DISEASES OF APPLE

Session-12

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SCAB OF APPLE

CAUSAL ORGANISIM:

Venturia inaequalis

Imperfect stage: Spilocaea pomi

ECONOMIC IMPORTANCE

- First reported from Sweden (1819).
- First reported on Ambri variety in Kashmir valley (1935).

SYMPTOMS

- Scab infections usually noticed on leaves and fruits.
- Affected leaves become twisted or puckered and have black, circular spots on their upper surface.
- On the under surface of leaves, the spots are velvety and may coalesce to cover the whole leaf surface.
- Severely affected leaves may turn yellow and drop.
Scab can also infect flower stems and cause flowers to drop.

- Scabby spots on fruit begin as sooty, gray-black lesions and may have a white or red halo.
- The lesions later become sunken and tan and may have spores around their margins.
- Infected fruit become distorted and may crack, allowing entry of secondary organisms.
- Severely affected young fruit may drop.
SCAB ON FRUIT AND LEAF
ETIOLOGY

Perfect stage: *Venturia inaequalis*—it is saprophyte in nature, grow on dead tissue of leaf.

- Imperfect stage: *Spilocaea pomi* is the conidial stage and parasite to living host.
  - The imperfect stage produce conidiophores which are brown, continuous or rarely septate. Conidia are ovate to lanceolate, 1-celled to 2-celled of truncate base and pointed apex. Conidia measure about 12-22×6-9µm.
  - The perfect stage produce perithecium within 50-100 asus produced. The asus contain oval to boat-shaped, hyaline, yellowish or olivacious color, 2-celled ascospore.
  - The upper cell of ascospore is shorter and somewhat wider than the lower cell. The unequal size of the 2 cells gives the species name, *inaequalis*.
  - The ascospore measure about 13×5µm.
Mode of survival and spread

• P.I.: Ascospores
• Wind borne conidia

Favourable condition

Rain with sufficient duration of leaf wetness upto a minimum period with temp. ranging from 6-26°C fav. For disease development.

Management

• Clean cultivation.
• **Resistant varieties:** Emira, red free, Ambstraking, Ambroyal, Ambrich and Ambred.
• Spray captan@0.2% or dodine@0.25% at short intervals after petal fall Single application of difolaton@0.3% at green bud stage followed by captan@0.2% at petal fall.

✓ **Spray schedule**

• 1st spray at Silver tip stage - 0.2% captofol (or) 0.3% captan
• IIInd spray at pink bud - 0.2% captan (or) 0.3% mancozeb
• IIIrd spray at petal fall - 0.5% carbendazim
• IVth spray - after 10 days of 3rd spray - 0.2% captan
LIFE CYCLE OF SCAB
POWDERY MILDEW

Causal organism – *Podosphaera leucotricha*

**SYMPTOMS**

- Appear soon after the buds develop into new leaves and shoots.
- Small patches of white or grey powdery masses on under surface of leaves.
- Leaves grow longer and narrower than normal leaves and the margin is curled.
- Twigs covered with powdery mass.
- Affected fruits remain small and deformed and tend to develop roughened surface.
- In nursery plants, formation of wood is affected.
Mode of survival and spread

- **P.I:** Mycelium in diseased vegetative buds and fruits.
- **S.I:** Wind borne conidia.

Favourable condition

Moderate temp. Of 19-25 °c with high relative humidity of 88%

Management

- Sanitation of orchard.
- Pre-bloom spray of lime sulphur (1:60).
- Spray dinocap@0.05% or Wettable S.
- Resistant varieties: Maharaja chunth and Golden Chinese (apple cultivars), Yantarka Altaskya, Dolgoe (Crab apple cultivars).
POWDERY MILDEW ON LEAF
INTRODUCTION

• The disease was first recorded in the United States as early as 1780 and often appears in epiphytotic form.

• The disease is also known to occur in India.

SYMPTOMS

• All above ground tissues including blossoms, fruits, shoots, branches, and in the rootstock near the graft union on the lower trunk are affected.

  Blossom clusters and young shoots: Blossom symptoms are first observed 1-2 weeks after petal fall.

• The floral receptacle, ovary, and peduncles become water soaked and dull, greyish green in appearance. Later these tissues shrivel and turn brown to black.
Shoot symptoms: Tips of shoots may wilt rapidly to form a "shepherd's crook".

- Leaves on diseased shoots often show blackening along the midrib and veins, before becoming fully necrotic.
- Numerous diseased shoots give a tree burnt and blighted appearance.
- Bark on younger branches becomes darkened and water-soaked. At advanced stages, cracks will develop in the bark, and the surface will be sunken slightly.
- Wood under the bark will show streaked discolorations. Similar symptoms can be observed in infected apple rootstocks.
- Infected small immature fruit becomes water soaked, then turn brown, shrivel, turn black and cling to the tree for several months after infection.
- Droplets of milky coloured, sticky ooze may appear on infected parts which usually turns brown on exposure to air.
FIRE BLIGHT SYMPTOM ON FRUIT AND SHOOT
The bacterium, *Erwinia amylovora* is the causal pathogen of the disease.

Cells of *E. amylovora* are

- Gram-negative
- Rod shaped
- Measure 0.5–1.0 x 3.0 mm
- Flagellated on all sides (peritrichous).
SURVIVAL AND SPREAD

The bacteria overwinter at the margins of the cankers and possibly in buds and apparently healthy woody tissue.

- Insects such as bees, flies and ants spread the bacteria to the flowers.

Favourable condition

Warm and humid weather and temp. above 19 °C.

MANAGEMENT

- During winter prune out and burn blighted twigs, branches and cankers, and even whole trees, at about 30cm below the point of visible infection.
- Disinfect the tools after each cut with 10% sodium hypochlorite.
- Insect control.
- Resistant varieties
- Dormant sprays with copper sulphate or bordeaux mixture, however, bordeaux mixture or streptomycin 100 ppm are the only effective in blossom period.
CROWN GALL

Causal organism – *Agrobacterium tumefaciens*

**SYMPTOMS**

- Small outgrowths on stem and roots near soil line.
- Galls are spherical, white or flesh coloured (young stage).
- Galls become hard and corky on woody stems, knobby and knotty.
- Affected plants stunted with chlorotic leaves.

**MANAGEMENT**

- Regulatory measures.
- Crop rotation with maize or other grain crops.
- Avoid injuries to roots or lower stem parts.
- Apply Penicillin or vancomycin for partial control.
- *Agrobacterium radiobacter (Strain K1026) (No gall) applied to fresh wounds*.
CROWN GALL