B.Sc. Third Year, Semester - V

Botany Paper No. XVI (C)

Plant Pathology Unit-2

6) Ornamentals:

a) Powdery Mildew of Rose

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6) Ornamentals:

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Causal Organism: *Sphaerotheca pannosa* var. *rosae*

- **Classification**
- **Division- Mycota**
- **Sub Division- Eumycotina**
- **Class- Ascomycetes**
- **Order- Erysiphales**
- **Family- Erysiphaceae**
- **Genus- *Sphaerotheca***
- **Species- *pannosa* var. *rosae***

Distribution

Powdery mildew is very destructive, affecting plants grown out of doors and in greenhouses. The disease occurs wherever roses are grown. Under conditions that are favorable for disease development, powdery mildew can cause complete defoliation. Epidemics can be expected any time during the growing season when the rainfall is low or absent, the days are warm and dry, and the nights are cool and damp. Nearly all species and cultivars of roses are susceptible under conditions that are favorable for disease development. Losses from powdery mildew occur through a reduced aesthetic value that is seen in fewer flowers of poorer quality, a lowered photosynthetic efficiency that results in reduced plant growth, and a reduced salability for roses as cut flowers.

Symptoms:

Symptoms:

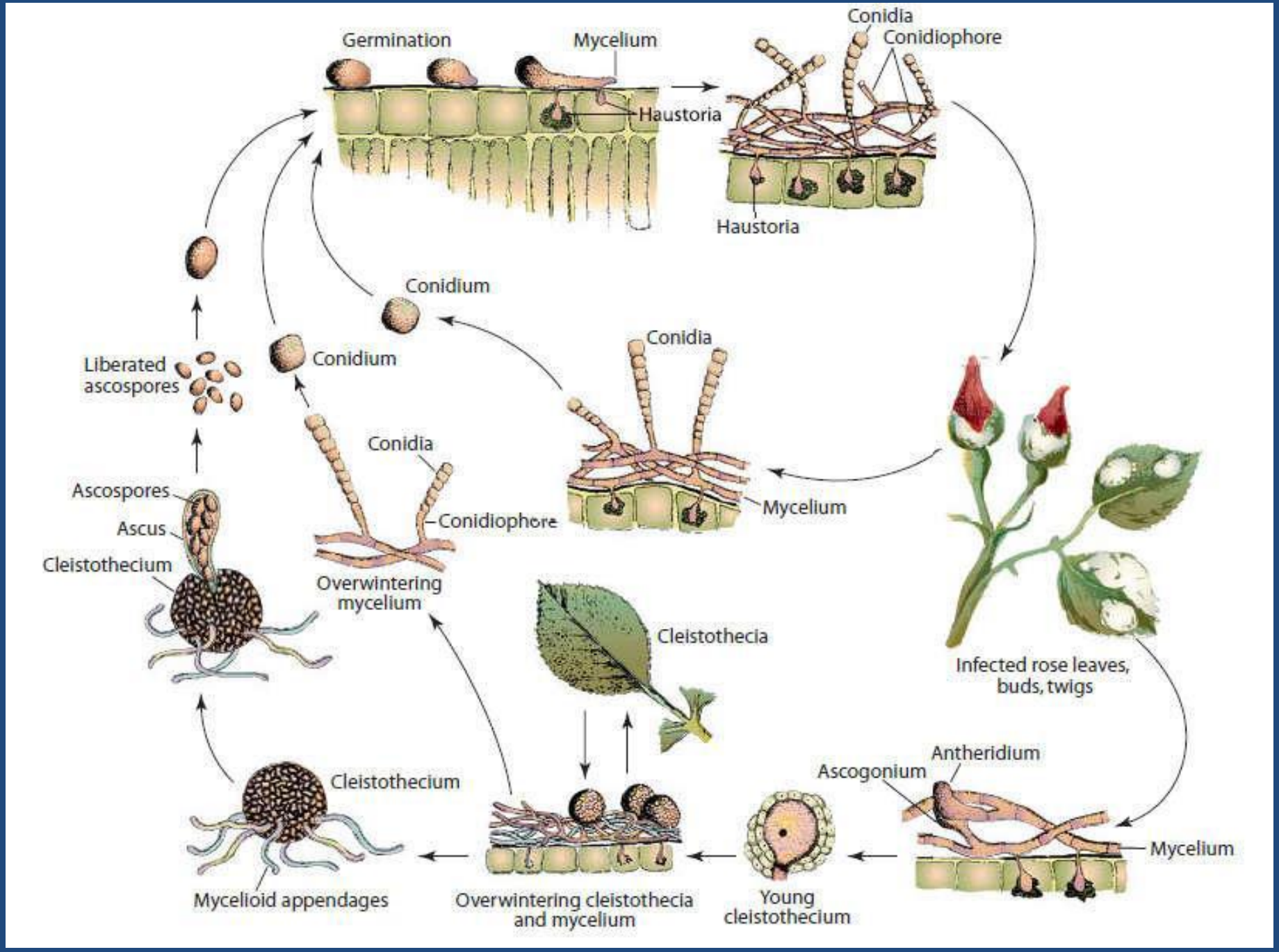
On garden roses, new shoots in the spring are dwarfed, distorted, and covered with a whitish gray mildew growth. On expanding leaves, mildew first appears on the upper leaf surface as irregular, light green to reddish, slightly raised blister like areas. The typical dense, powdery white growth (mycelium, conidiophores, and spores) of the mildew fungus soon appears. Severely infected young leaves become curled or irregularly twisted and are usually covered with enlarged, whitish gray, powdery, mealy, or felt like patches of the fungus. These leaves often turn reddish purple, under the mildew growth, then yellow, dry, and drop prematurely. Older, infected leaves are not usually distorted, but develop round-to-irregular areas covered with the flour like mildew growth. On highly susceptible rose cultivars, the buds, young stems, thorns, peduncles, fruit sepals, and even flower petals may become infected and entirely covered with the typically dense, flour like growth. Flower petals may be discolored, dwarfed, and may fail to open properly; the flowers may also die early. The growing tips and flower buds may be malformed and killed, but the death of an entire plant is rare. Plants can be severely stunted if they are heavily infected early in the growing season.

Causal organism and disease cycle:

Powdery mildew is caused primarily by the fungus *Sphaerotheca pannosa* var. *rosae*. The powdery mildew fungus overwinters as dormant mycelium in bud scales and rudimentary leaves within the dormant buds. Infected buds break open in the spring and develop into systemically infected shoots. The fungus sporulates on these shoots, producing large numbers of microscopic spores (conidia) in chains that are carried by the wind or other means to healthy rose tissue where they infect the upper and lower leaf surfaces, thus initiating a new disease cycle. The fungus survives in the Midwest in the winter as cleistothecia, which appear as black specks embedded in the mealy or felt like mildew growth on rose stems, thorns, and fallen leaves. The minute cleistothecia are formed within the mycelial mat at the end of the growing season. During warm and humid weather in the spring, a cleistothecium absorbs water and cracks open to discharge a single small sac or ascus containing 8 spores (ascospores). The microscopic ascospores are carried by the wind or splashing rain to healthy rose tissue and are capable of causing infection.

Causal organism and disease cycle:

In greenhouses or mild climates, where roses and powdery mildew both grow continuously throughout the year, cleistothecia are absent and only conidia are formed. New infection cycles are produced more or less continuously. Conidia and ascospores that land on the surface of a rose germinate and form a holdfast structure (appressorium) on the leaf or stem surface. From the bottom of the appressorium, a fine penetration tube or hypha pierces the cuticle and enters the epidermal cell where a globose feeding structure, or haustorium, is formed. With further growth on the plant surface, the fungus develops a dense, branched network of hyphae. Many additional haustoria form in other epidermal cells. Short, erect branches, or conidiophores, develop at the same time from the surface hyphae, producing a barrel-shaped conidium at the end of each conidiophore. Successive conidia, with one formed each day; commonly remain attached in chains, giving the characteristic powdery white appearance. The conidia eventually break away and are carried by air currents, splashing water, or other means to new infection sites. Handling rose plants, insects, mites, and snails also helps spread conidia. As many as 3 million spores may be formed on one square inch of infected tissue over a period of several weeks.


Germination
Mycelium
Haustoria
Conidia
Conidiophore
Haustoria
Conidium
Conidium
Liberated ascospores
Conidia
Mycelium
Conidia
Conidiophore
Ascospores
Ascus
Cleistothecium
Overwintering mycelium
Infected rose leaves, buds, twigs
Cleistothecia
Antheridium
Ascogonium
Mycelium
Cleistothecium
Mycelioid appendages
Overwintering cleistothecia and mycelium
Young cleistothecium

Control measures:

- Use of only top-quality, disease-free plants of resistant cultivars and species from a reputable nursery.
- Prune roses in the fall and in early spring, according to type and cultivar. All dead wood should be removed and burned.
- Maintain rose plants in high vigor: soil should be well prepared; avoid planting of large shrubs and trees; plant spacing; avoid excess use nitrogen; regular irrigation; weed eradication.
- Spraying fungicides on aerial parts at 7 to 14 day intervals.
- Vaporized sulfur gives excellent control of powdery mildew in greenhouses.

Thank you