

Symptom, causal organism, disease cycle and control measures of :-

① Green ear of Bajara:-

The disease is very common & occurs in almost all bajara growing areas of India. It is also reported from other countries of Asia, Africa and Europe. In India, It was first reported in 1907 by Butler. This disease causes a very heavy losses

→ Symptoms -

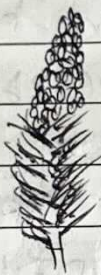


Fig - Symptoms on ears
(Green ear)

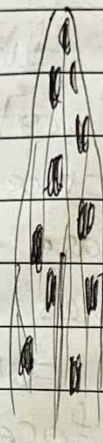


Fig - Symptoms on leaf
(Downy mildew)

The affected plant remain stunted. The symptom of disease can be studied in 2 stages viz. downy & Green ear.

② Downy mildew stage:-

In this stage, plants look pale yellow in colour. On upper surface of leaves, there appear chlorotic areas as long streaks, extending over entire leaf. On lower side, the leaves are covered by whitish downy growth of sporangiophores and sporangia. Soon chlorotic areas turn brown. The affected leaves become twisted and ultimately fall down.

⑥ Green ear stage:-

The principal symptoms are produced on inflorescence. There is transformation of floral organ viz. glumes, Palea, stamens and pistils into green, leafy structures. This gives an appearance of green leafy mass & hence it is called as green ear.

Three types of ears are found

- Ears length is normal, but entire ear is converted into leafy mass.
- Ears length is normal, but lowest portion is transformed into leafy mass.
- The ears length is reduced and entire ear is converted into leafy mass.

* Causal Organism:-

Green ear of Bajara, is caused by Sclerospora graminicola

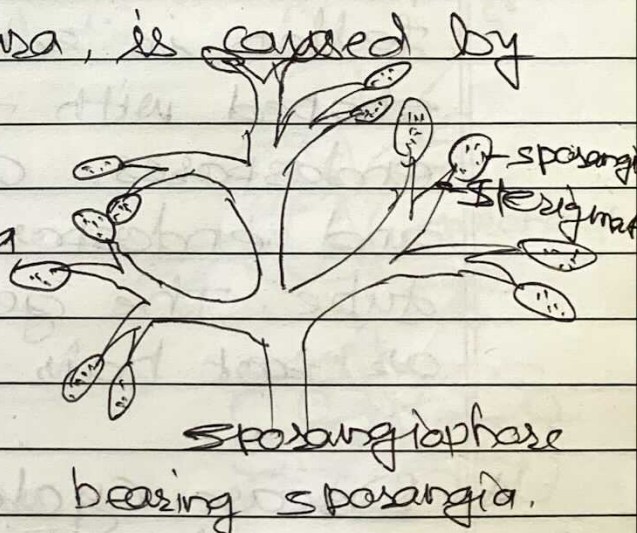
Div - Mastigomycota

Sub Div - Diplomastigomycotina

Class - Oomycetes

Order - Peronosporales

Family - Peronosporaceae



It is an obligate parasite. It develops systemically in plant. The mycelium is intracellular with small bulb-like haustoria. It is branched, hyaline and coenocytic.

The mycelium produces short, erect structures called sporangiophores which come out through stomata in clusters.

Sporangophores are only produced on leaves ~~never~~ in inflorescence. The sporangophore is unbranched in lower part, but dichotomously branched at apical end and produce short stalk called stegmata. Sporangia are borne on stegmata. The sporangia are hyaline, thin walled and elliptical with papilla. The sporangia germinate by producing biflagellate, kidney-shaped zoospore. The zoospore lose flagella, become encysted and produce germ tube to cause infection.

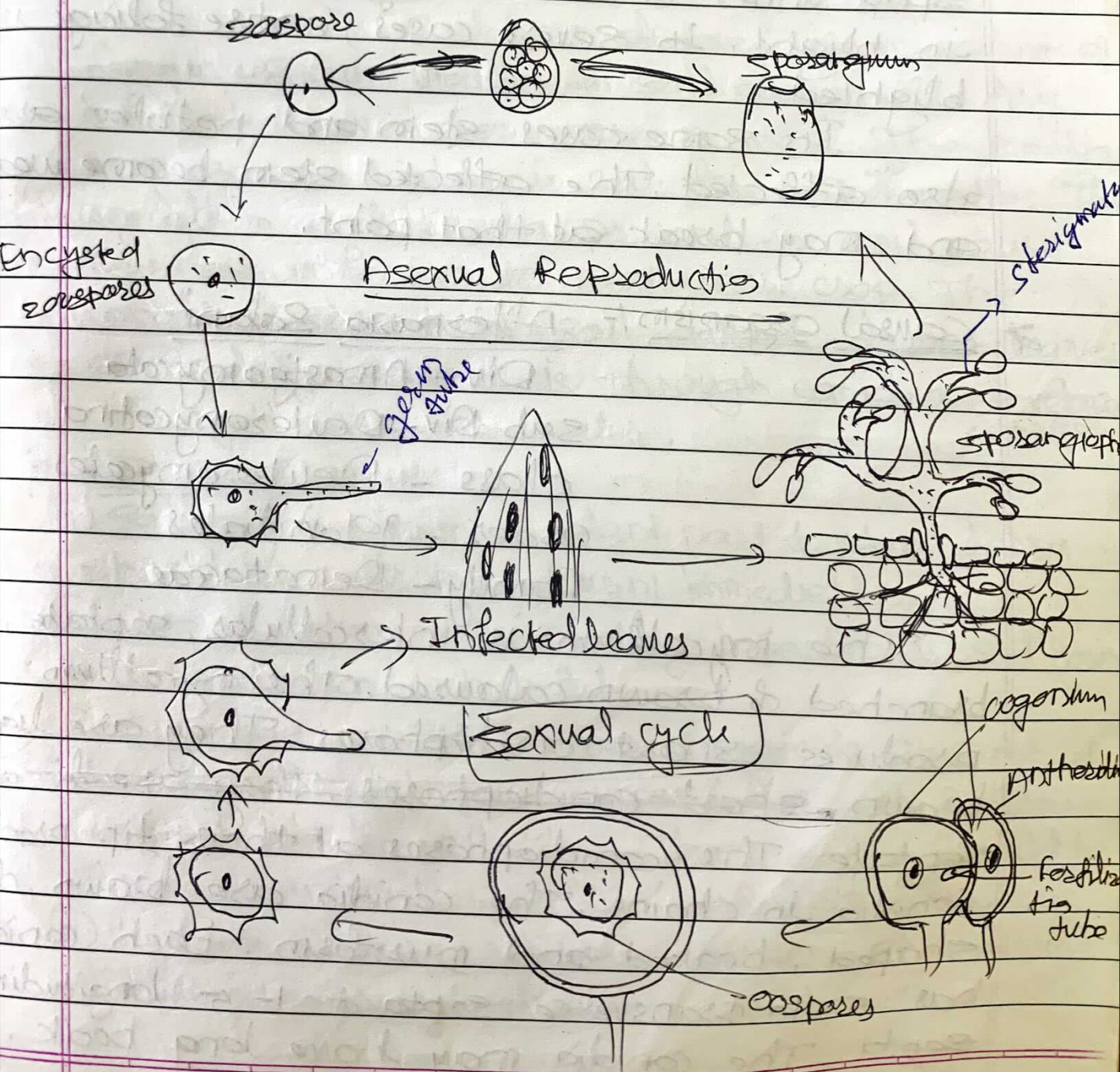
For sexual reproduction, antheridia and oogonia are produced. A fertilization tube is produced by antheridium, which penetrates oogonium. After gametangial contact, oospore is produced. The oospore are found in leaves fallen in soil. They are brown, irregular-shaped with thin exospores and thick endospores. On germination, exospore ruptures and endospore comes out in form of germ tube. The germ tube enters through stigma or root hairs and infect seedling.

* Disease Cycle :-

This is primary ~~soil~~ soil borne disease. Along with plant debris, oospore survive in soil for 3-5 years. In favorable condition, oospore germinate to produce a germ tube, which infect seedling. The secondary infection takes place by sporangia which produces zoospores. It enters leaf stomata and cause infection.

* control -

- ① Sanitation - Infected plants and fallen leaves should be collected and destroyed by burning
- ② Crop Rotation - at least for five years
- ③ Seed treatment - Seed treatment with thiram, ceresan or Agrosan are recommended.
- ④ Use of Disease Resistant Variety - Seed of disease resistant varieties of Bajara, such as HB-5, PHB-10 & PHA-14 should be used.



② Leaf spot of Tomato:-

common disease of Tomato, occurs all over India. It attacks foliage, causing leaf spots.



Affected leaves

* Symptoms:-

Brown spots of various size and shapes are present on leaves of tomato. The spots have concentric rings in them. Often several spots unite to form large patches, resulting in blight. In severe cases, entire foliage is blighted.

In some cases stem and petioles are also affected. The affected stem becomes weak and may break at that point.

* Causal organism:- Alternaria Solani

Div - Amastigomycota

Sub-Div - Deuteromycotina

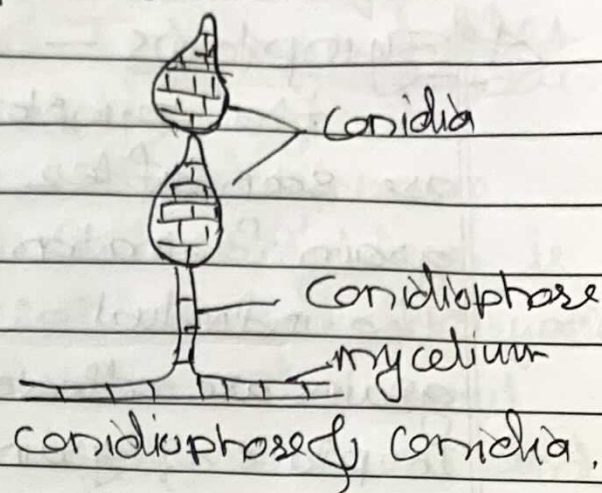
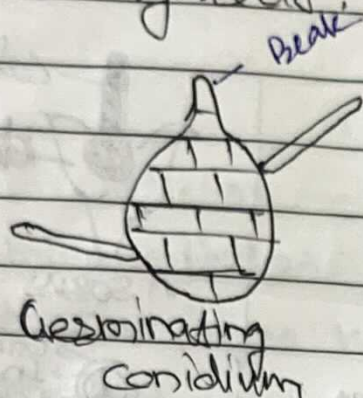
Class - Deuteromycetes

Order - Molliales

Family - Dermatiaceae

The mycelium is intercellular, septate, branched & brown coloured. The mycelium produces short conidiophores. They are light brown ~~short conidiophores~~. They are ~~di~~ and septate. The conidiophores at their tip produce conidia in chains. The conidia are brown, club-shaped, beaked and muriform. Each conidium has 5-10 transverse septa & 1-5 longitudinal septa. The conidia may have long beak.

They are carried away by wind to healthy leaf. In moist weather, conidia germinate by producing 5-10 germ tubes. The germ tube enters healthy leaf.



* Disease cycle:-

This is soil-borne disease. The mycelium of fungus remain viable in soil along with dry infected leaves, for year or more. The conidia may remain viable in soil for 1-7 ~~months~~ ^{years}. The mycelium and conidia present in soil cause primary infection to next year crop. The conidia present in soil attack lower leaves. Secondary spread is through conidia developed through wind or water, ^{carried}.

* Control Measures:-

- ① Sanitation:- Infected plant part & plant debris should be collected & burnt immediately.
- ② Crop rotation:- As primary infection is soil born crop rotation is helpful.
- ③ Spraying:- With copper fungicide or zineb at 15 days interval gives successful result. Bordeaux mixture is also effective. The spraying should be done throughout growing period of crops.
- ④ Use of Disease resistant varieties:- The disease resistant variety should be used.

③ Grain smut of Jowar :-

covered smut of Jowar - This is most common disease of jowar in India. The losses caused by it are very serious.

Symptoms -

The symptoms are seen after grain formation.

The individual grains are affected.

In place of grain,

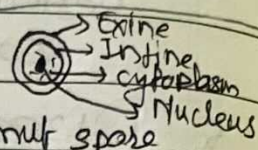
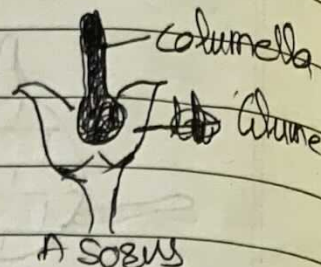
smut sorus is

produced i.e. grain

is replaced by cylindrical or oval dirty gray sorus. The sorus is surrounded by glumes at base.



A smutted ear



In some varieties of jowar, shape and size of smutted grain is not affected. When these grains are broken, they are found to be filled with smut powder. Such sori are unratified.

The wall of sorus varies. In cylindrical sorus wall is made of fungal tissue and ruptures ^{early}. In spherical sorus, wall is of actual ordinary wall of ripe awan. It is tough and rigid and remain unbroken till threshing.

Interior of sorus is completely filled with smut powder. In centre, there is a column of hard tissue called columella. It is made of host parenchyma.

* Causal organism :-

Sphacelotheca sorghi

Div - Amastigomycota
 Subph. ~~Basidiomycotina~~
 class - Basidiomycetes
 sub G. Teliomycetidae
 order - Ustilaginales
 Fam - Ustilaginaceae.

It is an obligate parasite. Mycelium is
 Inter cellular, branched, septate and dikaryotic.
 It produces knob like haustoria. The smut
 spores are small, spherical, light-brown and
 smooth walled. They are united to form loose
 balls. On getting moisture, smut spores are
 separated. Spores germinate immediately or
 remain ~~for~~ viable in dry condition upto 6 years
 In herbarium specimen, they remain viable
 for 13 years.

These are 2 types of germination of
 spores (a) In one case, smut spore germinate
 and produces a four celled Primordium. From
 each cell of promycelium basidiospores are
 produced by budding. The basidiospore are
 spinate-shaped and produce an infection thread
 which causes infection.

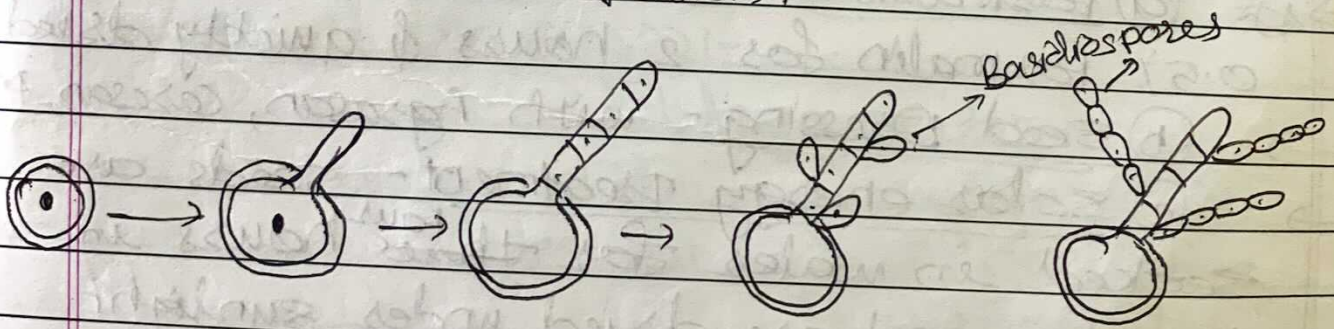
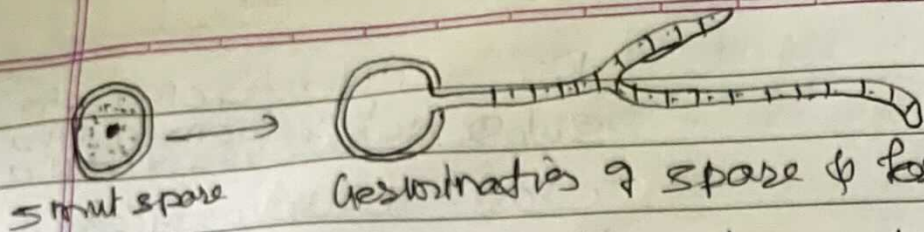


Fig. Germination of smut spores & formation of Basidiospores

(b) In other case, promycelium directly develops
 into branched or unbranched infection thread.



The infection thread penetrates host & produces primary monokaryotic mycelium, which after somatogamy develops into secondary dikaryotic mycelium. This grows along with plant and produces strut spores in developing grain.

* Disease cycle:- The disease is external seed-borne. Infection occurs at time of seed germination and emergence of seedling.

Many seeds are broken before harvesting as they may get broken during threshing and strut spores are lodged on surface of healthy grains. They remain dormant and germinate with germination of ~~spores~~ seed. The infection takes place during ^{emergence of seedling} ~~seed surface~~.

* Control Measures:-

① Seed Treatment:- Since disease is external seed-borne, seed treatment is very effective. It may be done by following methods.

→ ① Formalin wash:- seeds are treated with 0.5% formalin for 2 hours & quickly dried

→ ② Seed Dressing:- with Agrosan, Carosan, etc.

→ ③ Solar energy treatment:- seeds are soaked in water for ~~three~~ ^{four} hours in morning and are dried under sunlight

→ ④ Use of Disease resistant variety:-

T-29/1, PJ-7K, PJ-23K, Mandya et al. are disease resistant varieties of Jowar.

④ Whip smut of Sugarcane:-

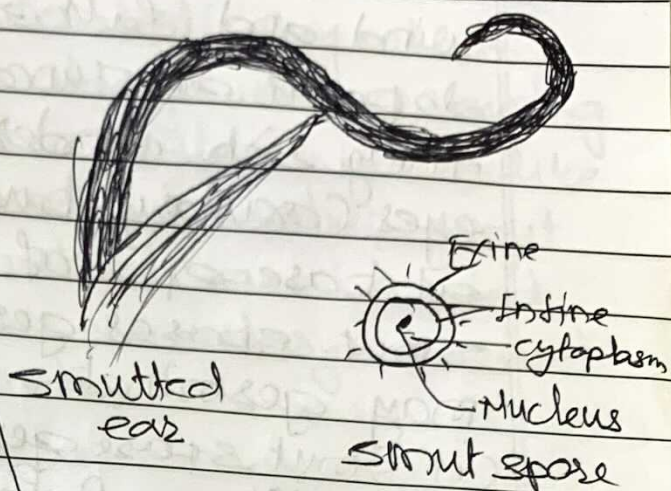
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Whip smut is a well known disease of sugarcane and is widespread in distribution. In India it is found wherever it is cultivated.

* Symptoms:-

The affected plants have rassy stem and are more taller than healthy ones. These affected plants produce at their apex a long, black, whip-like structure which is



curled on itself. The whip like part do not bear leaves. It represent floral shoot. In earlier stages, whip remain covered by thin silvery membrane. soon this membrane ruptures and a black powder of smut spore is exposed. Spores are blown away by wind. The spores are confined to few few outer cortical layer of whip, while inner portion remain unaffected.

* Causal organism:-

Ustilago scitaminea

Div - Amastigomycota

sub. Div - Basidiomycotina

class - Basidiomycetes

sub. class - Teliomycetidae

order - Ustilaginales

Family - Ustilaginaceae.

The pathogen is an obligate parasite. The mycelium is intercellular, branched, septate and dikaryotic. It produces haustoria. The smut spores are small, spherical, light brown and spiny. They are disseminated by wind and fall on near by canes. They deposit at Junction of leaf and sheath. Then they infect tender nodal region and young eyes (axillary buds). There is plenty moisture at base of leaf sheath. In this moisture smut spores germinate. The smut spores may germinate by 2 ways.

(i) smut spore germinate and produce 4-celled promycelium. Before formation of promycelium, nucleus divided by meiotic division. Each cell of promycelium produces a short stalk called sterigmata on which basidiospores are produced. Each basidiospore is an elongated structure and germinate producing an infectious thread.

(ii) Sometimes promycelium grows directly into an infectious thread. When infectious thread enters inside host, it produces primary monokaryotic mycelium. This mycelium after somatogamy forms a secondary dikaryotic mycelium. This mycelium grows within stem and produces a whip like structure at apex of stem.

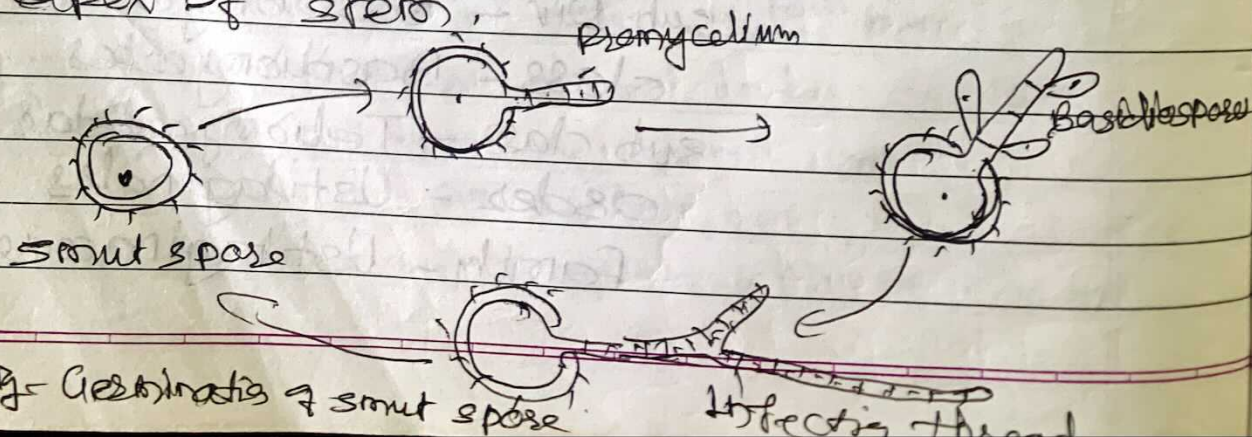


Fig - Germination of smut spore

* Disease cycle:-

The disease is external and internal seed born. The smut spores may be present on axillary buds or seed sets may contain mycelium in them. When such seeds are planted, mycelium continues to grow along with growing canes and at apex of stem, whip-like structure is produced. Its whip smut spores are present, which are carried away by wind. Thus, secondary spread occurs through wind.

* Control measures:-

① Removal of smutted whips- The smutted whips should be taken from field and carefully burnt outside field.

② Seed selection and treatment:-

Seed sets for plantation should be taken from healthy canes. Prior to sowing, they should be treated with Bordeaux salt.

③ Hot air treatment:-

Before sowing, seed sets should be treated with hot water at $55-60^{\circ}\text{C}$ for 10 minutes.

④ Use of Disease Resistant Variety:-

Disease Resistant Variety should be planted eg. Co-449, Co 527, Co 658, Co 717, Co-1148, Co 6806, Co 7108, BO 11 BO 22.

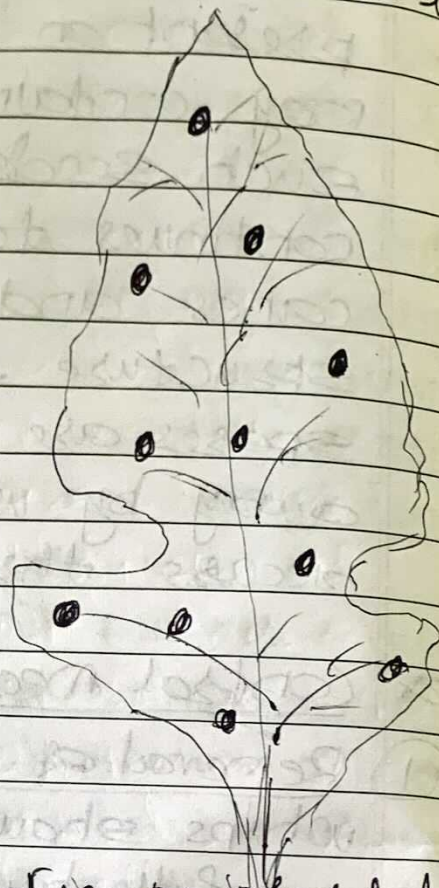
⑤ White Rust of Mustard:-

White rust is very common disease found on many cruciferous plants, like mustard, cabbage, radish etc. It is world wide in distribution.

* Symptoms -

The disease appears in form of shining, small, white, creamy pustules on leaves and stems. The root is not affected.

The pustules vary in size and shape. Several pustules may unite to form large, irregular patches. The host



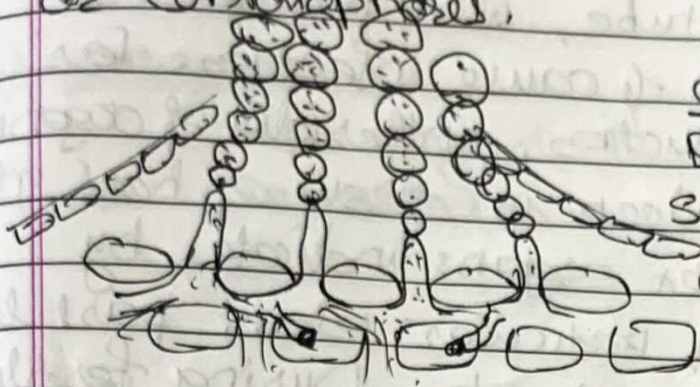
epidermis ruptures and white powdery mass of fungal spores is seen.

The floral parts show swelling. The axis of inflorescence and flower stalk get thickened. The flowers become sterile. In some cases, the stem becomes swollen at some distances.

* Causal organism:-

White Rust of Mustard is caused by Albugo candida. This is obligate parasite. The mycelium is intracellular, hyaline and coenocytic. It produces knob-like haustoria for absorption of food material from host cells. The hyphae just below epidermis grow vertically into short upright, club

-shaped, structure called sporangiophores or conidiophores.



Classification

Div. - Phycomycetes

Sub. Div. - Diplomycetes

Class - Oomycetes

Order - Peronosporales

Family - Albuginaceae.

T.S. of infected leaf.

Each sporangiophore cuts at its tip a chain of many spores/conidia. A gelatinous pad called disjunctor is developed in between sporangia. The sporangia are small, spherical and multinucleate. They are arranged in basipetal manner i.e. younger sporangium lies at base and oldest at apex. The chains of sporangia grow & exert pressure on epidermis. Due to this, epidermis ruptures & white mass of sporangia is exposed and there is form of characteristic blisters/pustules. The sporangia are carried away by wind.

The mode of sporangial germination is determined by moisture and temperature. At low temperature ($11-27^{\circ}\text{C}$) and high moisture, sporangia germinate by producing kidney-shaped, biflagellate zoospores. They swim in water for some time, lose their flagella, secrete wall and become encysted. They produce germ tube, which enters leaf. At high temperature (22°C & above)

At high temperature and low moisture, sporangia directly produce a germ tube, which enter host through stoma & cause infection. For sexual reproduction, antheridia & oogonia are produced deep in tissue of host. The formation of sex organs indicates by hypertrophy of particular plant part like stem, leaf, flower etc. During fertilization antheridia produces fertilization tube and after gametangial contact oospore is produced. The oospores are produced in deeper tissue of host. They are globose, thick walled and brown. Their outer wall is tuberculate. Oospore germinate after long period. On germination of oospore, zoospore are formed in vesicle. Each zoospore loses flagella, encysts & germinates, producing a germ tube and cause infection.

* Disease cycle

This is soil born disease. The oospore remain viable in soil for long time and cause primary infection. The secondary spread occurs by sporangia carried by wind.

* Control :-

① Sanitation :-

Infected plants should be collected and destroyed by burning. By doing this, oospores are also destroyed.

② Crop rotation :-

Since Oospore survive in soil, for

long time, crop rotation should be done for at least 3 years.

③ Spraying:-

Spraying of Bordeaux mixture (4:4:50) is recommended.

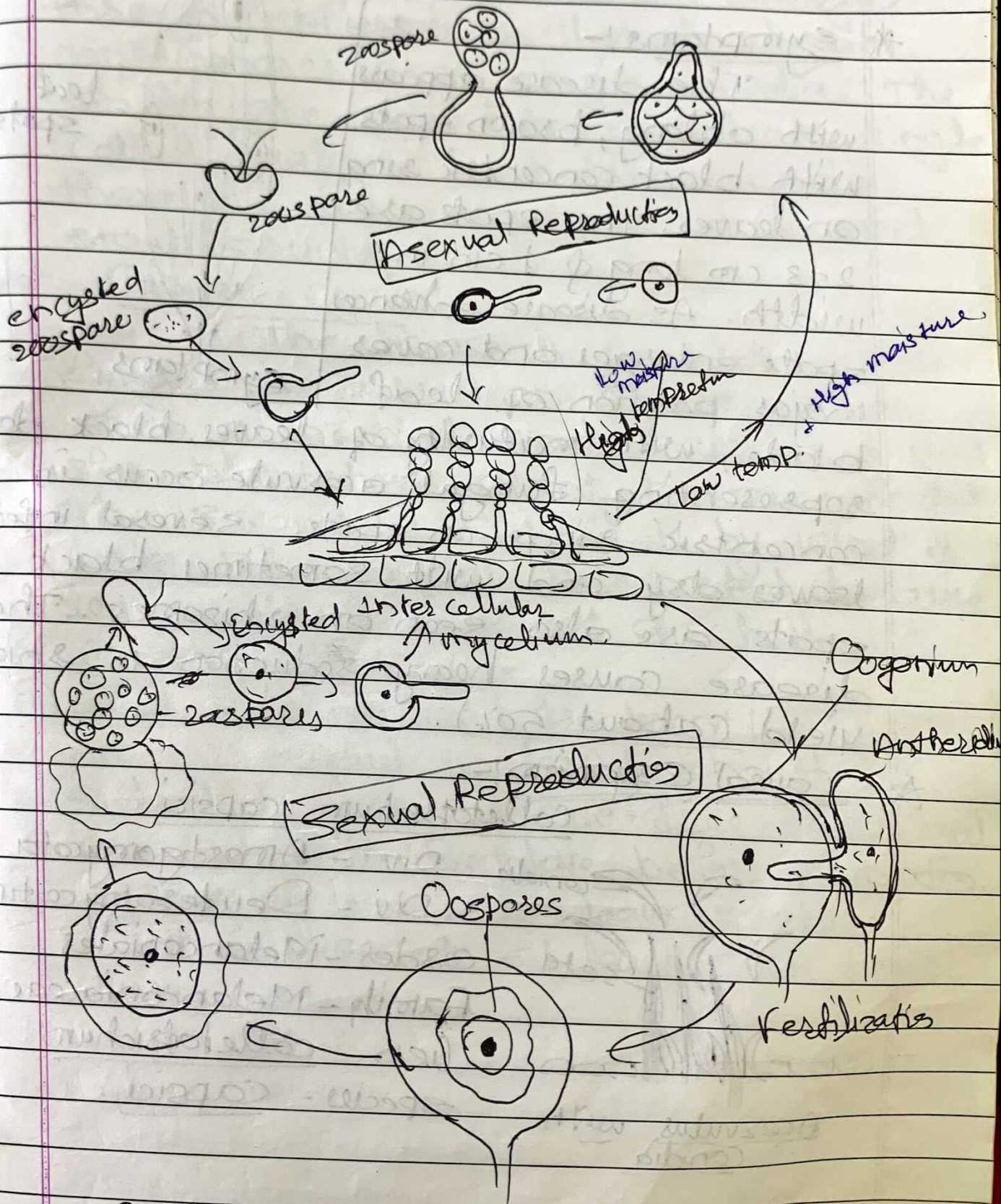


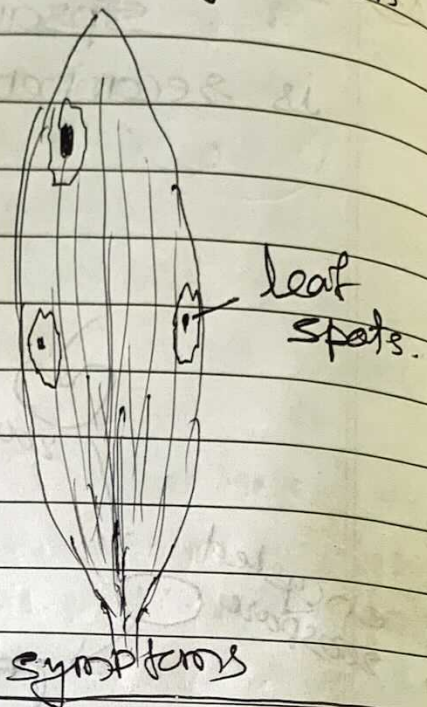
Fig - Life cycle of Albugo candida

[6] Leaf spot of Termesic

This disease is common in many parts of South India and in recent years it has become very severe, causing much damage to crop.

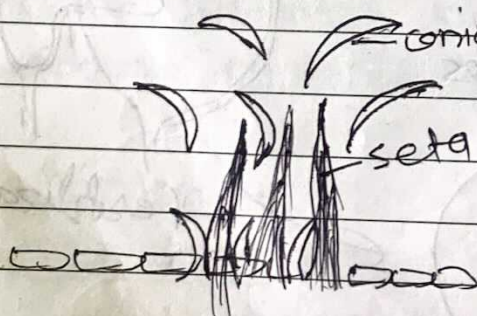
* Symptoms:-

The disease appears with oblong, brown spots with black concentric ring on leaves. The spots are 2-3 cm long & 1 cm in width. As disease advances spots enlarges and covers major portion of leaf blade, with maturity of leaves, black dots representing fungal aecium occur in concentric rings on spots. Several infected leaves dry and wilt. Sometimes black spots are also seen on rhizomes. The disease causes heavy reduction in rhizome yield (about 50%).



* Causal Organism:-

Colletotrichum capsici



Aecium with Conidia

Div - Ascomycota
s. Div - Deuteromycotina
Order - Melanconiales
Family - Melanconiaceae
Gen - Colletotrichum
Species - Capsici

Mycelium is inter as well as intracellular branched, septate & hyaline. It produces characteristic acervuli. The mycelium below epidermis produces single celled, club shaped conidiophores, which emerged through epidermis or through stomata. conidiophores bear single conidia. The conidia are cylindrical to falcate, single celled hyaline. In between conidia, there are dark-brown, septate and stout structure called setae.

* Disease cycle:-

The disease is seed borne. The fungus is carried on rhizome when such a infected seed-material is used for plantation. plant become infected. The secondary spread is by wind & water. The fungus is reported to cause leaf spots & fruit rot of chilli.

* Control Measures:-

① Seed selection and treatment:-

Seed material should be selected from disease-free areas and treated with Benlate before plantation.

② Spraying:- 1% Bordeaux mixture, Dithane 2-78, etc. at least three times during season.

10] Red Rot of Sugarcane!:-

It is serious and destructive disease of sugarcane. It occurs in sub-tropical and tropical regions. The world where sugarcane is cultivated In India, it is found in most of sugarcane growing states, particularly Bihar, M.P., U.P., Maharashtra, Punjab, Gujarat, T.N., Karnataka etc.

Symptom on leaf midrib

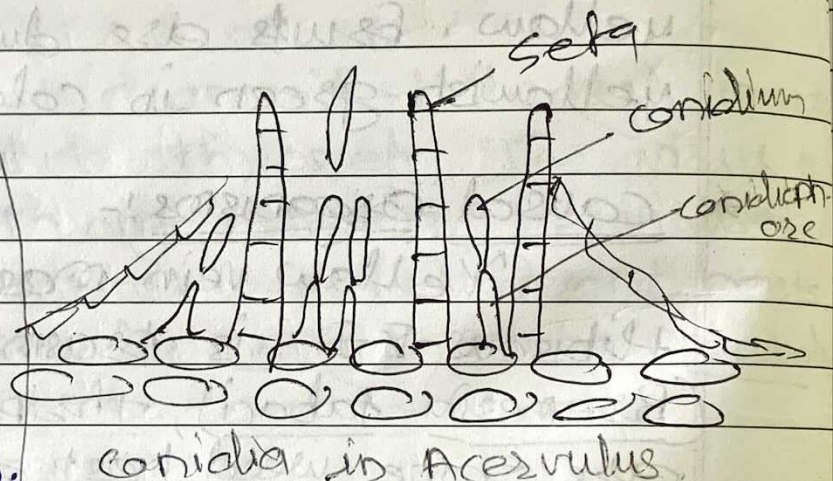
* Symptoms!:-

symptoms appear after rainy season on stem and leaves. The 1st symptom is discoloration of young leaves.

The yellowing margin and tip of leaves, dry/wither. Gradually withering continues from tip to leaf base and whole leaf dries.

In later stage, stem shrivels (wrinkled) and becomes dull in appearance. ~~The~~ diseased stem is split open, pith is found to be reddened. ~~stem is split open, pith is found to be~~

At the advance stages, red lesion are also developed on midrib of leaves. With formation of asexual fruiting bodies (acervuli), lesions become covered with



powdery masses of conidia.

The acervuli appears as dark dot like structure on shagvelled areas on internodes and near nodes.

* Effect:-

Due to enzymatic action of pathogen there is conversion of sucrose into glucose and alcohol (This loses in sucrose is about 33%). Hence there is reduction in available sugar in factory.

* Causal organism - Colletotrichum falcatum

Div - Amastigomycota.

Sub.D. Deuteromycotina

Class - Deuteromycetes

- sub. class - Hypomycetidae

Order - Melanconiales

Family - Melanconiaceae

Genus - Colletotrichum

SP - falcatum

Mycelium is intercellular and intracellular, branched, septate and hyaline. For

asexual reproduction conidia are produced. The mycelial cell get collected

beneath epidermis and form stomata.

From upper surface, small and septate, conidiophores as well as some bristles

called setae are developed. The setae are hair like long and have 4 septa.

As setae grow, epidermis ruptures and

conidia are exposed. Conidia are 1-celled sickle shaped (falcate) & hyaline. They are

dispersed by wind, rain & insects.

on suitable host, they germinate and cause infection & produce a germ tube, which develops into mycelium & produces an appressorium on coming in contact with hard surface. Appressorium is thick walled & function like clampydothore.

* Disease cycle:-

The disease is seed borne. The seed sets may carry spores, These setts ^{on sowing} produce disease, which produce conidia in aecia. These conidia serve as secondary source of infection. They germinate and penetrate into host at node through wounds by insects (bored by insects).

The fungus is also resistant to soil with plant debris and infect through cut ends.

* Control Measures:-

- ① Seed setts should be selected from healthy plants.
- ② Seed setts should be treated with Bordeaux soil.
- ③ Dipping in Bavistin, Benomyl, Topsin & Azoxan at 0.1% for 18 min at 52°C.
- ④ Diseased leaves & parts should be burned.
- ⑤ Crop rotation for 4 years.
- ⑥ Since insect wounds provide entry of pathogen measures should be taken to control insect pests.
- ⑦ Disease resistant variety should be used like Co 6806, Co-62198, Co 8021, Co Si-776, Co-6907, Co-975 etc.

1.11) Angular leaf spot / Bacterial Blight

Black arm of cotton:-

This is most serious bacterial disease of cotton. It is found in all the major cotton growing regions of the world including the United States, South America, Egypt, Sudan and other African countries. Russia, Ceylon, China, Australia etc. In India it is first observed in Madras in 1918 and now in almost all cotton growing areas.

Symptoms -

Infection is present on all aerial plant parts at different stages of plant development. The earliest symptom of the disease is seen in the cotyledons of germinating seeds. Minute, water soaked spots appear on the under surface of cotyledons. These later increase in diameter turn brown to black and form irregular patches distorting the shape of the cotyledons and causing them to dry and wither. The disease spreads to new leaves formed and the seedling may ultimately collapse and die. On the leaves similar water soaked spots appear first on the under-surface first and then on the upper surface. They increase in size, become angular, bound by small veinlets of the leaf and turn brown to black. Often the disease spread along the edge of the veins, hence called vein blight or black vein.

sometimes large areas are formed due to coalescence of a number of small spots leading to death and shedding of leaves. The infection may also spread to petiole causing them to collapse. In the affected areas large amounts of bacterial slime are exuded which form a dry film on the brown lesions.

Lesions on stem, petioles and fruiting branches are dark brown to black. They are elongated and sunken. The affected stems show cracks and gummosis and are easily broken by wind as these may be girdling and death of affected organs. On the balls or fruits the disease is characterized by the appearance of water-soaked lesions on the surface. These lesions turn dark brown and finally black, and are invariably sunken. Young affected balls fall down prematurely. If they mature, the lint is of not much commercial value. The bacterium within the ball passes along the fibres and infect the seed externally. It may also reach the interior of the seed either through micropyle or through punctures.

→ Causal organism:-

Xanthomonas malvacearum

or Xanthomonas axanopodis p.v. malvacearum

The bacterium is rod 0.3 - 0.8 x 1.3 - 2.7 microns in size. It forms no

spores and no capsules. It is motile by one polar flagellum (monotrichous). Stain reaction is Gram - ve. The bacterium is aerobic, colonies on beef extract agar are pale yellow, round, thin, raised, smooth and shining. It liquefies gelatin, coagulates and peptonizes milk and does not reduce nitrates. Optimum temp 25-30°C.

The primary infection starts mainly from the seed where the bacterium may be present as slimy mass on the fuzz or inside the seed. Infected cotton balls, leaves, and twigs present on soil surface also form an important source of carry over the disease. The leaves are mainly infected through stomata. The secondary spread is through wind, splashed rain and dew.

→ Control Measures:-

- ① Infected plant parts and alternative host are collected and destroyed
- ② Crop rotation, late sowing, early thinning, good tillage, early irrigation and addition of potash to soil help to reduce disease.
- ③ Seed Treatment - delinting by conc. H_2SO_4 i.e. seeds are immersed in acid for 10-15 min and then washed with water then dried and treated with Agrosan, GM, Cesasan & ethy mersuic phosphate and treating seeds with antibiotics for internal infection.
- ④ Bacterium is viable for one year in seeds hence storing seeds for two or more years is also effective.
- ⑤ Use of resistant varieties is best method.

✓127 Powdery Mildew of Pea:-

This disease is much more serious than the downy mildew due to the fact that it occurs more frequently and covers a larger host surface than does the downy mildew of same crop. It is developed late in the season reaching its maximum intensity when pods are forming. It is worst in dry weather. The disease is world wide in occurrence. Early varieties are less damaged. In hundred percent infected crop the reduction in pod numbers is estimated to be about 21-31% and reduction in pod weight about 24 to 27%.

Symptoms -

→ The disease first appears on leaves and then on other green parts of plant. Its attack is characterised by formation of white powdery patches on both sides of the leaf as well as tendrils, pods, stem etc. The superficial powdery mass consists of mycelium and spores.

→ Histological symptoms include collapse of the necrotic epidermal cell in case of subinfection, collapse of tissue below the penetrated epidermal cells and movement of host nuclei towards haustoria.

→ Physiological symptoms include increased transpiration, respiration increased but photosynthesis decreased.

⇒ Causal organism! - (Erysiphe polygoni)

Kingdom - plantae

Subkingdom - Cryptogamia

S. Division - Ascomycotina.

Class - Pyrenomycetes

Order - Erysiphales

Family - Erysiphaceae

Genus - Erysiphe

Species - polygoni

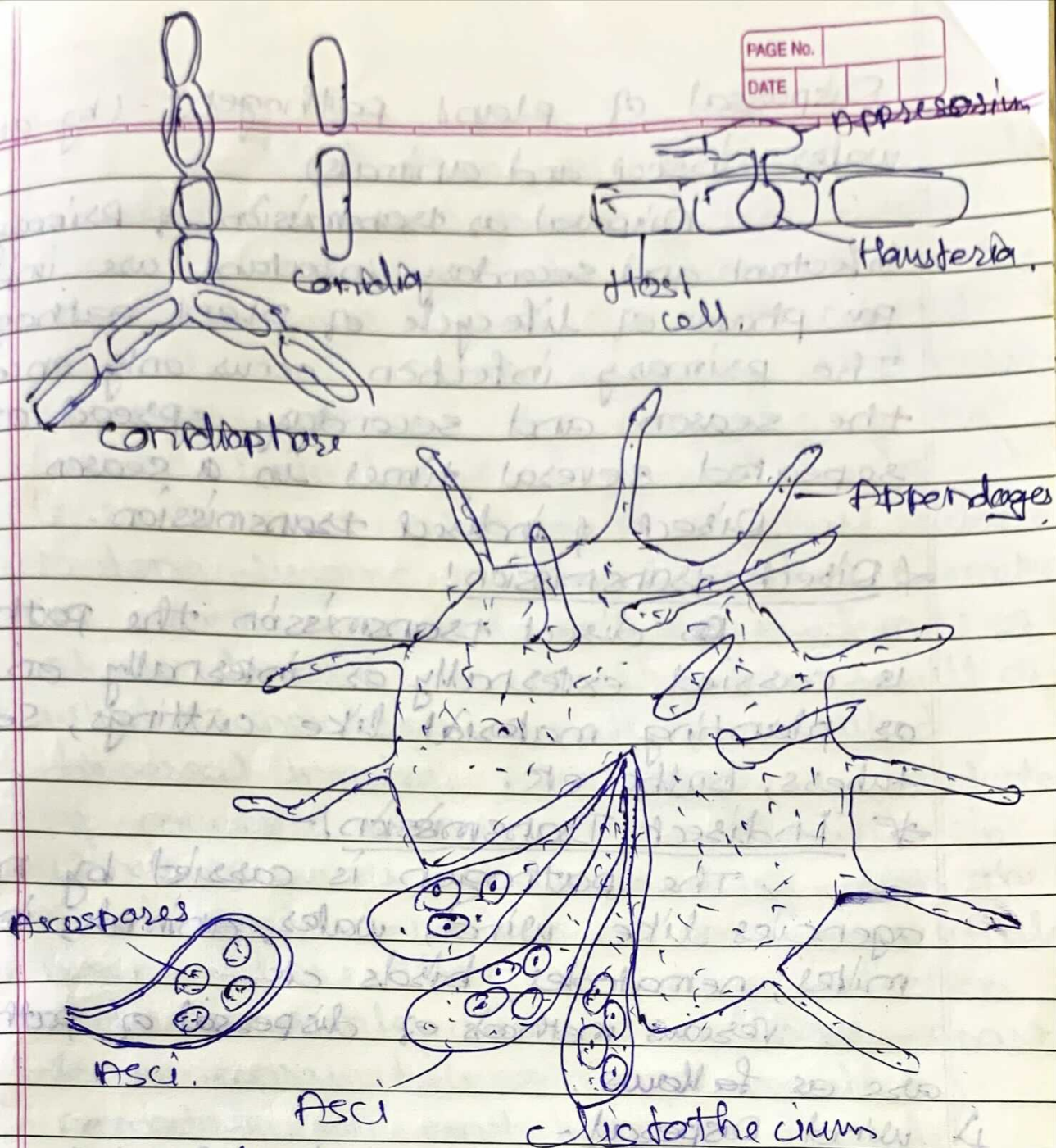
The mycelium is generally fine, persistent, barely thick. It is ectophytic, the entire thallus, except haustoria, being present on surface of affected parts.

The haustoria develop as outgrowth from lobed swellings (appressoria) adjacent to the leaf surface. The haustorium arises as an exceedingly narrow tube from the appressorium, penetrating the cell wall and swelling into a rounded sac in the epidermal cell.

The conidiophore arise vertically from the superficial hyphae on the host surface. Each conidiophore bears several spores in chain. Of these only the end one is mature as the spores are formed in regular order from the tip backward. The ripe conidia fall off quickly and are disseminated by wind. The conidiophores are septate and these cells are similar to conidia. The conidia are elliptical,

barrel shaped or sometimes cylindrical, hyaline, unicellular.

→ Late in season, the sexual fruits (cleistothecia) appear as sharp, black, minute bodies scattered in mycelial web. They are spherical structures measuring about 90 microns in diameter. The peridium of cleistothecium is composed of distinct polygonal cells and is provided with a number of myceloid appendages. These appendages may be few or many, free or interwoven, and resemble the ordinary hyphae. Usually 2 to 8 asci are formed in each cleistothecium. These asci originate from single point in the fruit. These are ovate, nearly sessile. Each ascus contain 3 to 8 ascospores which are elliptical, hyaline, unicellular. The cleistothecium persist in soil for long period of time and in next season when conditions are favorable disintegrate and release ascospores for infection. The fungus is an obligate parasite. The disease permeates through cleistothecia in the soil. Ascospores infect first the lower leaves near soil. Secondary spread is carried out by conidia. The dormant mycelium in pea seed also cause disease. If the seeds are subjected to hot water treatment the incidence of disease decreased.



Control Measures

- ① Field Sanitation - Infected plant parts should be collected and burnt.
- ② Early & Disease resistant varieties should be used.
- ③ spraying or dusting of sulphur is also effective method to control the disease.
- ④ Crop rotation - The disease is soil borne and hence crop rotation is also one of the effective method.
- ⑤ Hot water treatment to seed.