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### 3. Symptoms of Ustilago:-

The symptoms appear only on the floral parts. The floral spikes turn black and remain filled with the smut spores. Ustilago produces two main types of symptoms —

(i) Loose smuts :- In this case black spores are exposed at the flowering time and are blown away by wind, leaving a bare stalk of inflorescence. Example.

- a) Loose smut of Wheat — U. tritice
- b) Loose smut of Barley — U. nuda
- c) Loose smut of Oats — U. avenae
- d) Loose smut of doobgrass — U. cynodontis

(ii) Covered smuts → In this case spores remain covered by the wall of the grain (peridium) and are liberated only by the breaking of wall during thrashing. For example —

- a) Covered smut of Barley — U. hordei
- b) covered smut of oat — U. kolleri
- c) Gall smut of maize — U. maydis

In maize large sized galls are formed on stalk or on the ear. In sugarcane (U. scitaminae), the entire inflorescence is transformed into a several feet long, black, whip-like structure.

## On Line study material (e-content)

College: S.S. college, Jehanabad

Department: Botany

Subject: Fungi

Topic: Ustilago

Medium of Teaching: WhatsApp App & College web-site.

Date: 22.07.2020

Time: 11.00 - 12.00

Name of the Teacher: Dr. S. S. Sharma

Glass - B.Sc (Bot) Hons  
Part - I

### Ustilago: Taxonomic Position, & Structure

#### 1. Taxonomic Position: According to Alexopoulos & Mims (1979) -

Super Kingdom	—	Eukaryota
Kingdom	—	Mycetozoa
Division	—	Amastigomycota
Sub-Div.	—	Basidiomycotina
class	—	Basidiomycetes
order	—	Ustilaginales
Family	—	Ustilaginaceae
Genus	—	Ustilago.

#### 2. Habit and Habitat: -

Ustilago, the largest genus of the family Ustilaginaceae is represented by more than 400 species distributed all over the world. Bantles and Bisby (1958) reported 108 species from India. All species are parasitic and infect the floral parts of wheat, barley, oat, maize, sugarcane, Bajra, rye and wild grasses (mostly on cereals).

The name Ustilago has been derived from a Latin word 'ustus' meaning "burnt" because the plant parts give a 'burnt' appearance. Since the fungus produces black sooty/dusty mass of spores, therefore, it is commonly known as Smut Fungus.



(4)

(4)

### \* Sexual Reproduction :-

Ustilago is autoecious i.e. it completes its life cycle on a single host. Sex organs are completely absent but sexuality is pronounced. During the process plasmogamy, karyogamy and meiosis takes place. The product of sexual reproduction is the formation of "Teleutospores" or "chlamydospores" and "Basidiospores".

### • Formation of Teleutospores :-

The dikaryotic mycelium becomes active at the flowering time of the host and form a dense mass of hyphae within the host tissue. This mass includes numerous short-dikaryotic cells. The protoplast of each cell (binucleate) rounds off and the wall becomes gelatinised. Protoplast of each cell secretes a thick black wall around it. Such structure is called as chlamydospores or teleutospores or Brand spores or smut spores.

Each smut spore is binucleate, globose, yellow or brown or black with spiny, reticulate or smooth wall.

The thick wall of smut spore consists of two layers :

i) The outer thick layer — Exine or exosporium.

ii) The inner thin layer — Intine or endosporium.

The smut spores are disseminated by wind, insects or water.

(3)

#### 4. Vegetative structure of Ustilago -

The mycelium is always internal which may be inter/intra cellular. It is branched, septate, hyaline with or without haustoria.

Mycelium is of two types -

a) Primary mycelium : - It is monokaryotic (uninucleate) and formed by the germination of basidiospores. It is short lived.

b) Secondary Mycelium : - It is formed as a result of dikaryotisation of the primary mycelium. It is dikaryotic (binucleate) and remains viable for a long time (entire life).

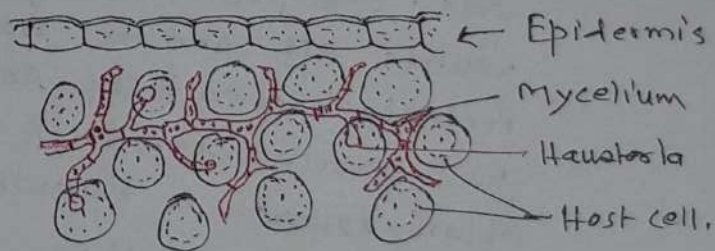


Fig. Ustilago showing intracellular Mycelium.

#### 5. Reproduction : -

Asexual reproduction in Ustilago is of rare occurrence. If it occurs in any case, it takes place by fragmentation, budding of basidiospores and formation of conidia.

