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From soil to silo: The journey of wheat cultivation

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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

- Protein 11-12%
- Carbohydrate 70-75%
- Fat 1-2%
- Fiber 1-2%
- Moisture 11-12%

Importance and use

- Use for human
- Also used for cattle feed
- Use for Beackery industry

Classification of wheat

1. **Triticum aestivum:-** common bread wheat and maxican and dwaf wheat
2. **Triticum durum:-** known as hard wheat and Macaroni
3. **Triticum dicoccum:-** known as emmer and upma wheat
4. **Triticum sporococum :-** known as indian tall wheat

Climate requirement

Wheat has wide adaptability. It can be grown not only in tropical and subtropical zones but also in the temperate zone and the cold tracts of the far north, beyond even the 600 north latitude. Wheat can be cultivated from sea level to as high as 3,300 m. Other parameters are following:

- Optimum Temperature Range- 20-25C (Ideal germination of wheat seed)
- 3.5 – 35C (Seed germination Temperature range)
- 14-15C (Optimum average tem. At the time of maturity)

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- Rainfall 40-50cm
- Humidity 50- 60%

Soil requirement

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.and loam to sandy loam soil best for wheat cultivation.

Seed and sowing

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,thyram capton theron 2.5 gm/kg seed.

Sowing time:- 15 October to 15 November

Spacing:- 20-25 cm row to row and 10-15 plant to plant

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

Seed rate:

- Broadcasting Method
- Sowing by dibbling
- Seed drill
- Line sowing behind plough
- 90 to 100 kg kera
- 80 to 100 kg Broadcast
- 20 to 25 kg Dibbling
- 60 to 80 kg seed Drill

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 follow

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.

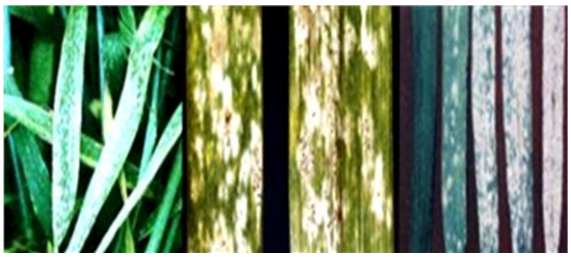
Water management

In wheat cultivation, irrigation requirement depends on various factors viz. Type of soil, variety grown etc Irrigation in dwarf wheat verities critical stages of wheat are described

- 1st Irrigation 20-25 DAS Crown root initiation stage
- 2nd Irrigation 40-45 DAS Tillering stage
- 3rd Irrigation65-75 DAS Late joining stage
- 4th Irrigation 90-95 DAS Flowering stage
- 5th Irrigation 110-115 DAS Milking stage
- 6th Irrigation 120-125 DAS Dough stage

Diseases Powdery mildew:- Powdery mildew can easily be diagnosed by the white, powdery patches that form on the upper surface of leaves and stem. Greyish white powdery growth appears on the leaf, sheath, stem and floral parts.

Control :- using fungicides, with options including copper-based, sulfur-based, and synthetic fungicidesTriazoles and other synthetic fungicides like azoxystrobin are also used, but their use should be managed to prevent resistance



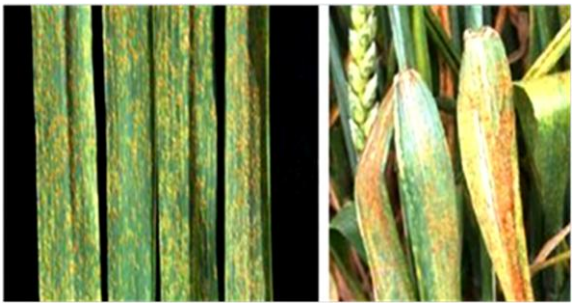
Loose smut

It is a seed borne disease; infection occurs during Loose Smut flowering through windborne spores. The infection remains dormant inside the otherwise healthy looking seed but the plants grown from such seeds bear infected inflorescence.

Control:- Treat seed with systemic fungicides like carboxin, difenoconazole, or tebufenazole before planting**.**

Brown rust:-The most common site for symptoms is on upper leaf blades, however, sheaths, glumes and awns may occasionally become infected and exhibit symptoms

Control:- using resistant wheat varieties**,** proper cultural practices**,** and timely fungicide applications when needed**.**



Flag smut

Symptoms can be seen on stem, clum and leaves from late seedling stage to maturity.The seedling infection leads to twisting and drooping of leaves followed by withering. Grey to grayish black sori occurs on leaf blade and sheath. The sorus contains black powdery mass of spores.

Control:-Treat the wheat seed with Carbendazim at the rate of 2 gm/kg of seeds

Kernel bunt:- Symptoms of Karnal bunt are often difficult to distinguish in the field due to the fact that incidence of infected kernels on a given head is low.

There may be some spreading of the glumes due to sorus production but it is not as extensive as that observed with common bunt.

Control :- seed treatment with fungicides and foliar sprays.

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

Aphids:- Termites damage the crop soon after sowing and sometimes near maturity. They feed on roots, stem of growing plants, even dead tissues of plant feeding on cellulose.

Control:- The spray of imidacloprid **@** 20 g **a.i.** Per ha

Termites:-CONTROL 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.

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.

- **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 rained condition, 20-25 q grain and 30-35 q straw/ha may be obtained. From Desi wheat varieties, 20-30 q grain and 60-70 q straw/ha may be obtained