

USTILAGO

(1)
SMUT disease or
(loose smut of wheat)

Systematic position -

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|----------------|----------------|
| Division - | Mycota |
| Sub-division - | Euromycotina |
| Class - | Basidiomycetes |
| Order - | Ustilaginiales |
| Family - | Ustilaginaceae |
| Genus - | Ustilago |

Occurrence -

There are about 300 - 400 species of this genus. More than are parasite on cereals like wheat, Barley, oat, Maize, Jowar; Sugarcane and other plants of economic importance. The disease caused by this fungus is known as smut disease which reduces 25% to 50% of yield.

Structure :-

The mycelium of this fungus is usually intercellular, septate and hyaline. There are two phases of mycelium.

(a) Primary mycelium -

The cells of primary mycelium are uninucleate containing a single haploid nucleus. This monokaryotic mycelium develops as a result of the germination of

basidiospores. It is short lived and the hyphae of mycelium are of '+' strains and '-' strains.

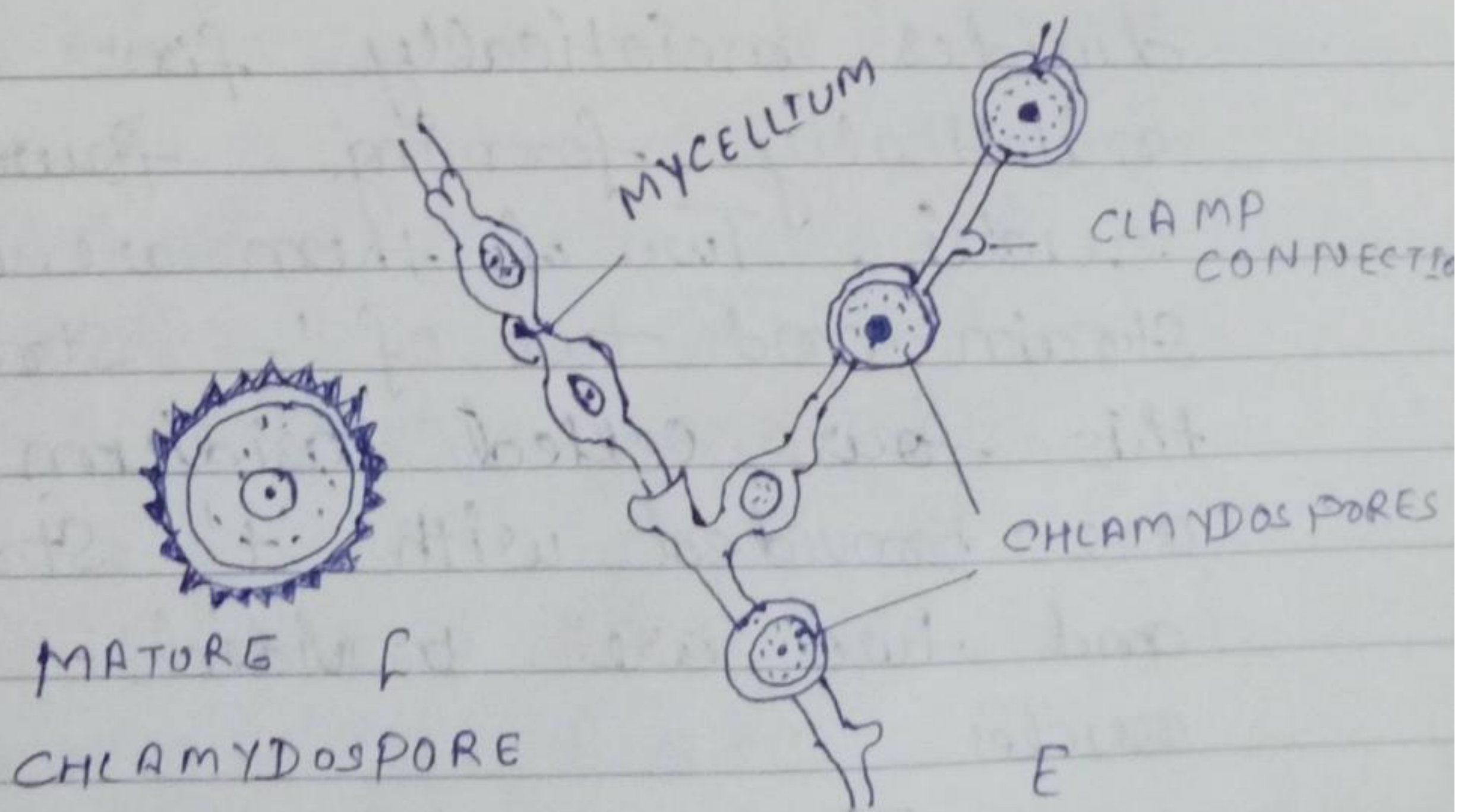
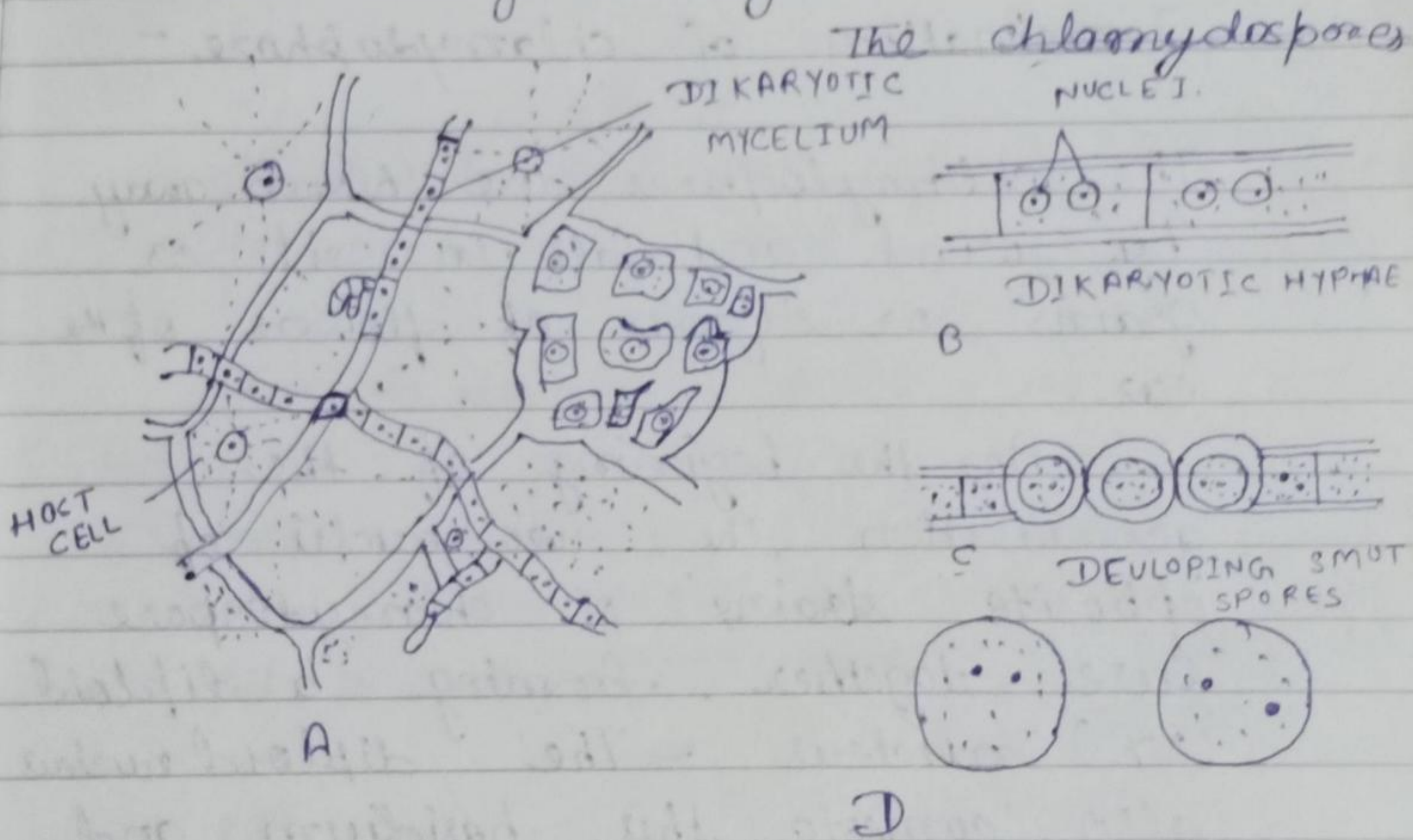
2. Secondary mycelium - The secondary mycelium is produced as a result of somatogamy and clamp connection between the two hyphae of '+' and '-' strains. Due to the clamp connection each cell of secondary mycelium becomes dikaryotic. This dikaryotic secondary mycelium lives for longer time in the intercellular spaces of the host tissues but it seems to cause no harm to the host plant. The mycelium gets food from host tissues with the help of haustoria.

CHLAMYDOSPORE (Smut disease spores or Brand spores or Teleutospores) :-

Although the infection occurs at an early stage but it is visible at flowering stage. The whole flower gets aborted. The ears appear blackend and shrivelled and the

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grains become filled with dark brown or sooty powder. This powder is the mass of chlamydo spores. The grains are totally destroyed.



Formation and Structure of chlamydo spore

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The chlamydozoospores are also called teleutozoospores, smut spores, brand spores or resting spores.

Germination of chlamydozoospore -

The chlamydozoospores are blown away by wind and fall in soil or grains or stigmas of flowers of the ear.

In the beginning of the germination the two nuclei of opposite strains of chlamydozoospore fuse together, forming a diploid ($2x$) nucleus. The diploid nucleus also comes to this basidium and divides meiotically first and then mitotically, forming four haploid nuclei. Two of them are of '+' strain and two of '-' strain. In this four celled basidium two cells are provided with '+' strain nuclei and two are provided with '-' strain nuclei.

The nuclei of cells pass to these outgrowths. Now these outgrowths are called basidiospore or sporidium.

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The mother cell divides again and again and the original nucleus of the mother also divides repeatedly. So many basidiospores are produced in chains. The basidiospores produced by '+' strained cells are the '+' strained and the cell of '-' strain produce '-' strain basidiospore.

Germination of Basidiospore :-

The basidiospores are detached from the parent cell and fall on soil or on any suitable host there where they germinate and produce primary micelia. The '+' strain basidiospore produces '+' primary mycelium and the '-' strain basidiospore produces '-' strain mycelium.

CONTROL MEASURES :-

- 1) The infected plants should be uprooted and burnt
- The disease free and resistant variety of seeds should be sown
- Treatment of seeds with agrason

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rest of the exposure to sun's rays is
sufficient to constitute the drying process.

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and cerason.

4. Use of vitavax and zineb.

5. Dusting by copper and sulphur dust and treatment with copper sulphate.

① **By destroying infected parts:** The disease can be controlled by plucking the infected ears and burning them before the teleutospores are fully ripe to be dispersed by wind.

② **Hot water treatment** → In this method the seeds are soaked in an ordinary water for 4-5 hours. This induces the dormant mycelium to germinate. Now these presoaked seeds are put in hot water (50°C) for 5 minutes. The seeds are taken out and then again dipped in hot water (50°C) for 1 minute. After this the seeds are dried and stored till sowing. Extreme care should be taken during this treatment so as to avoid embryo injury.

Solar heat treatment → In this method the suspected seeds are soaked in water for four hours on a bright summer day. After soaking the seeds are spread and dried in the sun from 12 noon to 4 P.M.

During this process the germinating dormant hyphae are killed and the seeds are dried at the same time. According to Bedi only one hour exposure to solar rays is sufficient for killing the intra-seminal mycelium and the