



DISEASES OF APPLE

Session-12

M.S.Swaminathan School of Agriculture,CUTM



SCAB OF APPLE

- **CAUSAL ORGANISIM:**

Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

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.



CONT...

Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

- 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.



Centurion
UNIVERSITY

SCAB ON FRUIT AND LEAF





Centurion
UNIVERSITY

Shaping Dreams
Empowering Communities...

ETIOLOGY

- Perfect stage: *Venturia inaequalis* - it is a saprophyte in nature, grows on dead tissue of leaves.
- Imperfect stage: *Spilocaea pomi* is the conidial stage and a parasite to living hosts.
- The imperfect stage produces conidiophores which are brown, continuous or rarely septate. Conidia are ovate to lanceolate, 1-celled to 2-celled with a truncate base and pointed apex. Conidia measure about $12-22 \times 6-9 \mu\text{m}$.
- The perfect stage produces perithecia within 50-100 asci produced. The asci contain oval to boat-shaped, hyaline, yellowish or olivaceous color, 2-celled ascospores.
- The upper cell of an ascospore is shorter and somewhat wider than the lower cell. The unequal size of the 2 cells gives the species name, *inaequalis*.
- The ascospore measures about $13 \times 5 \mu\text{m}$.

Cont...

Mode of survival and spread

- **PI: Ascospores**
- **ST: 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

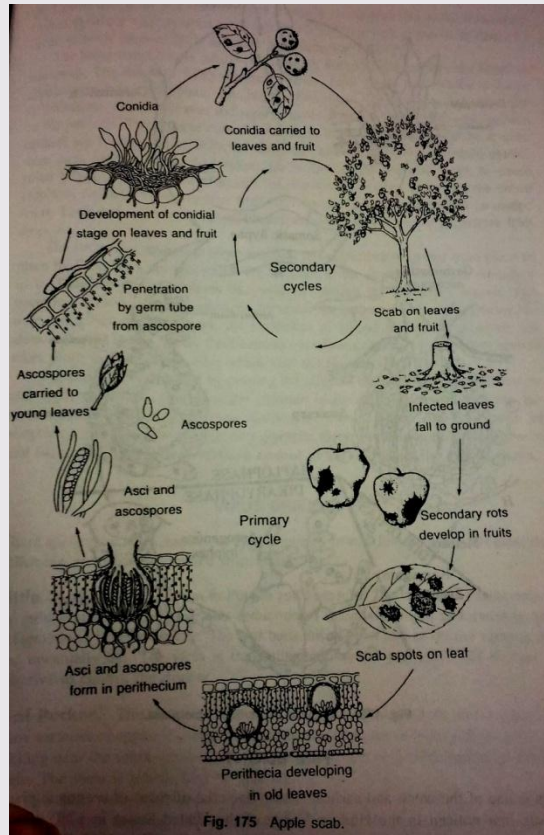
- 1st spray at Silver tip stage - 0.2% captofol (or) 0.3% captan
- IInd spray at pink bud - 0.2% captan (or) 0.3% mancozeb
- IIIrd spray at petal fall - 0.5% carbendazim
- IVth spray - after 10 days of 3rd spray - 0.2% captan



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

LIFE CYCLE OF SCAB





Centurion
UNIVERSITY
Shaping Lives...
Empowering Communities...

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.



CONT...

Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities...*

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).



Centurion
UNIVERSITY
Shaping Lives...

POWDERY MILDEW ON LEAF





Centurion
UNIVERSITY

Empowering Communities...

FIRE BLIGHT OF APPLE

INTRODUCTION

- The disease was first recorded In 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.



CONT....

Centurion
UNIVERSITY

Shaping Lives
Empowering Communities...

➤ **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



Centurion





Centurion
UNIVERSITY

Shaping Lives...
Empowering Communities...

CAUSAL ORGANISM

- The bacterium, *Erwinia amylovora* is the causal pathogen of the disease.
- Cells of *E.amylovora* are
 - Gram-negative
 - Rod shaped
 - Measure 0.5–1.0x3.0 mm
 - Flagellated on all sides (peritrichous).



CONT...

SURVIVAL AND SPREAD

O.P.J.S.
UNIVERSITY
*Shaping Lives
Empowering Communities*

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.



Centurion
UNIVERSITY

Shaping Lives...

Empowering Communities

CROWN GALL

Causal organism– *Agrobacterium tumefaciens*

SYMPTOMS

- Small out growths 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



Centurion
UNIVERSITY

*Shaping Lives...
Empowering Communities*

CROWN GALL

