

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Citrus Foot Rot / Gummosis

Symptoms

1. Foot Rot

- Foot rot results from an infection of the scion near the ground level, producing lesions which extend down to the bud union.
- Infection of the trunk results in dark, water-soaked areas, often with profuse exudation of a dark resin from the lesion.
- Infected bark remains firm with small cracks through which abundant gum exudation occurs.
- If the lesion encircles the trunk, girdling occurs, leading to the death of the tree.
- Trees killed by the pathogen show defoliation.
- Trees with the bud union close to the soil and trees in poorly drained locations are especially susceptible to infection.

2. Root Rot

- *Phytophthora* spp. infect the root cortex and cause a decay of fibrous roots.
- The cortex becomes soft, discolored and water soaked.
- The tree is unable to maintain adequate water and mineral uptake, and nutrient reserves in the root are depleted by the repeated fungal attacks.
- This results in the reduction of fruit size and yield, loss of leaves, and twig dieback of the canopy.

3. Brown Rot

- *Phytophthora* infection of fruit produces a decay in which the affected area is light brown and leathery.
- White mycelium forms on the rind surface under humid conditions.
- In the orchard, fruit near the ground become infected when splashed with soil containing the fungus.
- If favorable conditions of optimum temperature (23-27 °C) and long periods of wetting (18 plus hours) prevail, the disease spreads to fruit throughout the canopy.
- Brown rot may spread to adjacent fruit in the packing.

Foot Rot Symptoms



Gummosis



Citrus Brown rot



Etiology

- *Phytophthora parasitica*
- *P. citrophthora*

Epidemiology

- *Phytophthora parasitica* and *Phytophthora citrophthora* are fungal-like organisms that complete their life cycles in the soil.
- *Phytophthora parasitica* is most active at higher temperatures while *Phytophthora citrophthora* has a lower optimum temperature for growth.

Disease Cycle

- In wet soils, both of these organisms produce motile spores, known as zoospores, which are attracted to host roots where they germinate and infect root tissue.
- When zoospores contact roots they encyst, germinate and enter the root tip resulting in **rot** of the entire rootlet.
- **Foot rot** or **gummosis** occurs when zoospores splash onto a wound or bark crack around the base of the trunk.

Management

- The site selected for a field nursery or seedbed should be disease free and located at some distance from existing plantings free of *Phytophthora* spp.
- Remove the dead bark.
- Apply paste of Ridomil MZ-72 or Aliette.
- Spray with Aliette @ 2.5 gm/litre of water.

Melanose

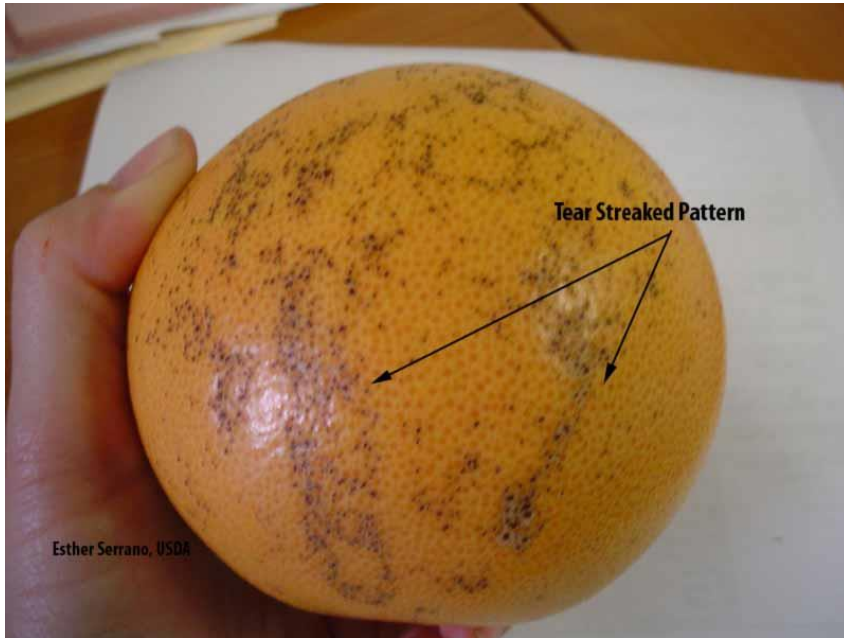
- **Symptoms:**
- **Leaves**
- About one week after infection, foliar symptoms appear as small brown discrete spots.
- Distortion and dieback of young shoots are associated with severe infections.

Leaf and Fruit symptoms



- **Fruit Symptoms:**
- It can create severe fruit rind blemishes, but the fungus does not normally affect the pulp.
- Early infections show relatively large pustules and they may coalesce to form extensive areas that often crack to produce mud cake melanose.
- Infections during later stages of fruit development produce small discrete pustules creating the tear-stain melanose pattern.
- **Pathogen:** *Diaporthe citri* (anamorph = *Phomopsis citri*)

Fruit Symptoms



Disease Cycle

- Pathogen completes its lifecycle on dead twigs.
- Around 18-24 hours of wetting is required for infection to occur and severe infection is favored by long periods of continuous wetting.
- The anamorph stage produces two types of asexual spores, the so-called alpha and beta conidia.
- They are formed in thick-walled, erumpent pycnidia that develop in dead citrus twigs.

Management

- Clipping of dead branches.
- This will reduce inoculum of the pathogen and allows effective coverage of fungicide.
- Spray Amistar @ 1 ml/liter of water in April.

Citrus Scab

- **Symptoms**

- Early scab pustules are a mixture of fungal and host tissue.
- Wart-like, raised light-brown pustules or scabs are produced on leaves, stems and fruit.
- These pustules are slightly raised and pink to light brown in color.
- On maturity, the pustules become warty and crack.
- Old scab lesions have a rough surface, and become cracked and fissured. Leaves become stunted, wrinkled or puckered, with irregular torn margins.

Etiological Agent

C. O. *Elsinoe fawcettii* Bitancourt and Jenk.

- **Anamorph:** *Sphaceloma fawcettii* Jenk.
- **Hosts**
- Lemon, rough lemon and mandarin.
- Other species of citrus including grapefruit, orange and pomelo are also susceptible.

Spread / Disease Cycle

- Conidia are produced in the scabs, spreading in wind and rain splash.
- These spores spread to new susceptible tissue.
- Insects may also spread them.
- Spread over long distances is on infected nursery plants and on fruits.
- The spores need a wetting period of 4 hours for germination and infection.
- The leaves, twigs and fruit are infected when they are young, becoming resistant to infection when full size.

Management

- **CULTURAL CONTROL**

- **Before planting:**

- Establish healthy nurseries for production of rootstocks and bud wood at suitable distance from commercial orchards where the disease may be present.

- **During growth:**

- Prune trees regularly to keep the canopy open and free of deadwood.

- **CHEMICAL CONTROL**

Fungicides should be applied to plants in nurseries at the beginning of leaf flush to prevent infection leading to stunted bushy plants that are difficult to bud.

- Spray of amistar @ 01 ml/liter of water.

*Sources

- 1. Recommended books.
 - 2. Latest research articles downloaded from Google.
 - 3. Google images.
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- *Solely for academic purpose and guidance of students.