati) , NIAW 1415 (Netravati) MACS-6122, MACS-9, HD-2189, HD-2278, HD-4502 (Malvika).