B.Sc. Third Year, Semester - V
Botany Paper No. XVI (C)

Plant Pathology Unit-2

4) Diseases of Oil Seeds

a) Tikka disease of groundnut

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a) Tikka disease of groundnut

Causal Organism: ***Cercospora arachidicola***

C. personata

Host: ***Arachis hypogea*** **(Groundnut)**

- **Classification**
- **Division-** **Mycota**
- **Sub Division-** **Eumycotina**
- **Class-** **Deuteromycetes**
- **Order-** **Moniliales**
- **Family-** **Dematiaceae**
- **Genus-** ***Cercospora***
- **Species-** ***arachidicola***

Distribution

This is most important fungal disease of groundnut. The disease occurs when the crop is two months old and under severe condition defoliation and general weakening of the plant resulting in fewer and smaller sized pods and loss in yield. Losses varying from 15 to 50 percent have been reported. When tikka disease is associated with rust (*Puccinia arachidis*) the loss may be up to 70 percent.

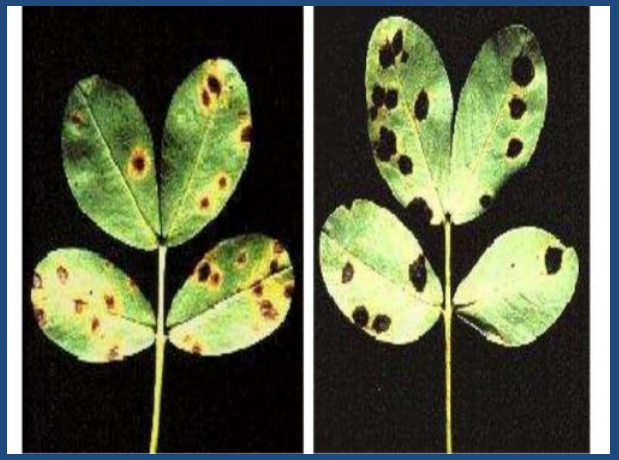
Symptoms:

1- Symptoms appear when the plant are 1 or 2 months old.

2- Due to excessive spotting on the leaves there is gradual weakening of the foliage which results in defoliation

3- Consequently, fewer and smaller nuts are formed.

4- According to Sundarram(1965) severe intensity of infection leads up to 22% reduction in yields.



Symptoms:

Two fungi are responsible for causing this disease. These are *Cercospora arachidicola* (causing early leaf spot) and *C. personata* (causing late leaf spot), both may appear simultaneously on the same leaf. The former appears earlier than the latter. Lesions first appear as small chlorotic areas about 10 days after spore deposition and mature sporulating lesions are visible about 15 days after deposition. All the aerial parts are attacked. In the beginning spots appear only on leaves but later may also develop on stem.

The early spots are subcircular to irregular, 1 to 10 mm in diameter, tend to coalesce later. Lesions are commonly dark brown to black on the upper surface and light brown on the lower leaf surface. Spots on upper leaf surface are surrounded by a yellow chlorotic halo. Sporulation occurs mainly on necrotic areas of lesions on the upper surface and they turn to reddish brown at sporulation stage.

Symptoms:

Lesions produced by late leaf spot disease are usually smaller and nearly circular, 1 to 6 mm in diameter and are commonly dark grey or black on the lower leaf surface. There is no yellow halo around them. Concentric rings of conidia are visible on the lower surface.

Both these pathogens can be distinguished after sporulation. In *C. arachidicola* the conidia are mostly confined to the upper leaf surface and occasionally on the lower one. They are sparse and not formed in concentric rings. In *C. personata*, conidial production is restricted to the lower leaf surface and conidiophores develop in concentric rings. Symptoms also develop on petioles, stem and pegs.

Causal organism and disease cycle:

Cercospora arachidicola (Early leaf spot)

The mycelium is initially intercellular becoming intracellular when the host cells collapse. Stroma slight to 100 µm in diameter and are dark brown. Conidiophores five to many are fasciculate, pale golden brown to yellowish brown, darker at the base, mostly unbranched and 20-50 µm in size, continuous or with septa. Conidia are subhyaline, pale yellow, often curved, 1 to 12 septate, rounded to tunicate at the base, tip subacute and measure 35-110 □ 4-5 µm.

The perfect stage is *Mycosphaerella arachidis*. Perithecia mostly scattered, mostly along lesion margin, partly embedded in host tissue, ovate to subglobose, 47.6-84 □ 44.-74.0 µm in size, black, ostiolate; asci cylindrical, club shaped with short stipes, fasciculate without paraphyses, 27.0-37.8 □ 7-8.4 µm in size bitunicate, eight spored; ascospores uniseriate; two celled, upper cell some what larger, slightly curved, hyaline, 11.2 □ 3.6 µm in size.

Cercospora personata (Late leaf spot)

The mycelium is septate, intercellular with branched Haustoria in live cells. Stroma dense and up to 130 µm in diameter. Conidiophores emerging through ruptured epidermis in dense fascicles, brown, smooth 10-100 □ 3.0-6.5 µm in size, septate or continuous, usually simple, with prominent conidial scars. Conidia medium olivaceous, cylindrical, straight or curved, finely roughened wall rounded at the apex, 1-9 septate and measure 20-70 □ 4-9 µm.

The perfect state is *Mycosphaerella berkeleyii*. Perithecia scattered, along lesion margin, partly embedded in host tissue, ovate to globose, 84-140 □ 70-11 µm in size, black, ostiolate; asci cylindrical, club shaped, with short stipes, fasciculate, 30-40 □ 4-6 µm, without paraphyses, eight spored; ascospores uniseriate, 2-celled, the upper cell some what larger, hyaline, 14.9 □ 3.4 µm in size.

There is no definite information available on the source of primary inoculum. Since the perfect stage is rare in the nature. Conidia present in crop residue are probably the most important source of primary inoculum. Conidia lying in soil on diseased plant debris and those carried in the shell are the source of primary inoculum.

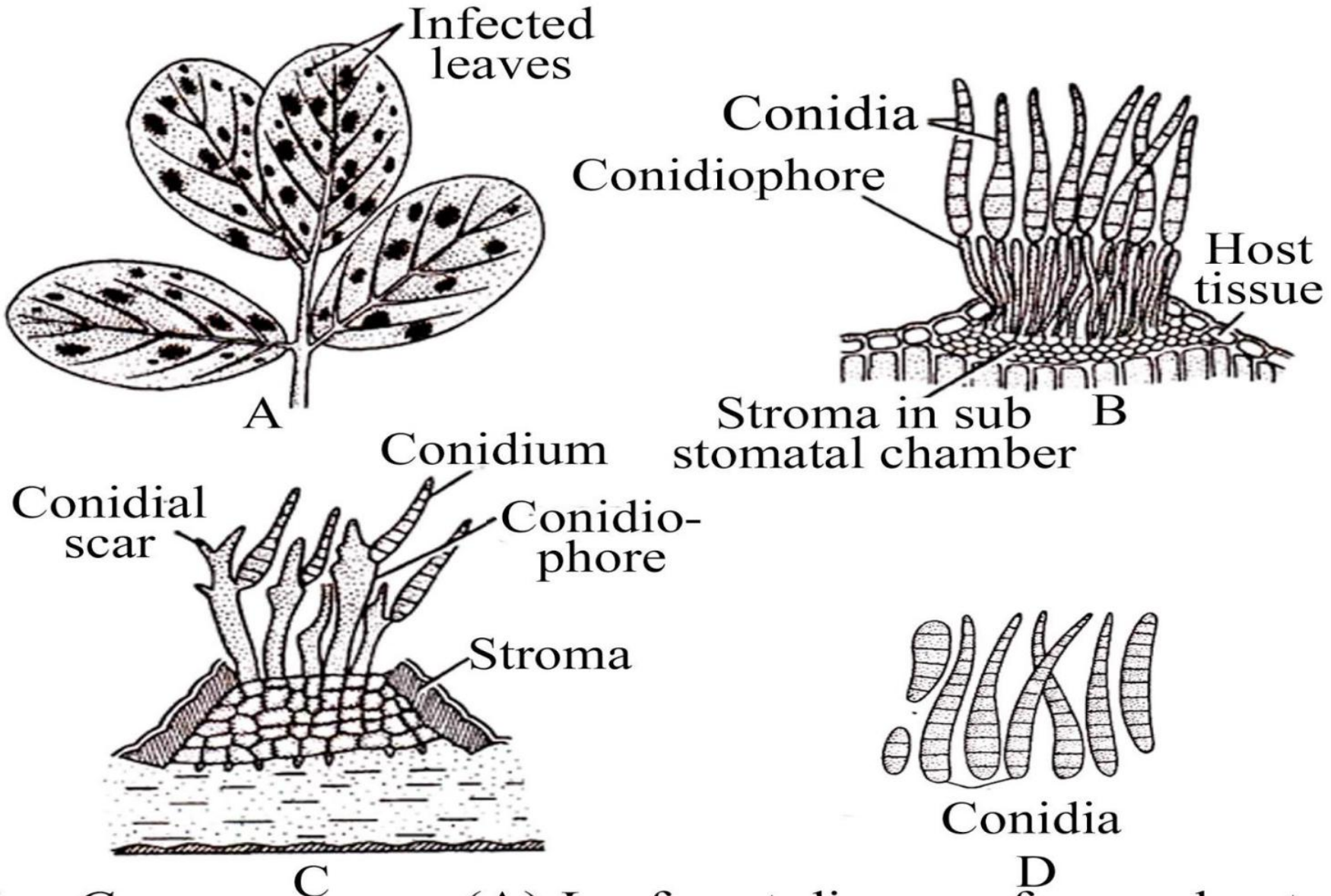
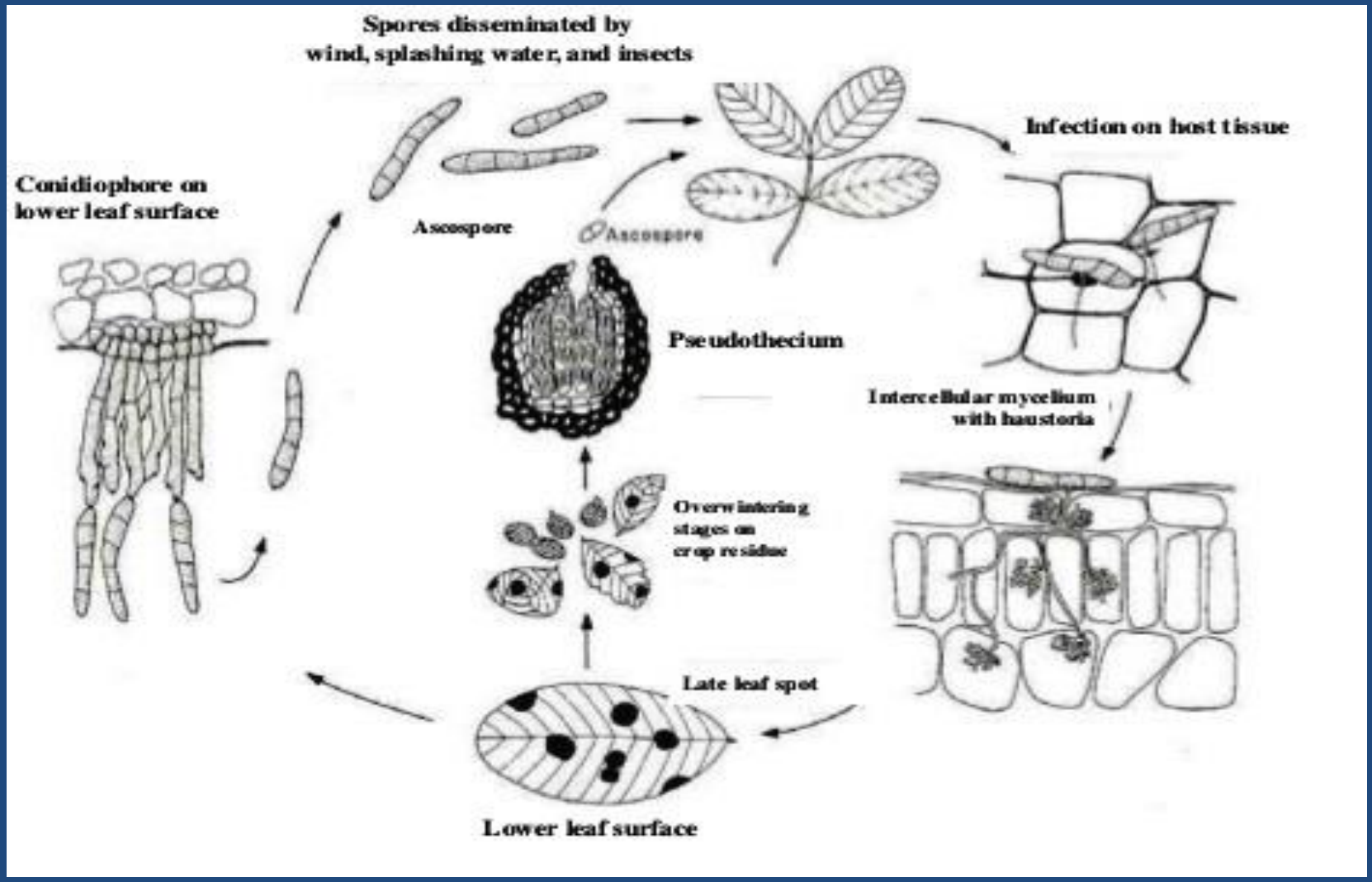


Fig: *Cercospora spp.* (A) Leaf spot disease of ground nut; (B) Conidiophore bearing conidia; (C) LS of acervulus with geniculate conidiophores; (D) Conidia.

Disease cycle



Control measures:

1. Plant debris from the previous crop should be removed (burnt) to avoid soil borne primary inoculum.
2. The disease is favoured by mineral deficiency so that nutrient should be supplied by soil or spray application.
3. Rotation and deep burying of the debris may help to destroy the soil borne inoculum.
4. Seed treatment is essential to eliminate the seed borne infection.
5. Disinfection of seed with shell can be accomplished by using sulphuric acid.
6. Seeds without shell are disinfected by half an hour soak in 0.5 percent copper sulphate solution or by dressing with Agrosan G.N.
7. The disease can be effectively controlled by spraying the crop with copper fungicides two or more times at intervals beginning four to six weeks after sowing.
8. Although some wild species of groundnut are highly resistant to tikka disease, resistant commercial varieties are yet to be developed.

Thank you