# Guava
# Sapota
# Pomegranate
# Annona
# Jack

# Guava

## Important disease in Guava

1. Anthracnose : ***Colletotrichum gloeosporioides***
2. Guava rust : ***Puccinia psidii***
3. Wilt : ***Fusarium oxysporum* f. sp. *psidii***
4. Fruit canker : ***Pestalotiopsis psidii***
5. Stem canker : ***Physalospora psidii***
6. Red rust : ***Cephaleuros virescens***

Minor:

1. Leaf spot : ***Cercospora psidii***
2. *Phomopsis* Fruit rot : ***Phomopsis psidii***

# **1. Anthracnose** or **Die-back**

**Etiology:** ***Colletotrichum gloeosporioides***

Conidia are hyaline, aseptate, oval to elliptical or straight, cylindrical.

Conidiophore is cylindrical and tapers towards apex.

It is hyaline and septate.

Acervuli are dark brown to black.

**Symptoms:**

- Symptoms will be seen in mature fruits on the tree.
- The symptoms consist of sunken, dark colored, necrotic lesions.
- Under humid conditions, the necrotic lesions become covered with pinkish spore masses.
- As the disease progresses, the small sunken lesions coalesce to form large necrotic patches affecting the flesh of the fruit.
- In severe cases, dieback of main branches will be noticed.


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## Mode of Spread and Survival:

- The pathogen remains dormant for about three months in the young infected fruits.
- It becomes active and incites rot when the fruit begins to ripe. In moist weather, acervuli appear as black dots scattered throughout the dead parts of the twigs.
- The conidia are spread by wind or rain.

## Management:

- Spray the trees with Bordeaux mixture 0.5 % or Copper oxychloride 0.2 % before monsoon.

# 2. Guava rust

Etiology: ***Puccinia psidii***

Symptoms:

- The pathogen can affect foliage, young shoots, inflorescences and fruit of guava.
- Typical symptoms associated with this disease include distortion, defoliation, reduced growth and if severe, mortality.
- On fully expanded leaves, dark bordered, roughly circular brown lesions with yellow halos develop.

**Management:**

🍉Spraying with Mancozeb 0.2% or Copper oxychloride 0.2%

# 3. Wilt

**Etiology:** ***Fusarium oxysporum* f.sp. *psidi***

Mycelium is white or pink with a purple tinge.

Pathogen produces microconidia (oval to ellipsoid),

macroconidia and chlamydospores.

**Symptoms:**

- Leaves turn pale green, yellow to reddish discolouration, premature shedding of leaves.
- Discolouration of the stem and death of the branches along one side
- Diseased plants fail to produce new flush and flowers.
- Fruits produced in the affected plants are very small.

Rotting of roots at the basal region.

- Bark turn light brown and plants dries within a year.

**Epidemiology:**

Disease incidence is higher during monsoon season.

Severe in alkaline soil.

**Management:**

- Removal of infected branches, uprooting of wilted plants.
- Application of green manure and oil cake.
- Avoid low lying area and water logging.
- Soil should be treated with lime or gypsum to correct the pH.
- Use resistant varieties.

# 4. Stem canker

Etiology: ***Physalospora psidii.***

Perithecia is glabrous with a fleshy wall. Ascospores are hyaline, narrow, ellipsoid and one celled. Conidia are single celled, ovoid with a rough wall. Pycnidia are produced in stem and fruits by the pathogen.

Symptoms:

- Affected twigs show wilting and death.
- Cracks and lesions are formed along the stem which arrest the translocation of nutrients.
- Infected fruits turn dark brown to black and dries up resulting in die-back symptoms.

**Mode of spread and survival:**

Pathogen remains in the infected tissues beneath the bark and become active under favourable conditions.

**Management:**

- Removal and destruction of the infected stem and branches.
- The cut-ends are painted with Bordeaux paste.
- Spraying the trees with Copper oxychloride **0.2** per cent after pruning reduces canker incidence.

# Red rust

Etiology: *Cephaleuros virescens*

Symptoms:

- The alga produces specks to big patches on the leaves.
- They may be crowded or scattered.
- The pathogen extends between cuticle and epidermis and penetrates the epidermal cells.

Mode of spread and survival:

The disease is more common on closely planted mother plants.

The zoospores cause the initial infection. High moist condition favours the development of fruiting bodies of the alga.

## Management:

This algal disease is controlled by spraying with Bordeaux mixture 0.6 % or copper oxychloride 0.1% or lime sulphur.

# Sapota

## Important disease in Sapota

1. *Phaeopleospora* leaf spot : ***Phaeopleospora indica***
2. *Pestalotiopsis* leaf spot – ***Pestalotiopsis versicolor***
3. Flat limb – ***Botryodiplodia theobromae***
4. Sooty mould: ***Capnodium* spp.**

Minor:

1. Dry rot
2. Soft rot
3. Fruit rot

# Phaeopleospora leaf spot

**Etiology:** ***Phaeopleospora indica***

Symptoms:

- Small, circular, pinkish to reddish brown, conspicuous spots with whitish center on matured leaves.
- Spots coalesce and leaves drop prematurely.

**Epidemiology:**

Pathogen grows best at 25 °C and 90% RH. More severe during October – December. Susceptible varieties are Cricket ball, Kirthibarthi.

**Management:**

- Avoid susceptible varieties.
- Spraying of Zineb@0.2% or Ziram@0.2% or Copper oxychloride 0.25%.


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# Pestalotiopsis leaf spot

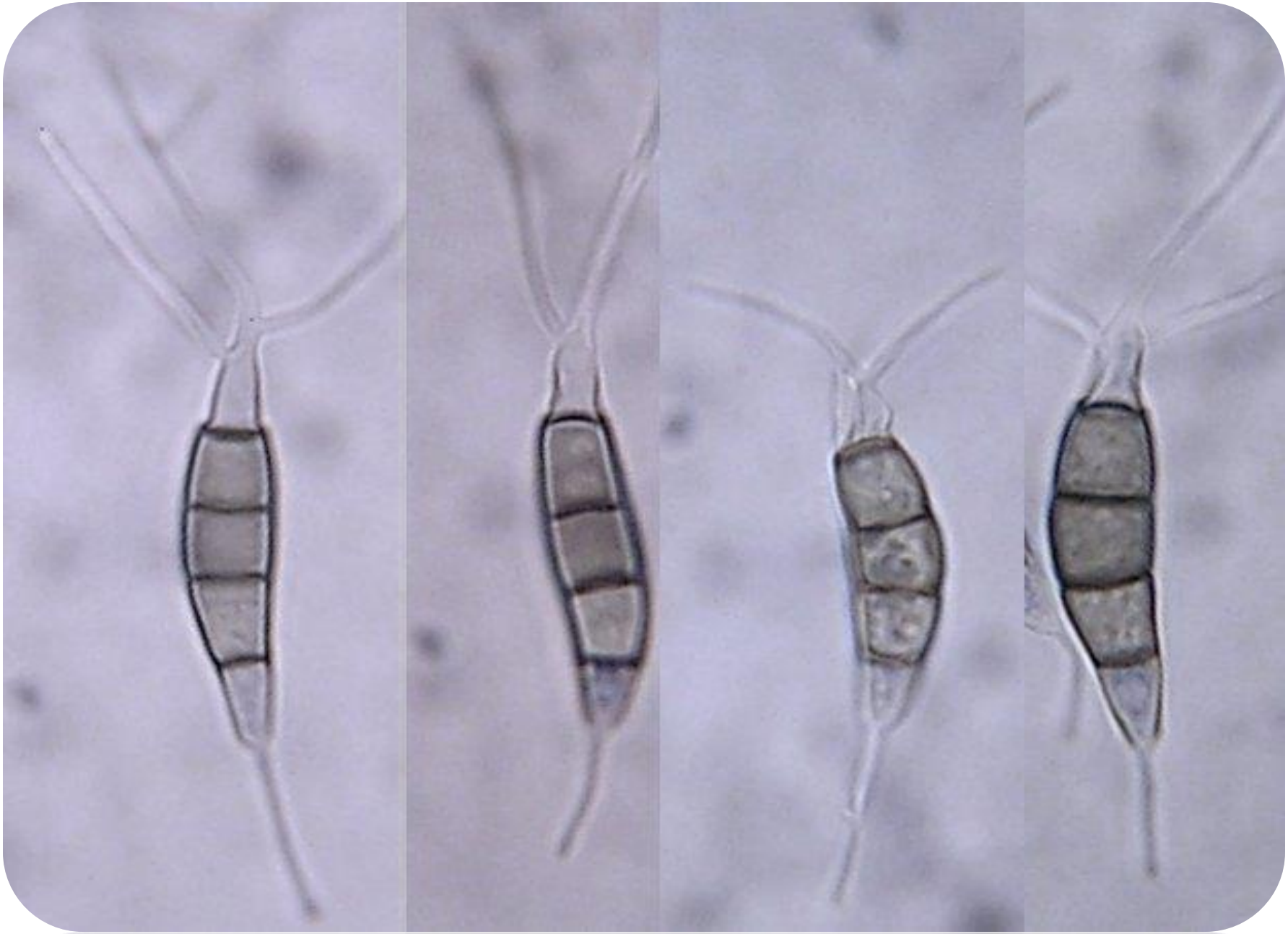
**Etiology:** ***Pestalotiopsis versicolor***

**Symptoms:**

- Small, reddish brown specks on leaf lamina.
- Spots enlarge, become circular measuring 1 to 3 mm in diameter.
- Fully developed spots show grayish centre and dark brown to reddish margin.
- Minute black fruiting bodies (pycnidia) are seen in the center of the spots.

**Management:**

- Spraying of Zineb @ 0.2%.



# Flat limb

**Etiology:** ***Botryodiplodia theobromae***

Fungus produces pycnidia. Conidia are hyaline, thin walled initially later becomes thick walled and dark brown. They are two celled.

**Symptoms:**

- Branches of affected trees become flat and twisted.
- Leaves become thin, small and yellow.
- Cluster of leaves and flowers are seen on the affected twigs.
- Flowers remain infertile.
- Fruits are undersized, hard and fail to ripen.
- Foliage and fruits fall prematurely.

## Management:

- Pruning of affected branches followed by Captan or Zineb (0.3%) spray.

# Sooty mould

Etiology: ***Capnodium* spp.**

The pathogen produces sooty black growth on the leaf surface. This disease reduces the photosynthetic activity of the tree.

# Dry rot

**Etiology:** ***Fusarium solani***

Mycelium is greyish white. Microconidia are hyaline, cylindrical-wedge shaped and 1-septate. Macroconidia are cylindrical to falcate and multiseptate.

Chlamydospores are globose to oval, smooth to rough walled and intercalary or terminal.

**Symptom:**

Infected stems produce brown to black colour with disintegration of tissues at soil level.

Affected plant dies.

**Management:**

Balanced nutrition of host.

Application of organic manure.

# Soft rot

**Etiology**: ***Pestalotiopsis mangiferae***

Mycelium is branched and septate. Acervuli are black, globose to sub-globose. Conidiophores are short and simple. Conidia are fusiform, 4-septate. Middle three cells are dark brown. End cell is hyaline and pointed.

**Symptom:**

- The disease appears as water-soaked spots covering the entire fruit within 3 to 4 days.
- Rotten fruits become soft and dark brown and later numerous acervuli are seen in rotted zones.
- The fungal colonies are yellowish white.

# Pomegranate

## Important disease in Pomegranate

1. *Cercospora* leaf spot : *Cercospora punicae*
2. Bacterial blight : *Xanthomonas axonopodis* pv. *punicae*
3. Leaf spot : 5 pathogens

Minor:

1. Canker
2. Fruit spots (2)
3. Fruit rots (7)
4. Leaf and fruit spot
5. Flower and fruit spot.

# Cercospora Leaf Spot

Etiology: ***Cercospora punicae.***

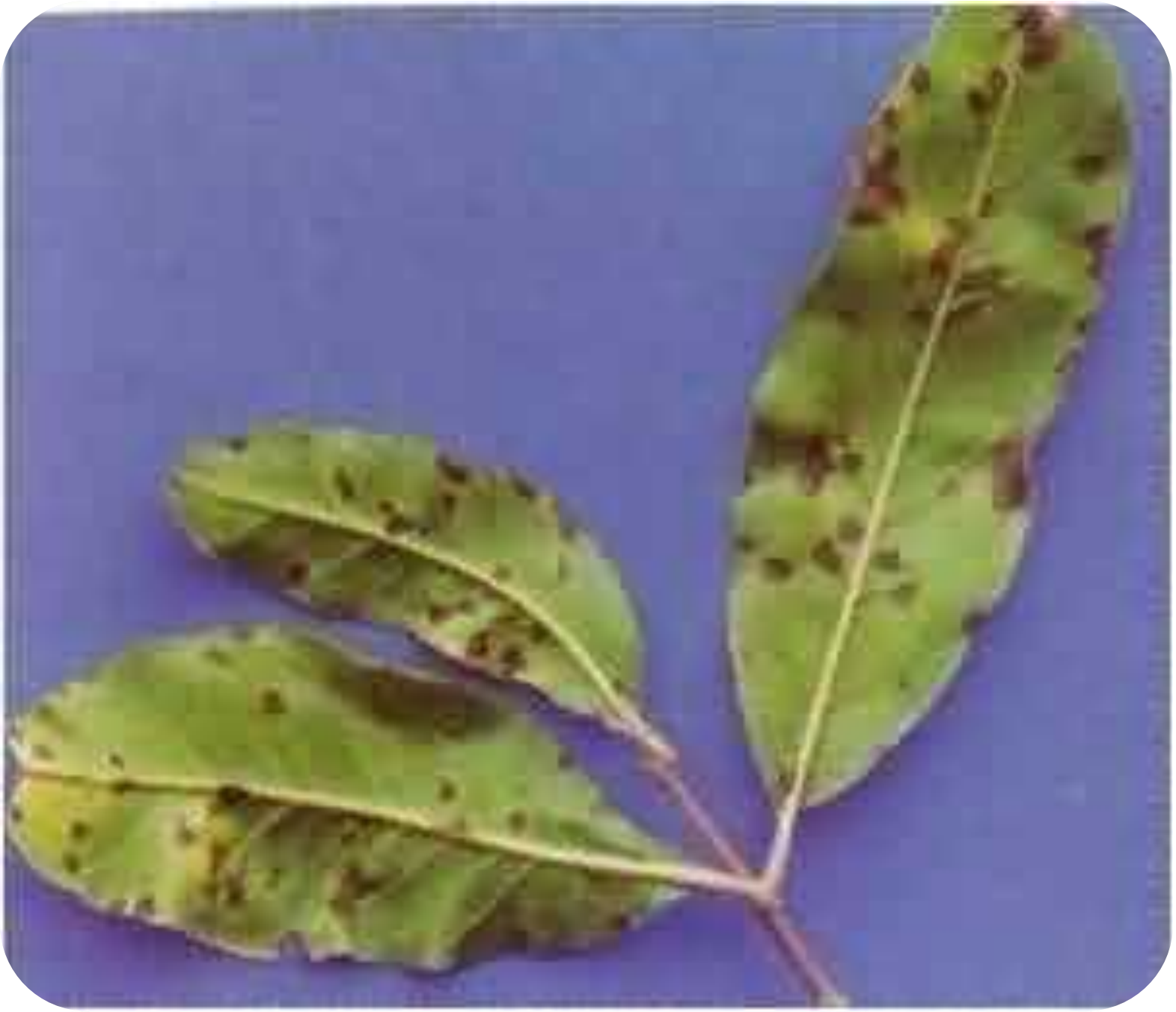
Conidiophores are olivaceous brown, short, fasciculate, sparingly septate. Conidia are hyaline to pale olivalceous cylinderic and septate.

Symptom:

Light brown zonate spots appear on the leaves and fruits. Black and elliptic spots appear on the twigs. The affected areas in the twigs become flattened and depressed with raised edge. Such infected twigs dry up. In severe cases the whole plant dies.

Mode of spread and survival:

The pathogen spreads through wind-borne conidia



**Epidemiology**: The disease is serious during Sep-Nov.

**Management:**

The disease can be effectively controlled by pruning and destruction of diseased twigs followed by spraying with Thiophanate-methyl 0.1 per cent or Chlorothalonil 0.2 per cent or Mancozeb 0.2 per cent.

# Bacterial leaf spot / Blight

Etiology: ***Xanthomonas axonopodis* pv. *punicae***

It is a Gram-negative rod, motile with single polar flagellum. It is non-acid fast and aerobic.

Symptoms:

Small , irregular, water-soaked spots appear on the leaves.

Spots are translucent, later turn light brown to dark brown and are surrounded by prominent water-soaked margins. Spots coalesce to form large patches.

Severely infected leaves fall off. The bacterium attacks stems, branches and fruits also.

On the stem, the disease starts as brown to black spots around the nodes which leads to girdling and cracking of nodes. Branches break down.

Brown to black spots appear on the pericarp with L or Y shaped cracks.

The spots on fruits are raised and oily in appearance.

**Mode of spread and survival:**

The bacterium survives on the tree. The pathogen survives for 120 days on the fallen leaves during off season. The primary infection is through infected cuttings. The disease spreads through wind splashed rains.

Epidemiology: High temperature and low humidity favour the disease

Management:

🍎Spraying Agrimycin 100 ppm (Streptomycin + Tetracycline) or Bordeaux mixture 1.0 % controls the disease

# Leaf spots (Many Fungi)

**a)*Colletotrichum gloeosporioides***

**Symptom:**

The disease appears as small, regular to irregular dull violet or black spots on the leaves.

These spots are surrounded by yellow margins. The infected leaves turn yellow and drop off.

**Mode of spread and survival:**

The pathogen spreads through wind-borne conidia.

**Epidemiology:**

The disease is severe during August-September when there is high humidity and the temperature between 20 and 27$^{C}$C.

**Management:**

The disease is effectively controlled by spraying with Carbendazim 0.1 per cent or thiophanate-methyl 0.1 per cent or Mancozeb 0.2 per cent at fortnightly interval.

**b) *Sphaceloma punicae***

**Symptom:**

The disease attacks leaves, shoots, calyx and fruits. Rusty spots appear on leaves. Infected leaves turn yellow and die. Rusty coloured pustules appear on fruits.

**Epidemiology:**

Drizzling rains and abundant dew favour disease development and spread.

**Management:**

Spraying with Thiophanate-methyl 0.1 per cent or Carbendazim 0.1 per cent controls the disease.

**c) *Fusarium fusarioides***

Symptom:

The disease appears as minute specks towards the leaf margin. The spots are brown, circular to irregular in shape. Later the spots coalesce and form big dark brown necrotic blotch.

**d) *Phomopsis aucubicola***

Hyphae of the fungus are colourless, poorly branched, septate. Pycnidia are densely gregarious, black, immersed, globose to sub-globose, dark brown to black and ostiolate. Conidiophores are simple, short, unbranched and hyaline.

Symptom:

Buff-brown spots appear on the margins. Sometimes spots are formed scattered on the leaves. Black pycnidia are found on the spot in the upper surface of the leaf.

**e) *Drechslera rostrata***

The fungus produces conidia which are pale to dark olivaceous brown, cylindrical , less curved.

Symptom:

Numerous, small, black spots scattered all over the fruit. Margin of the spots varies from dark green to orange in colour. Spots gradually enlarge and coalesce to form big dark spots of various sizes. Mild infection is confined to rind of the fruit but severe infection extends to the inner tissues and even to the seeds, showing ashy discolouration.

# Annona

## Important disease in Annona

1. Fruit rot : *Trichothecium roseum*
2. Fruit rot : *Glomerella cingulata*

# 1. Fruit rots

**a) *Trichothecium roseum***

**Symptom:**

- White cottony net work of mycelium was detected on the rough surface of the fruit.
- Within 6 to 10 days, the entire outer surface and the inner tissues are covered with mycelium.
- Later on as the mycelium spreads, it started changing from white to pink and in course of time the entire outer and inner surfaces are converted into pinkish mass within 15 days of infection.
- Infected fruits never ripened even after a long period of time and simultaneously it also started decaying.

# 2. Fruit rot

**b) *Glomerella cingulata***

**Symptom:**

- Blackish brown spot occur at blossom end, spreads and cover entire fruit.
- Affected fruits shrivel, dry and may be retained in the tree or fall down later.

**Management**: Spraying with Bordeaux mixture 0.5 % controls the disease.

# Jack

## Important disease in Jack

1. Die-back : ***Botryodiplodia theobromae***
2. Fruit rots **:** ***Rhizopus artocarpi***
   **R.** ***nigricans***
   ***Phytophthora palmivora***

**Minor:**

1. Leaf spots : (Many fungi)
2. Rust : ***Uredo artocarpi***
3. Pink disease **:** ***Botryobasidium salmonicolar***

# Die-back

**Etiology:** *Botryodiplodia theobromae*

**Symptoms:**

- The most of die-back becomes evident by discolouration and darkening of the bark some distance from the tip.
- The dark area advances and young green twigs start withering first at the base and then extending outwards along the veins of leaf edges.

- The affected leaves turn brown and their margin roll upwards.
- At this stage, the twig or branch dies, shrivels and falls.
- There may be exudation of gum from affected branches.
- Such branches are often affected by shoot borers.
- Infected twigs show internal discolouration.

**Management:**

- Pruning of infected twigs.
- Spraying of Carbendazim 0.1% or Thiophanate-methyl 0.2% or Chlorothalonil 0.2%.
- Controlling shoot borers and shot-hole borers by suitable insecticides is also important in reducing die-back disease.

# Fruit rots

## a) *Rhizopus artocarpi*

**Symptom:**

- It causes premature fall of young fruits due to rotting.
- Young fruits and male inflorescences are badly attacked by the fungus and only a small percentage of the fruits reach maturity.
- Female inflorescence and matured fruits are not usually attacked.
- The disease is a soft rot. A large number of the affected fruits fall off early.
- During first stage the fungus appears as a greyish growth with abundant mycelia which gradually becomes denser forming a black growth.

➢The fungus gradually advances until the whole fruit or the entire inflorescence rots and falls off.
➢The disease is severe in very humid conditions.

**Management:**

- Spraying the young fruits with Captan 0,2 % or Bordeaux mixture 1.0 % or Copper oxychloride 0.25 % at an interval of three weeks during the months of January, February and March is effective in controlling the disease.
- Spraying Mancozeb 0.2 % or Carbendazim 0.05 % or Copper oxychloride 0.2 % at 15 days interval during fruit growth.

**b) *Rhizopus nigricans***

Symptom:

- The fungus causes premature fall of fruits.
- The rot is more severe during humid conditions.

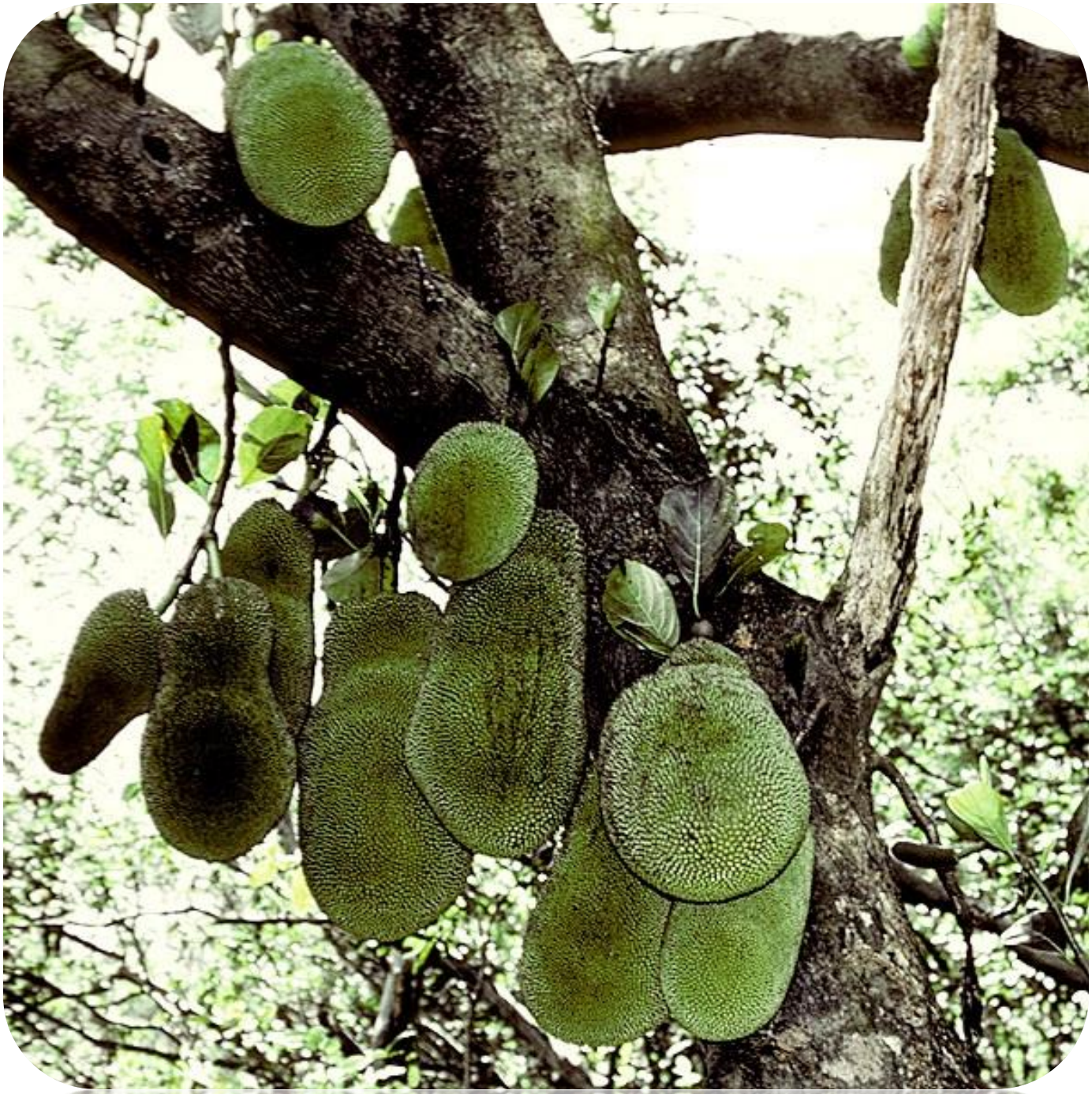
Management:

- Spraying with Benomyl 500 or 1000 ppm

**c) *Phytophthora palmivora***

Symptom:

- Infection takes place through hole or wounded skin.
- Water-soaked lesions occurs in 48 to 78 hours after inoculation.
- They enlarge to form light brown spots with sporulating hyphae near the edge.
- Affected fruits develop soft rot.



# Minor Disease – Jack Fruit

Leaf spots : ***Phyllosticta artocarpina***
***Pestalotiopsis elastica***
***Colletotrichum gloeosporioides***
Rust : ***Uredo artocarpi***
Pink disease **:** ***Botryobasidium salmonicolor***