Loose Smut of wheat (Ustilago)

Loose Smut of wheat is an internal seed borne disease caused by Ustilago nuda a member of Basidiomycetes. The disease is cosmopolitan in distribution.

Symptoms :- Entire 'ear' except rachis and awns smutted and black powdery mass appear; In the begining, the smut sori remain covered with thin silvery membrane, but soon after the rupture of this covering; the loose mass of teleutospores is esetensively dispersed by wind and the rachis remains barren.

Pathogen :- The pathogen causing loose smut of wheat is Ustilago nuda. The smut spores develop on the mycelium found in the intercellular spaces of the host. The smut spores are minute, pale olive-brown, more or less spherical in shape or occassionally oval, and measures 5-9 μ in diameter. The outer wall of it is called exospore and is thick and echinulate whereas the inner wall endospore is thin and smooth. They grminate by germ tube which develops to become a promycelium of four uninucleate cells, two of which are of (+) strains and two are of (-) strains. From each segment single infection thread develops. The two opposite strained infection thread unite a dikaryotic cell is produced. The dikaryotic hypha develops from the dikaryotic ell. The dikaryotic hypha enters the style and reaches the embryo where it develops into thick irregular and branched mycelium. The mycelium remains dormant in the embryo.

The dormant mycelium established in the embryo of the seed

becomes active at the time of the germination of the infected seed & grows along with the apex of coleoptile. On the emergence of the ears the mycelium reaches in the floral parts and becomes activated and produce smut spores.

Disease Cycle :- The disease is internally seed borne. The pathogen becomes active during seed germination, grows along with the plant and becomes systemic. The dikaryotic mycelium, at the time of ears formation, transforms into teleutospores, which infect the embryo of new host plants. Teleutospore fall and germinate on the stigma of wheat flowers and form 'infection threads' on a septate promycelium. The dikaryotization establishes secondary mycelium which grows and establishes in the embryo (embryo infection). After infection the mycelium becomes dormant in the seed until next sowing season.

Control :- The following methods have been suggested to control the disease -

(I) Hot water treatment followed by 4-5 hrs of drying in sun effectively disinfects the seeds.

(II) The use of resistant of variety is the simplest and most important of control.

(III) Since the disease is seed borne, the seeds should be selected from healthy crops.

(IV) Roguing :- The infected ears should be burnt outside the fields, so that the smut spores may be destroyed.

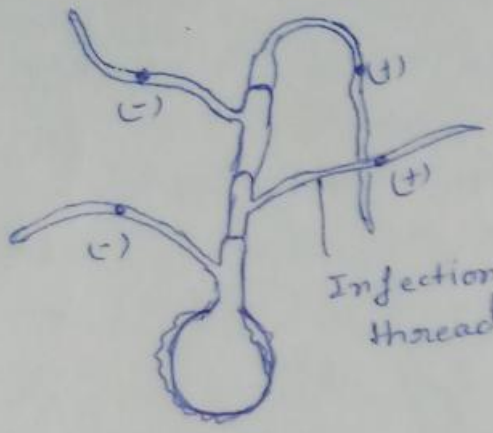
(v) Chemical treatment :- The disease can be effectively controlled by soaking wheat seeds in fungicides like chlorex, Purex, Ceresan and vitavax. By this method the pathogen is destroyed and the seed becomes fit for sowing.

Smutted ear.

Smut spore

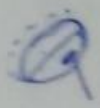
Germinating Smut spore

Germinating



Infection thread

Dikaryotic mycelium.



Dormant mycelium.