

-Cultivation of wheat crop

Introduction:

Wheat (*Triticum spp.*) is world's most widely cultivated food crops. It is mainly a rabi season crop in India. It has played a very vital role in stabilizing the food grain production in the country over the past few years. In India, it is the second important staple cereal food.

Nutritive value of wheat grain

Component	% in grain	% in flour
Moisture	9-18	13-15
Protein (%N x 5.7)	8-15	8-13
Cellulose (Fiber)	2-2.5	0.2
Oil and Fat	1.5	0.8-1.5
Mineral matter (ash)	1.5-2	0.3-0.5
Carbohydrates	62-71	65-70

Importance and utility:

Wheat is also used for manufacturing of bread, flakes, cakes, biscuits, etc.

Classification of Indian Wheats:

1. Emmer Wheat (*Triticum dicoccum schub L.*)
2. Macroni Wheat (*T.durum Desf.*)
3. Common Bread Wheat (*T. vulgare Host*) :
4. *Triticum aestivum* :

Origin and History:

Wheat is being cultivated since pre-historic times. From all possible record, it seems that its centre of origin is South Western Asia. It is believed that Aryans brought wheat grains to India.

According to De Candolle, the wheat was originated in the Eupharates and Tigris and spread from there to China, Egypt and other parts of the world.

Valilov(1950), after extensive studies came to the conclusion that the origin of the durum (kathiya) wheat was probably in the region of Abyssinia, where as the whole group of soft wheat, which includes bread wheats, probably originated in the region of Pakistan, South-Western Afghanistan and the Southern parts of mountainous Bokhara.

Climate Requirements:

Wheat has wide adaptability. It can be grown not only in tropical and sub-tropical zones but also in the temperate zone and the cold tracts of the far north, beyond even the 60° north latitude. Wheat can be cultivated from sea level to as high as 3,300 m.

Other parameters are following:

Optimum Temperature Range- 20⁰-25⁰C (Ideal germination of wheat seed)
3.5⁰ – 35⁰C (Seed germination Temperature range)

14-15⁰C (Optimum average tem. At the time

of maturity)

Rainfall

25-150cm/year

Humidity

50-60%

Season for Wheat Cultivation in India:

Wheat, in India, is best grown as a rabi or winter season crop since the conditions during that time are conducive for growth and ensures maximum yield.

Soil Requirements:

Wheat needs soil with a moderate amount of water holding capacity. Well-drained loams and clayey loams are considered to be a good for wheat.

Others characteristics of soils for wheat cultivation.

Salinity level (EC)

6ds/m, Yield is reduced by about 50% at 14ds/m.

pH

6-8

Improved varieties:

ICAR- Indian Agricultural Research Institute, New Delhi released and identified eight new varieties of major field crops and seven varieties of horticultural crops during 2015.

HS 542 (Pusa Kiran), HW 1098 (Nilgiri Khapli), HDCSW 18, HD 3117, HD 4728 (Pusa Malvi), HS 562,

Other Varieties-

Arjun (HD 2009), Janak (HD 1982), HD 2285, HD 2329, U.P. 2338, WL 711, U.P. 215, 262, 301, 319, 368, 2003, Jairaj (JNK 4W185), Malvika (HD 4502), HP 1102, 1100, 1633, K 8804, 9006, HD 2135, 2177, 2189 etc.

Seed and Sowing:

a) Sowing time:

The normal time of sowing of high-yielding cultivars in irrigated areas start in the beginning of November.

Long and medium duration cultivars like UP2003 and Arjun etc. should be sown in the first fortnight of November.

Short duration cultivars (120-125 days) like UP115, 162, etc in second fortnight of November.

Under specific circumstances, wheat is also sowing in December.

In late-sown wheat, only short duration cultivars should be sown because there is comparatively less reduction in their yields as compared to late and medium duration cultivars. When wheat is sown beyond December there is a drastic reduction in yield. After November, delay in sowing by each day causes reduction of 5kg/ha/day in north-eastern parts of the country and 41kg/ha/day in north-western and central parts of the country.

b) Seed rate:

Seed rate of wheat under various sowing methods

Method of Sowing	Seed rate (kg/ha)
Line sowing behind plough	90-100
Sowing by kera/pora method	80-100
Sowing by dibbling	25-30
Late sowing by seed drill	125-155
Broadcasting Method	100-120

c) Spacing: :

For normal sown crop, 22-22.5cm.(Row spacing)

For irrigated, timely sown wheat, a row spacing of 15 to 22.5 cm.

Under irrigated late-sown conditions 15-18.

Depth:

Mexican cultivars is about 5cm.

Semi-dwarf(One zene dwarf), 5-6cm

For dwarf wheat's, the planting depth should be between 5 and 6 cm.

d) Seed treatment:

The seed of loose smut-susceptible varieties should be given solar or hot-water treatment. If the wheat seed is used only for sowing, it can be treated with Vitavax,thiram 2.5 gm/kg seed.

Method of sowing:

Wheat is sown by the following 4 methods.

- a- Broadcast.
- b- Behind the plough.
- c- Drilling.
- d- Dibbling.
- e- FIRB System- The furrow irrigated raised bed (FIRB) has been recently developed and is being promoted by the Rice-Wheat consortium of the CGIAR institute.

Application of Mannures and Fertilizer:

It is desirable that 2 to 3 tonnes of farmyard manure per hectare or some other organic matter is applied 5 or 6 weeks before sowing.

The fertilizer requirement of the irrigated wheat crop is as follows:

- a. With assured fertilizer supply:
 - Nitrogen (N) @80-120 kg/ha.
 - Phosphorus (P₂O₅) @ 40- 60 kg/ha.
 - Potash (K₂O) @ 40 kg/ha.
- b. Under fertilizer constraints:
 - N @ 60-80 kg/ha.
 - P₂O₅ @ 30-40 kg/ha.
 - K₂O @ 20-25 kg/ha.

Total quantity of Phosphorus and potash and half the quantity of nitrogen should be applied at the time of sowing. Remaining quantity of Nitrogen should be applied at the time of crown root initiation. For the late sown irrigated wheat crop, the NPK fertilizer dose recommended is:

N – 60-80 kg/ha.

P₂O₅ – 30-40 kg/ha

K₂O – 20-25 kg/ha.

Interculture:

Generally weeding is done after 1 ½ to 2 months after sowing or weedicides like 2,4 D, Avadex or Nitrofen (Tok E-25) for controlling *Chenopodium* sp, *Angallis* sp. *Asphodelus* sp. *Phalaris* sp. of weeds.

Water Management:

In wheat cultivation, irrigation requirement depends on various factors viz. type of soil, variety grown etc.

Irrigation in dwarf wheat varieties: The critical stages of wheat are described below.

1 st Irrigation	20-25 DAS	Crown root initiation stage
2 nd Irrigation	40-45 DAS	Tillering stage
3 rd Irrigation	65-75 DAS	Late joining stage
4 th Irrigation	90-95 DAS	Flowering stage
5 th Irrigation	110-115 DAS	Milking stage
6 th Irrigation	120-125 DAS	Dough stage

Crop rotation:

Maize-Wheat

1 year

Maize-wheat-cotton-barseem

2 years

Paddy-wheat

1 year

Cotton-wheat-green gram

1 year

Plant Protection:

Diseases-

Wheat crops suffer from several diseases causing reduced yield and quality.

The major diseases and their chemical control are given below.

S.No	Diseases	Chemical control
1.	Black or stem rust	Spray 0.2% zineb or dithane M-45
2.	Yellow or strip rust	-do-
3.	Brown or leaf rust	-do-
4.	Alternaria leaf blight	Treat seed with vitavax @ 2.5g/kg of seed, Spray 0.2% zineb or dithane M-45
5.	Powdery mildew	Spray propiconazole(Tilt 25EC)@0.1% at emergence or appearance of disease
6.	Loos smut	Seed treatment with trichoderma viride @ 1.5g/kg seed
7.	Karnal bunt	Seed treatment with ceresin G.N. @ 2.5g/kg of seed is beneficial
8.	Molya nematode	Apply temik 10G @ 10kg/ha at sowing time

Insect-Pests:

Wheat is attacked by a number of insects- pests and rodents both in the fields and in storage. Some insets-pests and their control are following.

S.No	Insets-Pests	Control
1.	Aphids.	The spray of imidacloprid @ 20 g a.i. per ha
2.	Termites	Treated the seed with chlopyriphos (1g/kg seed) or fipronil (0.3g/kg seed), broadcast chlopyriphos mixed soil (3lt. in 40-45 kg soil) 15 days after sowing.
3.	Army worm and gram caterpillar	Spray of carbaryl(sevin 50 WP @ 2.5 kg/ha in 800lt. of water/ha.
4.	Fields rat	Use rat trap or drowning them in water.

Harvesting:

The time of harvesting of wheat depends on the type and variety grown. The wheat crop is usually harvest when the grains become hard and the leaves become dry and brittle. General time for wheat harvesting in different zones is given in table.

Wheat growing zones	General time of harvesting
NEP zone	Last week of March and continues till mid April
NWP zone	Second fortnight of April
Central zone	End of February to March
Peninsular zone	Second fortnight of February to beginning of March
Hilly zone	May-June

Yield:

40-45 q grain and 70-80 q straw/ha may be obtained from dwarf wheat varieties under irrigated areas. Under rainfed condition, 20-25 q grain and 30-35 q straw/ha may be obtained. From Deshi wheat varieties, 20-30 q grain and 60-70 q straw/ha may be obtained.

REFERENCES:

1.	Indian Crops	Ahlawat and Omprakash
2.	Major Crops of India	Dr. Kali charan Sharma
3.	Principles of Agronomy	S.R. Raddy
4.	Agronomy of field Crops	S.R. Raddy