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Postharvest Diseases of Mango

Mango Anthracnose

Symptoms

- On mango, anthracnose symptoms appear on leaves, twigs, petioles, flower clusters (panicles) and fruits.

Leaf symptoms

- On leaves, lesions start as small, angular, brown to black spots that enlarge to form dead areas.
- The lesions may drop out of leaves during dry weather.

Symptoms...

Symptoms on Panicles

- The first symptoms on panicles are small black or dark-brown spots, which can enlarge, coalesce and kill the flowers.

Symptoms on Petioles, Twigs and Stems

- Petioles, twigs, and stems are also susceptible and develop the typical black lesions found on fruits, leaves and flowers.

Fruit Symptoms

- Ripe fruits affected by anthracnose develop sunken, prominent, dark brown to black decay spots before or after picking.
- Fruits may drop from trees prematurely.
- The fruit spots coalesce and can penetrate deep into the fruit, resulting in extensive fruit rotting.
- Mostly infections on green fruit remain latent until ripening.
- The fruits that appear healthy at harvest can develop significant anthracnose symptoms rapidly upon ripening.

Tear Staining Symptoms

- Tear stain becomes visible in which linear necrotic regions develop on the fruit.
- Deep cracks in the epidermis may extend into the pulp.

Epidemiology

- Lesions on stems and fruits may produce prominent spore masses under wet conditions.
- Wet and warm weather conditions favor anthracnose infections in the field.
- Warm and humid temperatures favor postharvest anthracnose development.

Disease Cycle

Dissemination:

- Conidia of the pathogen are dispersed by splashing rain or irrigation water.
- Spores approach infection sites (leaves, panicles and branches).

Infection:

- On immature fruits and young tissues, spores germinate and penetrate through the cuticle and epidermis to multiply in the tissues.
- On mature fruits, infections penetrate the cuticle, but remain latent until ripening of the fruits begins.

Pathogen's Reproduction:

- Masses of conidia are produced in fruiting bodies (acervuli) on symptomatic tissue, under moist and favourable conditions.
- Many cycles of disease can occur as the fungus continues to multiply during the season.
- **Survival:**
- Inter-seasonal survival of the pathogen is on infected and defoliated branches and mature leaves.

Symptoms on Mature Leaves



Symptoms on Young Leaves



Fruit Symptoms



Fruit Symptoms...



Fruit Symptoms...



Fruit Symptoms...



Anthracnose Symptoms on very Young Fruit



Tear Stain Lesions on Fruit



Courtesy: Google Images

Symptoms on Panicles



Symptoms on Stem



Postharvest Symptoms



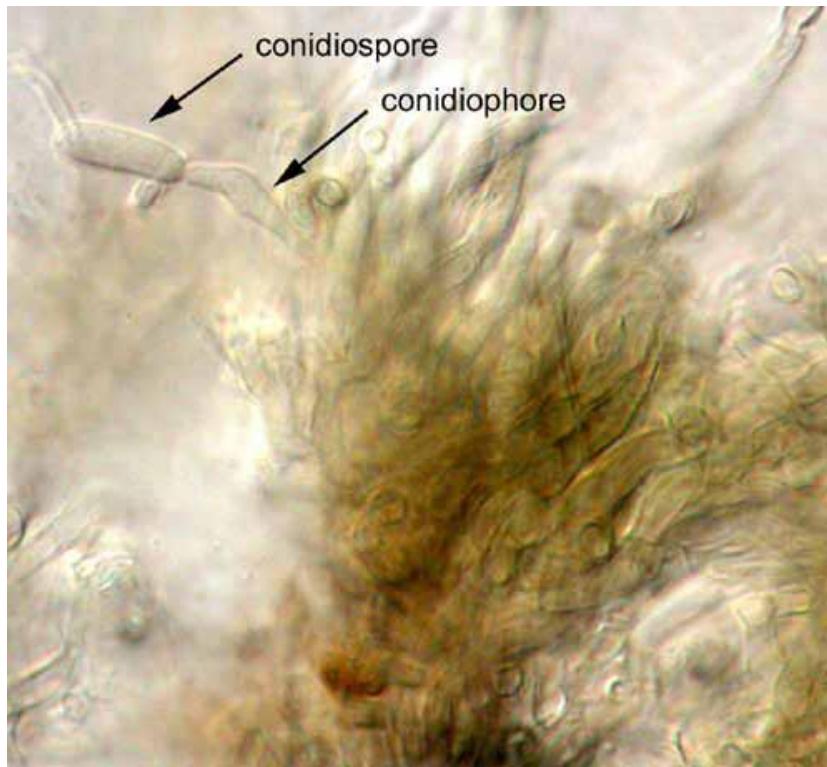
Colletotrichum gloesporioides



Courtesy: Google Images

Causal Organism

- *Colletotrichum gloeosporioides* Penz & Sacc



Management of Anthracnose

1. Cultural Management

- Tree skirting
- Clipping of diseased branches along with some healthy part.
- Removal of malformed parts.
- Fallen fruit and tree trash should be destroyed.

2. Resistance Management

3. Chemical Control

Spray of Topsin-M @ 1 gm/L water

Stem End Rot of Mango

- **Symptoms:**
- Symptoms of dark rot develop on the stem end.
- The rot produces dark streaking of the water-conducting tissues.
- This symptom differentiates stem end rot from anthracnose.
- The whole fruit gradually becomes black with symptoms progressing downward.
- C.O. *Botryodiplodia theobromae*

Symptoms of Stem End Rot on Mango



Disease Cycle

- This fungus is a natural inhabitant of the branches of mango tree.
- It grows into the stem of the fruit before harvest.
- Bark, trash or soil may infect fruit kept on garden floor as a usual practice.

Management

- Destroy diseased parts properly.
- Follow integrated disease management practices.
- Spray of Topsin-M @ 1 gm / liter of water.
- Postharvest dip of fruit in hot water for 15 minutes at 52°C with Carbendazim @ 0.05%

Guava Anthracnose

- **Symptoms**
- The disease mostly affects the tender parts of the tree such as young leaves, shoots, flowers and fruits.
- **Die back phase**
- The young shoots, leaves and fruits are readily affected.
- The greenish colour of the growing tip is changed to dark brown and later to black necrotic areas extending backwards causing the die back.
- The young fruits droop down and dry up.
- The disease becomes severe during August to September.

- **Fruit and leaf infection phase**
- Fruit and leaf infection mostly occurs in rainy season crop.
- Small pin-head spots are first manifested on unripe fruits, which later enlarge to form sunken, circular spot of dark brown to black in color.
- The unripe fruits become harder and corky.
- C.O. *Colletotrichum gloeosporioides*
- *Gloeosporium psidii*

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Courtesy: Google Images

Stylar End Rot

- **Symptoms**
 - The disease symptoms appear as discoloration on the lower region adjoining the persistent calyx. This area increases in size and turns dark brown.
 - The affected area becomes soft. Epicarp and mesocarp tissue show discoloration and the diseased area becomes light brown in colour.
 - C. O. *Phomopsis psidii*
- **Survival and spread:** Pathogen survives in infected fruit and plant debris.
- Pathogen spreads through wind.
- **Favourable conditions:** Temperature 10 to 35 °C (25 °C optimum) is favourable for disease development.

Stylar End Rot (Diseased and Healthy Fruit)



Management

- Prune and destroy diseased plant parts.
- Spray of Topsin M @ 01 gm / liter of water.

*Sources

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

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Green and Blue Mould

- **Green Mould**
- **Symptoms**
- This is considered to be a destructive fruit rot of citrus.
- Early symptoms include a soft water-soaked area on the peel, followed by the development of a circular colony of white mould, up to 4 cm diam. after 24-36 hours at 24°C.
- Green asexual spores (conidia) form at the center of the colony, surrounded by a broad band of white mycelium.
- The lesion spreads more rapidly compared to those caused by *P. italicum*. The fruit rapidly spoils and collapses.
- If citrus fruit is fully covered by green conidial mass then one billion conidia may be present on fruit.
- **C.O. *Penicillium digitatum***
- The disease develops most rapidly at temperatures near 24°C.

Green Mould on Kinnow



Blue Mould

- **Symptoms**
- Postharvest rotting caused by *Penicillium italicum* Wermer is responsible for significant economic losses of citrus.
- Early symptoms include a soft water-soaked area on the peel, followed by development of a circular colony of white mould.
- Bluish asexual spores (conidia) form at the center of the colony, surrounded by white mycelium.
- The lesions spread more slowly than those caused by *P. digitatum*.
- Water soaked area surrounds the lesion. In case of severe infection, the fruit is rapidly spoiled.

Blue Mould



Courtesy: Google Images

Green and Blue Mould on Fallen Kinnow Fruit



Spread

- Spores of these fungi are common in the atmosphere and spread through wind.
- The fungi infect through wounds in the fruit, but infection by contact can also occur.

Management of Green and Blue Mould

- **Cultural Control**
- Fruit blemishes and injuries need to be minimized.
- Infected fallen fruits should be removed and properly destroyed.
- Disinfectants can be used to clean equipment in packing and storage facilities.
- Harvest following rain is discouraged because wet fruit are more prone to injury.

Chemical Control

- Fungicides are used commonly as dips or sprays to prevent *Penicillium* rots.
- Thiabendazole (TBZ) is effective as postharvest dip against both moulds.
- Fruits are dipped, without rinsing, in the product at the recommended dosage for 30 seconds, within 24 hours of harvest.
- At commercial level, in Kinnow factories, following fruit dipping is done to control Blue and Green mould and other postharvest diseases:
TBZ 01 liter + Imazalil 01 liter / 200 liter of wax.

***Sources**

- 1. Recommended books.
- 2. Latest research articles downloaded from Google.
- 3. Google images.
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Gray Mould of Grapes

- Gray mold of grape is also known as Botrytis bunch rot.
- It's one of the most important diseases of grapes in the world which can cause serious losses in grape yields. The fungus can occur anytime during the growing season, but most commonly occurs near the harvest time.

• Symptoms

- Usually, *Botrytis cinerea* infects ripe berries.
- Infected berries become soft and watery.
- Under humid conditions, they are covered with the grey sporulating growth of the fungus.
- Infected berries become “mummies” and drop off later.
- C.O. *Botrytis cinerea*

Symptoms of Gray Mould of Grapes



Disease Cycle

- The fungus survives in grape mummies, dead grape tissues and other plant hosts.
- The fungus produces conidia from *sclerotia*.
- Conidia are dispersed by the wind which cause several new infections.
- Fungus can infect young shoots, blossoms, and leaves.
- Wounds on berries which are caused by birds, insects, hail, or other diseases increase the infection of *Botrytis*.

Factors Favouring

- The disease is favoured by the temperature range between 3 and 30 °C.
- Free moisture and high relative humidity above 90% also favour the disease development.

Management

- Gray mold can be efficiently controlled by the use of the good cultural practices.
- Fungus overwinters on the old plant tissues so phytosanitation is essentially required.
- Integrated disease management practices minimize the infection levels.
- Spray Captan 50 WP @ 1 gm / liter of water.

*Sources

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 - 2. Latest research articles downloaded from Google.
 - 3. Google images.
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