

Powdery mildew of Pea

Causal organism: *Erysiphe pisi* DC. var. *pisi*

Taxonomic Position of the Pathogen: Kingdom: Fungi, Phylum: Ascomycota, Class: Leotiomycetes, Order: Erysiphales, Family: Erysiphaceae, Genus: *Erysiphe*, Species: *pisi* var. *pisi*

Distribution and Importance: This disease occurs worldwide and is much more serious than the downy mildew of pea due to frequent occurrence and coverage of a much larger host surface area. In *Bharat*, it is known since as early as 1910. It usually develops late in the season reaching its maximum intensity when pods are forming. It is most worst in dry weather unlike the downy mildew which flourishes in wet weather. Early varieties are less damaged. Varieties maturing in January usually escape the maximum intensity of the disease.

Symptoms: This disease first appears on the leaves and then on other green parts of the

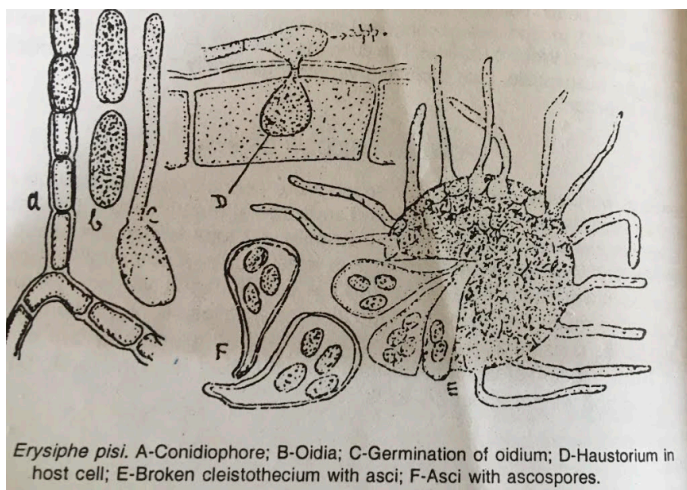


plant. Its attack is characterised by white or light pink floury patches on both surfaces of leaves as well as on tendrils, stems and pods. These patches originate as minute discoloured specks from which a powdery mass radiates on all sides. In severe conditions, large areas on the aerial parts of the



host may be covered with these white or light pink floury patches. The superficial mass consists of mycelium and spore of the fungus causing disease. Histological changes in the host include collapse of the necrotic epidermal cells in case of sub infection, collapse of tissue below the penetrated epidermal cells, and movement of the host nuclei towards the haustoria of the fungus. Physiology of the host is also affected. There is increased transpiration, especially during night. Respiration is also increased and photosynthesis decreased.

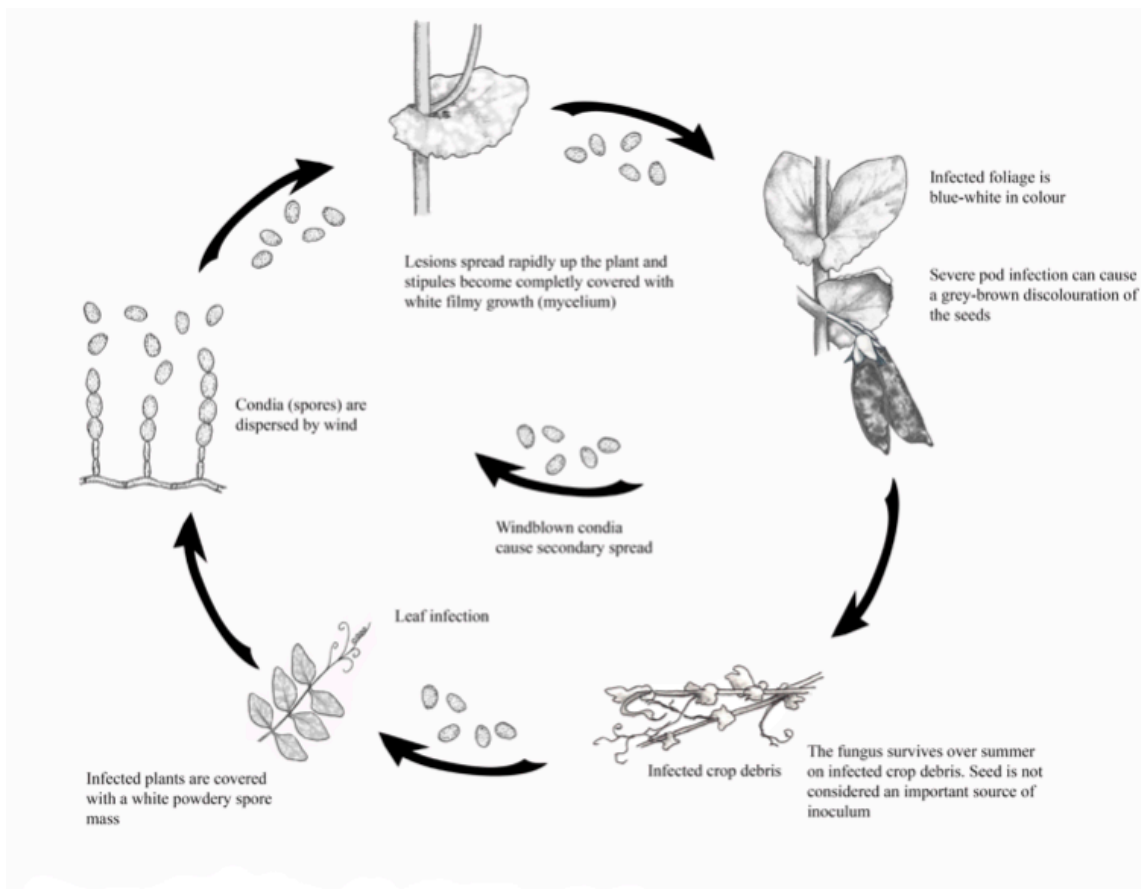
The Pathogen: The mycelium of the fungus is generally fine, persistent, rarely thick. It is ectophytic, the entire thallus, except haustoria in epidermal cells, is present on the host surface. The haustoria develop from lobed swellings (appressoria) on the sides of the hyphae adjacent to the host surface. Conidiophores arise vertically from superficial hyphae on the host surface. They are septate and their cells are not much different from conidia in shape. Conidia are formed single or in short chains. The conidia are hyaline, ellipsoid to ovate with vacuolate cytoplasm, and measure 31-38 x 17-21 μm . The ripe conidia fall off quickly and are dispersed by wind. Hyphae cells, cells of conidiophores, conidia and haustoria are uninucleate.



Late in the season, but not always on leaves, the sexual fruiting body (cleistothecia) may be formed as short, black, minute bodies scattered in the mycelium web. They are round structures measuring about 90 μm diameter. The peridium of these cleistothecia is provided with a number myceloid appendages. Usually 2-3 asci are formed in each cleistothecium. These asci originate from single point in the fruit body and appear in a fan-like manner. They are

ovate, nearly sessile, 46-72 x 30-45 μm in size. The asci contain 3-8 ascospores which are hyaline, elliptical, unicellular, and measure 19-25 x 9-14 μm .

Disease cycle: The pathogen is biotrophic parasite. It survives between crop seasons through cleistothecia in soil. The wall of cleistothecia disintegrate and ascospores are released from asci. These spores cause infection on lower leaves near the soil line. Hence, ascospores are primary inoculum and these cause primary infection. The growth that



develops produces conidia for secondary spread of the disease. Therefore, secondary infection caused by conidia. These conidia are continuous spread by wind to cover large

area of the pea crop. Jhooty and Munshi (1990) suggested that cleistothecia were not found in plains of Punjab, Uttar Pradesh and rarely in the hills. Since the pea crop is grown throughout the year in one or the other region of Punjab, Uttar Pradesh and Himachal Pradesh. The pathogen is present in conidial stage throughout the year. It survives in its mycelial and conidial stage on the main host in the plains during the winter months and in cooler regions or on higher altitudes of Himachal Pradesh during the summer months. The primary inoculum in the form of conidia comes from these sources by wind currents to infect the main crop in the plants.

Management:

1. Use of resistant varieties viz., Pant Pea-5, Malviya 15, JP-885, HUP-2, P-388, Pant Pea-8, PM-2, DMR-9, DMR-11, Rachna, etc.
2. Spraying with Karathane @ 1 ml/litre or wetttable sulphur @ 3 g/litre or Dinocap @ 1 ml/litre of water and repeat after 10-15 days, if necessary. Some other fungicides like, Sulfex @2.5 kg/ha, Calixin (0.1-0.05%) and Bavistin (0.1%) were all effective in controlling the disease. Bitertanol, triarimenol and dichlobutazol are some of the more recent fungicides used against the disease.
3. Several fungi such as *Ampelomyces*, *Cladosporium*, *Tilletiopsis* and *Thrips tabaci* (insect) are natural biocontrol agents of powdery mildew.
4. Avoid late planting.
5. After harvest collect the plants left in the field and burn them.