

**B.Sc. Botany**  
**Part-I (2019-21)**  
**Paper-II: Microbiology Fungi and Plant Diseases**  
**GROUP-B**

**LOOSE SMUT OF WHEAT**

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## LOOSE SMUT OF WHEAT

This disease is very common and widespread. It causes great damage in the wheat growing tracts of India, particularly in the Punjab, Uttar Pradesh and certain districts of Madhya Pradesh. In Punjab the disease is called Kangraoti.

Host: *Triticum vulgare*  
Pathogen: *Ustilago tritici*

Symptoms - Loose smut is most obvious just after the wheat has headed. The smutted <sup>ears</sup> emerge from the boot leaves a little earlier than the healthy ones.

- 1) The smutted ears bear loose, black, powdery masses of smut spores instead of flowers, and completely destroyed.
- 2) All the ovaries and other floral parts except the awns and rachis are converted into masses of smut spores.
- 3) In the young spikelets before emergence each ovary has become a spore sac.
- 4) The spores of each spikelet are covered by a thin greyish or silvery membrane.

By the time the ear emerges from the boot leaf the membranous sheath ruptures to expose the black powdery mass of spores.

5) When the wind blows the spores are blown off and the bare rachis and central axis is left behind. To it may cling a few spores that have not been blown off by the wind.

It is not necessary that all the ears of a wheat plant may be smutted. Some may be found to be healthy and others diseased.

Etiology →

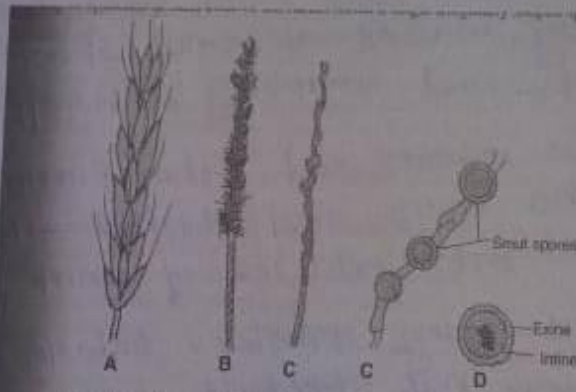


FIG. 14.3 (A-C). *Ustilago tritici*. A, Normal ear of wheat; B, Smutted ear of wheat; C, Naked rachis after the spores are blown away by wind; C, A portion of a hypha with smut spores; D, A smut spore.

1. As the infected grain is sown and germinates, the dormant fungus mycelium within the grain resumes activity.
2. Growing mycelial hyphae keep pace with the growth of the host plant. They remain just behind the growing point.
3. At the flowering time, the hyphae reach the inflorescence region and accumulate in the floral parts, chiefly florets, which are subsequently ~~etc.~~ completely destroyed.
4. The hyphae become swollen and additionally septate. The segments, which are binucleate, round off, separate and secrete thick walls to become smut spores (teliospores).
5. The teliospores serve as a means of propagating the disease during the growing season. They are ~~etc.~~ steadily carried from the smutted ears by air current, at a time when the healthy plants are in the ~~etc.~~ dry weather to the ~~etc.~~ flowering stage.

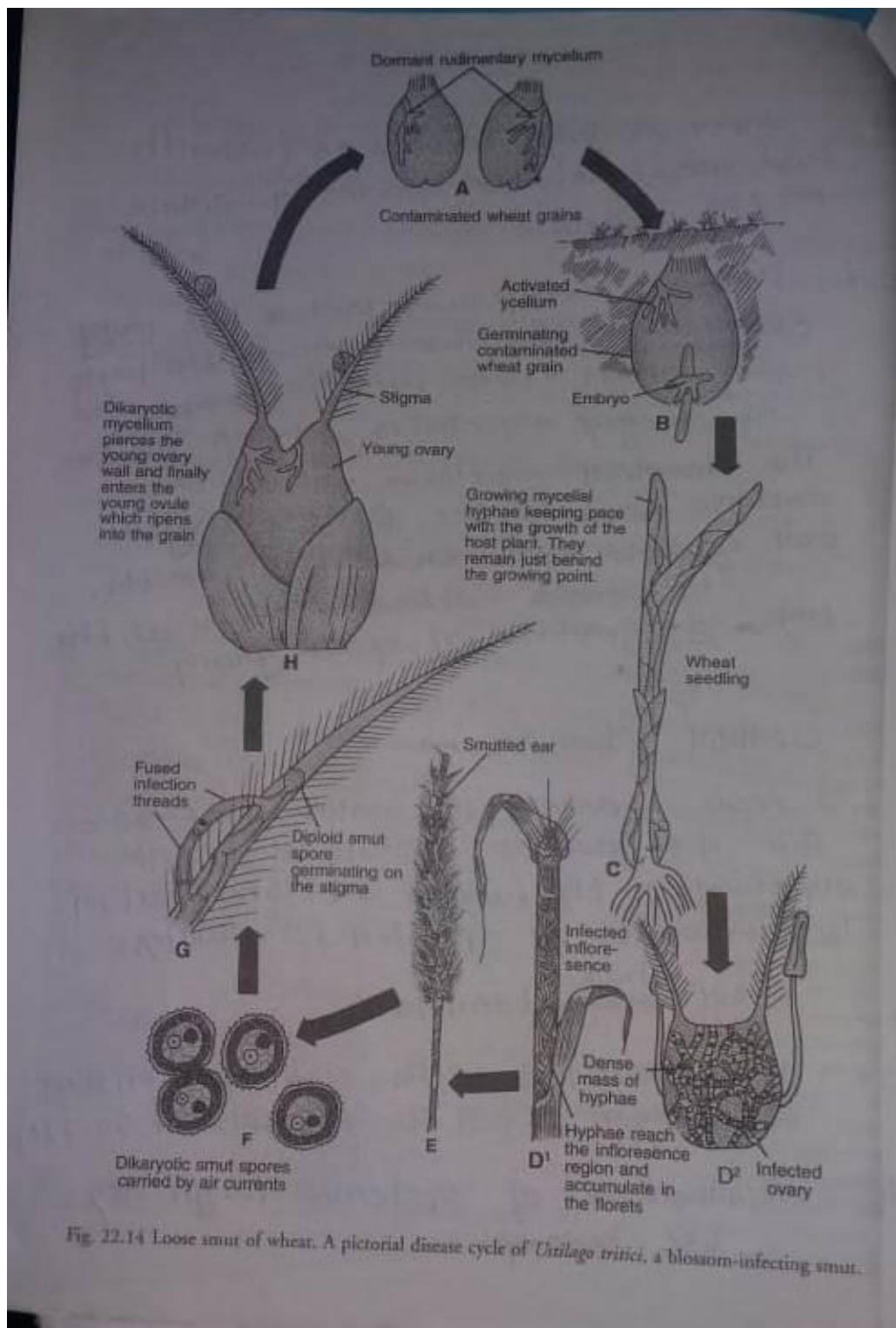


Fig. 22.14 Loose smut of wheat. A pictorial disease cycle of *Ustilago tritici*, a blossom-infecting smut.

6. Under suitable conditions (warmth and moisture) the spores germinate on the stigma.

7. Dikaryotic mycelium pierces the young ovary wall and finally enters the young ovary which ripens into the grain.

The fungus mycelium becomes inactive. The dormant mycelium within the embryo carries the fungal pathogen over seasons unfavourable for growth.

It becomes activated again at the time of germination of the grain.

#### Control Measures -

1. Seeds soaked in water at  $26-30^{\circ}\text{C}$  for 4-5 hours to activate dormant mycelium of the fungus and then put in hot water ~~for~~ at  $54^{\circ}\text{C}$  for 10 minutes.
2. Solar <sup>heat</sup> ~~energy~~ treatment.
3. Seed treatment with 0.2% suspension of Spargan SL for 40-50 hours at  $50-72^{\circ}\text{F}$ .
4. Application of systemic fungicides like Benomyl.

5. Growing resistant varieties like Kalyan 227, HP710, HP320, and PB 96.

The disease results in the reduction of yield from 20 to 50 percent. Quality of the grain is however not affected.

Recent researches have been conducted to use PCR and ELISA techniques in the assessment of loose smut incidence in seed lots.