



B.Sc. Third Year, Semester - V
Botany Paper No. XVI (C)
Plant Pathology Unit-2

4) Diseases of Oil Seeds

b) Damping off of Mustard



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b) Damping off of Mustard

Causal Organism: *Pythium debaryanum*

Host: *Brassica campenstris* (Mustard)

Classification

- **Division-** Mycota
- **Sub Division-** Eumycotina
- **Class-** Oomycetes
- **Order-** Pythiales
- **Family-** Pythiaceae
- **Genus-** *Pythium*
- **Species-** *debaryanum*

Distribution

Damping off disease is widely distributed all over the world. It occurs in valleys and forests, in tropical and temperate climates and in every green house and nursery beds. The disease affects seeds, seedlings and older plants. Maximum damage is done to the seed and seedling roots during germination either before or after emergence. Poor seed germination or poor emergence of seedlings is due to damping off infections in pre-emergence stage. Older plants are not killed, but they develop stem lesions or root rot, thus retarding their growth.

Symptoms:

Damping off disease occurs in two stages: i) pre-emergence phase and ii) post-emergence phase

i) Pre-emergence phase:

In this phase, the young seedlings are killed before they reach the surface of the soil. In fact they may be killed even before the hypocotyl has broken the seed coat. The radical and the plumule, when they come out of seed undergo complete rotting. Since this happens under soil surface, the disease is often not recognized at all by the farmer, who attributes the failure in emergence of seedlings to poor quality of the seed.



Symptoms:

ii) Post-emergence phase:

It is generally conspicuous and well known to workers who worked in a nursery. This phase is characterized by the toppling over of infected seedlings, any time after they emerge from the soil until the stem has hardened sufficiently to resist invasion. Infection usually occurs at or below the ground level and the infected tissue appears soft and water soaked. As the disease advances the stem become constricted at the base and the plants collapse. Seedlings that are apparently healthy one day may have collapsed by the following morning. Generally the cotyledons and leaves wilt slightly before the seedlings are prostrated, although they may remain green and turgid until collapse occurs.

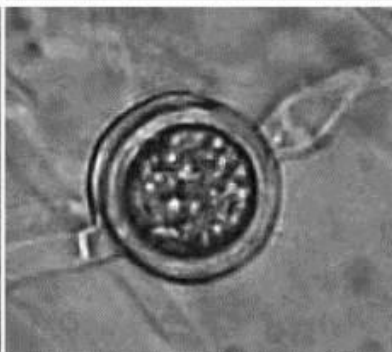
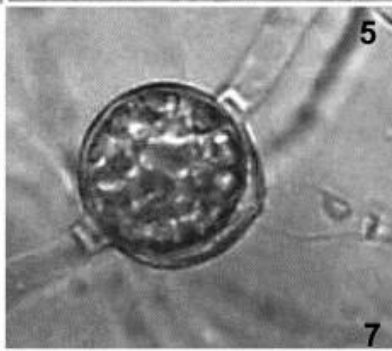
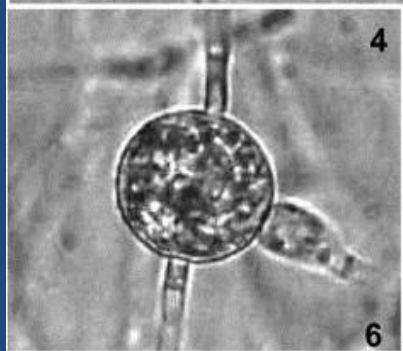
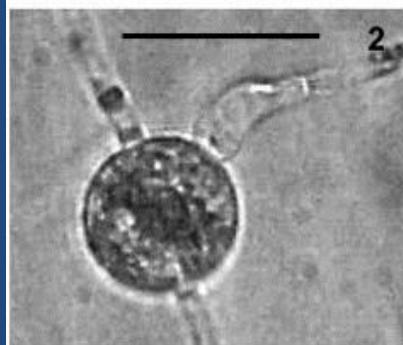
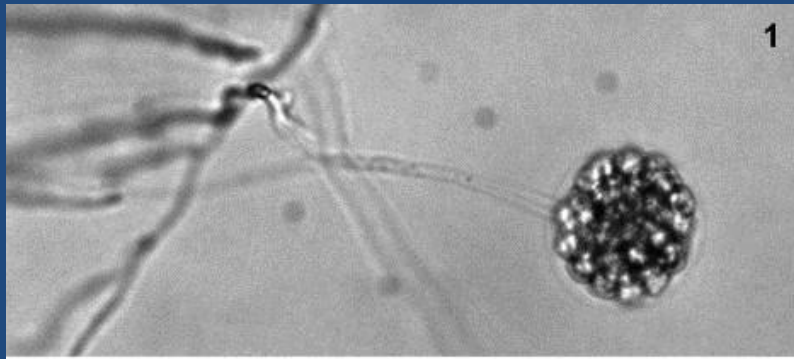
In the field, the disease is most severe when the moisture in the soil is medium to high and the temperature is comparatively high. When conditions are favourable for development of the disease, damping off is often responsible for as much as 90 percent killing of seedlings. In specially susceptible plant species seedling losses of 25 to 75 percent occur yearly. Most of the loss is due to pre-emergence damping off.

Causal organism and disease cycle:

The disease is caused by *Pythium debaryanum*. The mycelium is white, intracellular, slender, profusely branched with coenocytic hyphae. There are produced terminal and intercalary sporangia which may be spherical, filamentous or of various shapes. They germinate to develop a vesicle in which zoospores are formed. Released zoospores swim for some time, encyst and infect the host tissue by germ tube.

Causal organism and disease cycle:

Antheridia and oogonia develop at the end of short hyphae. After fertilization, thick walled oospores develop which are resistant to extremes of temperatures and other adverse factors. They go under a period of rest and germinate in the next season. Each oospore produces a vesicle at the end of germ tube. Zoospores are formed inside the vesicle. Both sporangia and zoospores germinate at low temperature of 10-18°C to form zoospores, but directly in to germ tube at temperature above 18°C. The pathogen remains in water, soil, on dead plant and animal matter as saprophytes. The fungus enters the seed by direct penetration of moistened, swollen seed coats or cracks. Further penetration of embryo or emerging seedling tissue occurs through mechanical pressure and dissolution by enzymes. Pectinolytic enzymes dissolve the middle lamella in between cells, cellulolytic enzymes degrade cell walls and proteolytic enzymes breakdown the protoplast of invaded cells.



**Microscopic
Image of *Pythium* sp.**

Disease cycle

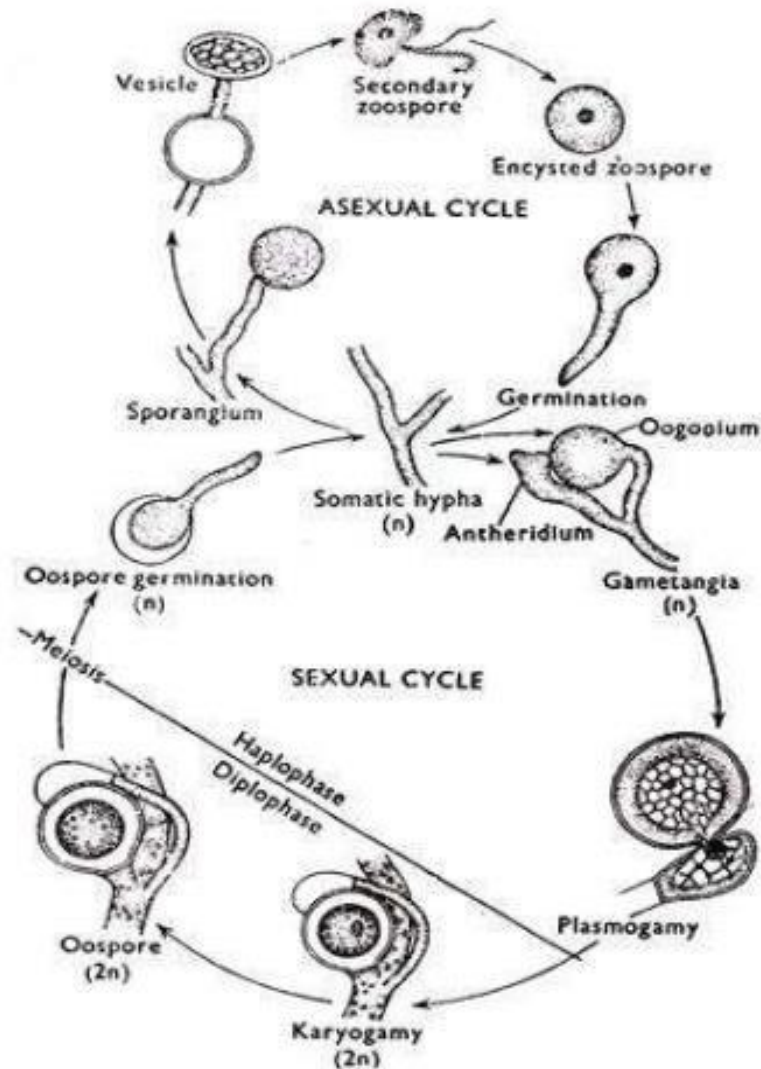


Fig. 164. Life cycle of *Pythium* sp.

Control measures:

- 1. Soil disinfection with chemicals like formalin : water (1:50), captan, thiram, blitox-50 etc in a 0.2 – 0.5% suspension.**
- 2. Soil sterilization by steam or dry heat.**
- 3. Seed protectants which include several types of chemicals as phygon, agrosan GN, arasan, cerasan, captan, blitox-50 and others. These are applied to seeds in dry or wet form.**
- 4. Seed treatment followed by spraying of seedlings with ziram, chloranil, captan, soluble copper etc.**
- 5. Cultural practices including good drainage, improvement of soil aeration, check on excessive use of nitrate fertilizers etc.**

Thank you