

Course – M. Sc. Botany Part 1 Paper III

Topic – Loose Smut of Wheat

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Loose Smut of Wheat

- The disease loose smut of wheat is caused by *Ustilago nuda tritici*.
- Incidence is more in north than in south India.
- Country wide loss is about 2-3% of total yield.
- There was a loose smut epidemic in Punjab, Haryana and western U.P. in 1970-75.



LOOSE SMUT OF WHEAT

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Distribution:

- All wheat growing regions of India.
- Particularly in Punjab, Haryana, U.P. and certain regions of M.P.

Symptoms:

- Symptoms appear after ear emergence.
- Diseased ear emerged first than normal in some varieties
- Mostly all ears is converted into a black mass of spores
- All the floral parts of the head, except the rachis and pericarp membrane, are invaded by mycelium of the fungus and converted into loose aggregation of smut spores (teliospores).
- Significant reduction in tillering.

- Except awns all parts of ear converted into smut spore.
- Black powder in ear-covered by silvery membrane.
- Membrane burst later & smut spore release.
- Group of smut spore called sorus.
- High respiration and low dry weight.



LOOSE SMUT OF WHEAT
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Causal agent: Etiology

Pathogen - *Ustilago nuda tritici*. (Syn. *U. segetum* var. *tritici*)

Systematic position:

Kingdom: Fungi

Phylum: Basidiomycota

Sub phylum: Ustilaginomycotina

Class: Ustilaginomycetes

Order: Ustilaginales

Family: Ustilaginaceae

Genus: Ustilago

Species: *U. tritici* (Pers.)

Pathogen characters:

- It is an internally seed borne fungal disease.
- It causes systemic infection.
- The teliospores of the fungus are pale, olive brown, spherical to oval in shape, about 5-9 micro diameter and are adorned with minute echinulations on the wall.
- They germinate readily in water, each spore producing one four celled germ tube(promycelium).
- The promycelial cells fuse and give rise to the germ tubes that enter the ovary through the stigma and become established in the embryo, remaining dormant until seed germination.
- Its presence is revealed only when the plant matures and a smutted ear emerges.

Mycelium characters:

- The Primary mycelium consists of hyaline, slender, septate hyphae with a single haploid nucleus in each cell. (Monokaryotic or haplo mycelium).
- The Secondary mycelium consist of hyphae with two haploid nuclei in each cell. (Dikaryotic hyphae).

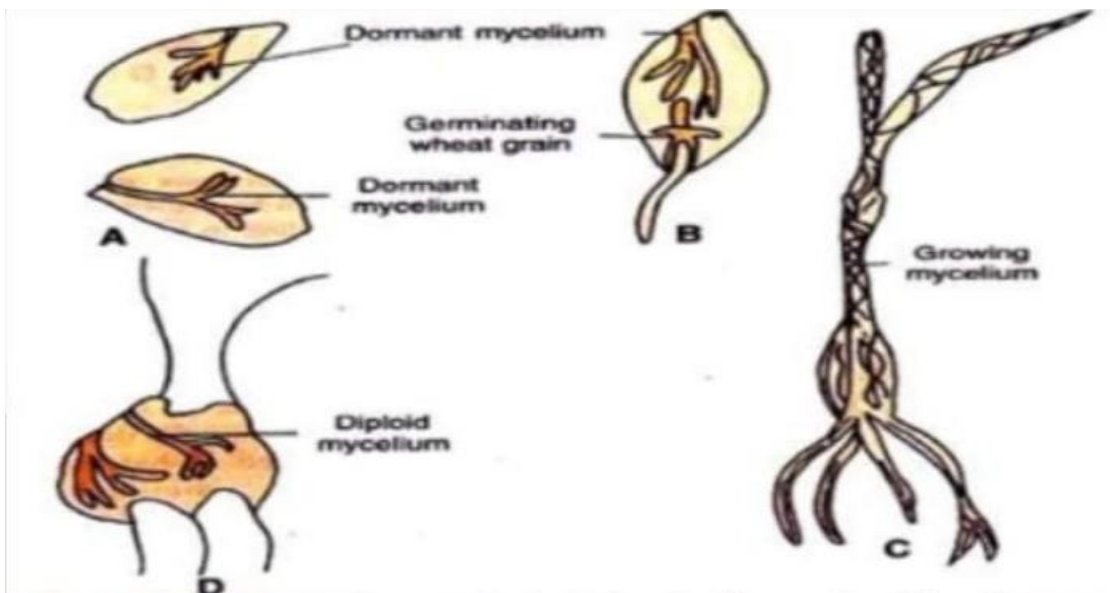


Fig. 14.6 (A-D). *Ustilago tritici*. A. Infected wheat grain with a dormant mycelium; B. Germinating wheat grain with an activated mycelium; C. Wheat seedling with the mycelium growing and spreading; D. Diploid mycelium has finally invaded the ovary.

MYCELIUM OF LOOSE SMUT

Disease control and Management:

- Treat the seed with Carboxin (Vitavax) @ 2g/kg seed before sowing.
- Grow resistant varieties like Sonalika, Kalyan 227, PV18, WG307, NP13 and C302.
- Bury the infected ear heads in the soil, so that secondary spread is avoided.
- Spraying of fungicides like Carboxin (Vitavax) 0.125% or Tebuconazole (Folicur) 0.2
- Hot water treatment (Jenson, 1886):
 - Soak the seeds in water @ 26-30°C for 5 hours to induce dormant mycelium to grow.
 - Then immerse the seeds in hot water @ 54°C (129°F) for 10mins to kill the mycelium.
 - Drying of seed.
- Solar treatment (Luthra and Sattar, 1954 in Punjab):
 - In May- June -Soak the seeds in cold water for 4 hours from 6AM to 10AM.
 - Spreading and drying of seeds on brick floor in bright sun (44°C) for 4 hours from 10AM to 5PM in the afternoon.