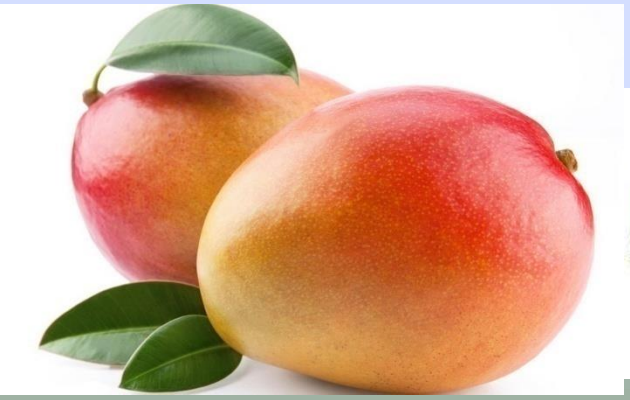
MANGO



Important Diseases in Mango

1. Anthracnose : ***Colletotrichum gloeosporioides***
2. Powdery Mildew : ***Oidium mangiferae***
3. Mango malformation : ***Fusarium moniliforme*** var. ***subglutinans***
4. Stem end rot : ***Diplodia natalensis***
5. Die-back : ***Botryodiplodia theobromae***
6. Red rust : ***Cephaleuros mycoides***
7. Grey blight : ***Pestalotia mangiferae***
8. Sooty mould : ***Capnodium mangiferae***
9. Bacterial canker : ***Xanthomonas campestris*** **pv. *mangiferae-indicae***
10. Giant Mistletoe **: *Loranthus***

1. Anthracnose

Blossom blight, Leaf spot, Fruit rot, Twig blight, Wither tip, Fruit russeting

Etiology: ***Colletotrichum gloeosporioides***

- **Mycelium -** septate and coloured.
- **Acervuli** develop profusely on diseased parts.
- Acervuli when matured ,release pink masses of conidia under moist conditions.
- **Conidia** are borne on hyaline conidiophores.
- Conidia -single celled, hyaline, cylindrical or oval with two oil drops.

Symptom:

- The disease appears on young leaves, stem, inflorescence and fruits.
- Leaves brown or dark circular or irregular spots. The affected leaf tissues dry and fall off.
- The infection spreads to the green twigs and forms dark brown lesions.
- Often, black necrotic areas develop on the twigs from the tip downwards causing a dieback.
- In humid weather, minute, black dots develop on the floral organs.

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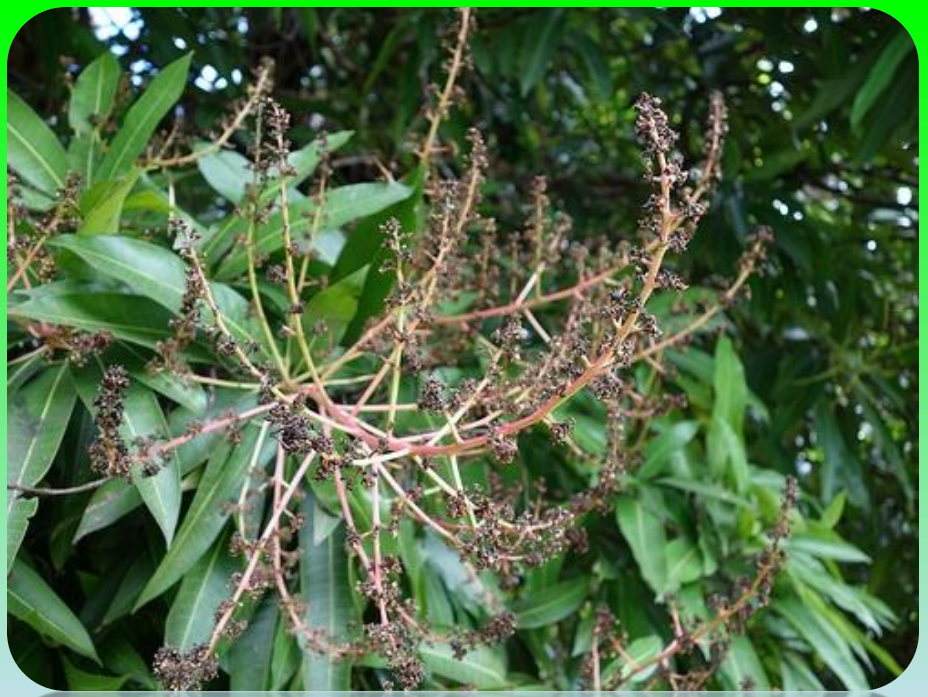
Symptom:

- The infected flower-parts ultimately wither.
- Tender fruits turn black and fall off.
- The ripening fruits show typical anthracnose.
- Black spots appearing on skin of the affected fruits gradually become sunken and coalesce.
- Finally softening and rotting of fruits.
- Pinkish fructification will be seen on the fruits.
- Latent infections of fruit are established before harvest.
- It also occurs during transit and storage.



Mode of spread and survival:

- The primary survival of pathogen is in the diseased twigs, on dried leaves, defoliated branches, mummified flowers and flower brackets.
- The secondary spread is through airborne conidia.
- The disease spreads rapidly in the rainy season.
- Contact with diseased fruit during transport and storage.

Epidemiology:

Optimum weather condition is 25°C and Relative Humidity 95-97%. Acervuli are abundant on dead twigs and 80% of the spores are viable.

Management:

- Pruning of infected twigs.

- Spraying of Bordeaux mixture 0.6% during Febrauary, April and September.

- Spraying of Carbendazim 0.1% / Thiophanate methyl 0.1% / Chlorothalonil 0.2% at 15 days interval until harvest.

- Fruits may be exposed to ammonia/sulphur dioxide/carbon dioxide gases to prevent the disease.

- Spraying of Copper oxy chloride + zineb after completion of heavy showers followed by wettable sulphur 0.2% before flowering and carbendazim 0.1% at 15 days interval from fruit formation stage.

- Spray *P. fluorescens* (FP 7) at 3 weeks interval commencing from October at 5g/lit on flower branches.

- Before storage, treat with hot water (50-55°C) for 15 minutes or dip in Benomyl solution (500ppm) or Thiobendazole (1000ppm) for 5 minutes

Powdery Mildew

Powdery mildew is one of the most serious diseases of mango affecting almost all the varieties.

Etiology:

Oidium mangiferae (Acrosporium mangiferae)

Mycelium is hyaline, branched and ectophytic.

Haustoria are present in epidermis.

Conidiophores short, hyaline and conidia single celled, barrel shaped, produced singly or rarely in chain.

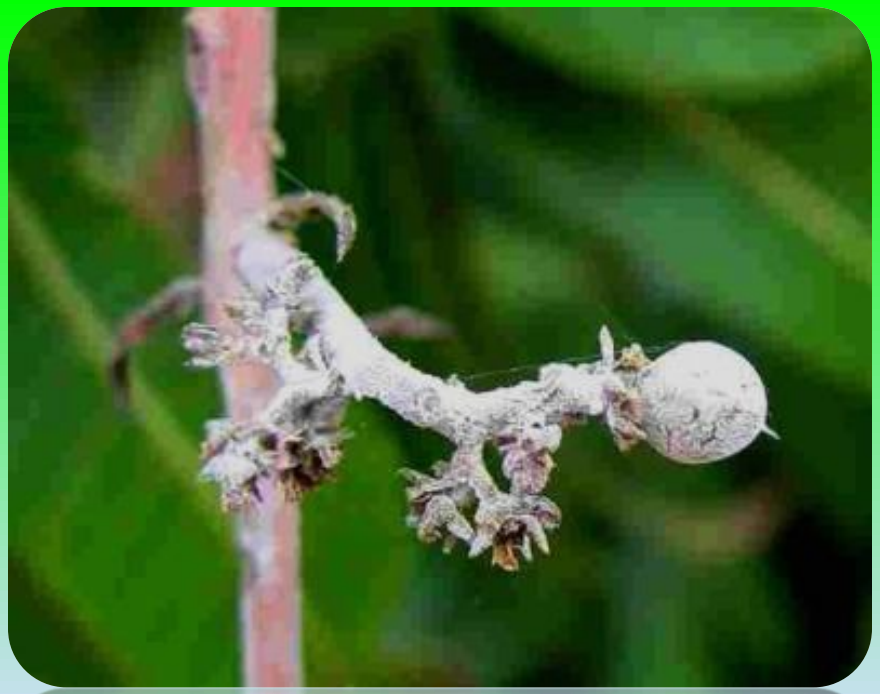
Symptoms :

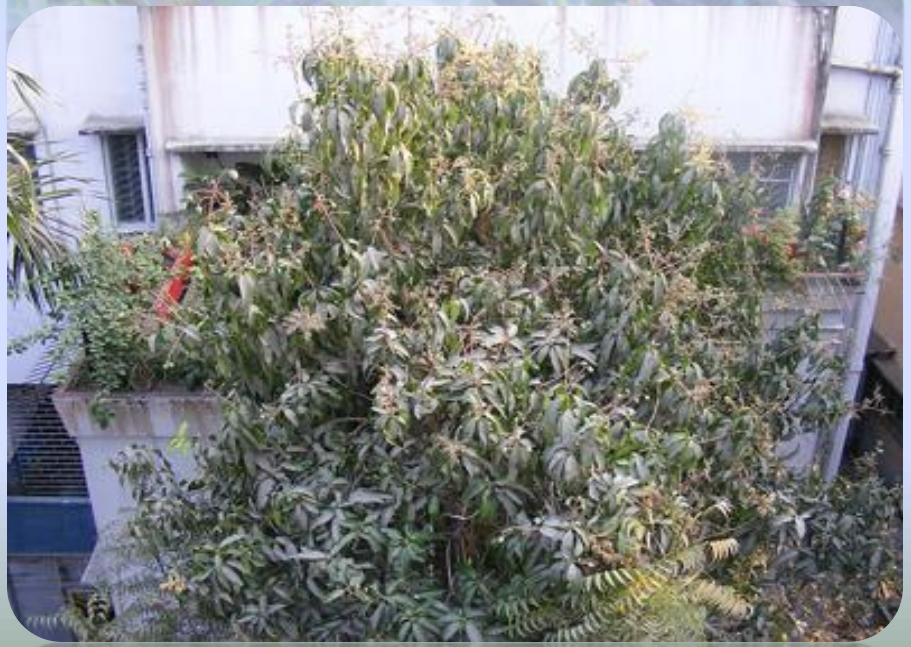
- The characteristic symptom of the disease is the white superficial powdery fungal growth on leaves, stalk of panicles, flowers and young fruits.

- Shedding of infected leaves.

- The affected flowers and fruits drop pre-maturely reducing the crop yield considerably.

- In severe cases, the loss in yield may be upto 20%.





Mode of spread and survival:

- Survives as dormant mycelium in affected leaves.
- Secondary spread by air borne conidia.

Epidemiology:

- Rain or mist in daytime accompanied by cooler nights during flowering are congenial for the disease spread.
- High wind velocity for 3 – 4 days with maximum temperature (30^0C), minimum temperature (15^0C) and max. RH 73 – 84 % min. of 23 – 26 % are conducive for quick spread.

Management:

- Dusting the plants with fine sulphur (250-300 mesh) at fortnightly interval (before flower opening and repeat for two times.

- Spraying with Wettable sulphur (0.2%) or Carbendazim (0.1%) or Tridemorph (0.1%) or Karathane (0.07%).

- Addition of sticker like Teepol @ 1 ml/lit to the fungicidal solution is essential to increase the effectiveness of the fungicide.

Mango malformation

Etiology:

Fusarium moniliforme var. subglutinans

Micro conidia are one or 2 celled, oval to fusiform.
Macro conidia are rarely produced. They are 2 -3 celled and falcate.
Chlamydospores are not produced.

Etiology of the disease still remains difficult to understand.

Symptoms:

(i) Bunchy top phase: In bunchy top phase ,in nursery ,appears at 4-5 months stage. Bunch of thickened small shoots, bearing small rudimentary leaves. Shoots remain short and stunted giving a bunchy top appearance.

(ii) Vegetative malformation: excessive vegetative branches of limited growth in seedlings. They are swollen with short internodes forming bunches of various size and the top of the seedlings shows bunchy top appearance.

(iii) Floral malformation: Malformation of inflorescence, shows variation in the panicle formation. Malformed head dries up in black mass and persist for long time. Secondary branches are transformed into number of small leaves giving a witches' broom appearance.

Mode of spread:

Diseased propagative materials.

Epidemiology:

The disease is serious in northwest region.

Temp. of 10 – 15^0 C during December – January.

4-8 year old trees are highly susceptible.

Management:

- Diseased plants should be destroyed.
- Use of disease free planting material.
- Incidence can be reduced by spraying 100-200ppm NAA during October.
- Pruning of diseased parts along the basal 15-20 cm apparently healthy portions followed by the spraying of Carbendazim (0.1%) or Captafol (0.2%).

Stem end rot

Etiology:

Diplodia natalensis

The fungus produces brown to black, globose to sub globose, pyriform, erumpent pycnidia that are ostiolate.

Two types of conidia are produced within a pycnidium.

One is hyaline, thin walled and unicellular.

The another one is thick walled, olive brown and two celled with four to six longitudinal striations.

Symptoms:

- The onset of die-back becomes evident by discolouration and darkening of the bark some distance from the tip.
- The dark area advances and the green twigs starts withering first at the base.
- The affected leaves turn brown and its margin rolls upward.
- Twigs and branches dies, shrivels and falls.
- Brown streaking of vascular tissues seen on splitting the twigs lengthwise.

Symptoms:

- The fungus also infects fruits. Infected fruit pericarp darker near the pedicel.
- Under humid atmosphere extends rapidly and the whole fruit turns completely black within two or three days.
- The pulp becomes brown and soft.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Mode of spread and survival:

The fungus persists in infected plant parts which serve as source of inoculum.

Epidemiology:

RH > 80%, temp. of 25 – 31^{0}C and rain favours the disease development.

Management:

- Prune and destroy infected twigs and spray Carbendazim or Thiophanate Methyl(0.1%) or Chlorothalonil (0.2%) as fortnightly interval during rainy season.
- Dip fruits in 6% Borax solution at 43 ^{0}C for 3 min.

Red-rust

Etiology: ***Cephaleuros virescens***

After the vegetative growth it develops its reproductive structures. Certain cells become sporangia.Two types.

1. Sporangia formed directly on the thallus are sessile and thick walled with orange pigments. They are formed singly on the vegetative filaments.
2. Some are produced above the surface on special sporangiophores swollen into a vesicle at the tip (3-6 sporangia / vesicle).
3. When the sporangia are ripped the contents are converted into zoospores and liberated through an opening in the wall.
4. The zoospores are orange in colour, ovoid and swim actively by means of cilia.

Symptoms:

- Algae attacks foliage and young twigs.
- Rusty spots appear on leaves, initially as circular, slightly elevated, coalesce to form irregular spots.
- The spores mature fall off and leave cream to white velvet texture on the surface of the leaves.

Epidemiology:

The disease is more common on close plantation. High moist condition favours disease development. The zoospores formed by the sporangia initiate fresh infections.

Management:

 Spray Bordeaux mixture (1.0 %) or Copper oxychloride 0.25%

Grey Blight

Etiology: ***Pestalotia mangiferae***

- Acervuli seen as minute black dots on affected portion. Mycelium is colored and septate.
- Conidia five celled , upper two cells are slightly darker.
- 3-5 appendages are produced at the apex of the spore.

Symptoms:

- Brown spots develop on the margin and at the tip of the leaf lamina.
- They increase in size and become dark brown.
- Black dots appear on the spots which are acervuli of the fungus.
- On matured green fruit, water soaked lesions are formed which enlarge rapidly and causes rotting of fruits in storage.

Mode of spread and survival:

Survive on mango leaves for over a year. Spreads through wind borne conidia.

Epidemiology:

Heavy infection is noticed during the monsoon when the temperature is 20-25˚C and high humidity.

Management:

- Remove and destroy infected plant parts.
- Spraying Copper oxychloride 0.25 % or Mancozeb 0.25% or Bordeaux mixture 1.0%.

Sooty mould

Etiology: ***Capnodium mangiferae***

The fungus grows on the leaf surface on the sugary substances secreted by Jassids, Aphids and scale insects.

Symptoms:

- The fungi produce mycelium which is superficial and dark.
- The fungus grows on the leaf surface, flowers, stems and fruits.
- Black encrustation is formed which affect the photosynthetic activity.
- Fruit set is affected.
- Black coating is also found on the fruits , quality is reduced.


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Mode of spread and survival: Diseased leaves serve as primary inoculum.

Epidemiology: Severe in old and dense orchards. High humidity is congenial for the fungal growth. Heavy infestation with plant hoppers and the sugary secretion favours the disease

Management:

- Management should be done for insects and sooty moulds simultaneously.
- Spraying systemic insecticides like Monocrotophos or methyl dematon (3 ml/lit)
- After that spray with dilute solution of starch or maida (1kg Starch/Maida in 5 lit of water. Boil and dilute to 20 lit.).
- Spray Bordeaux mixture 1.0%.

Bacterial canker

Etiology:

Xanthomonas campestris* pv. *mangiferae-indicae

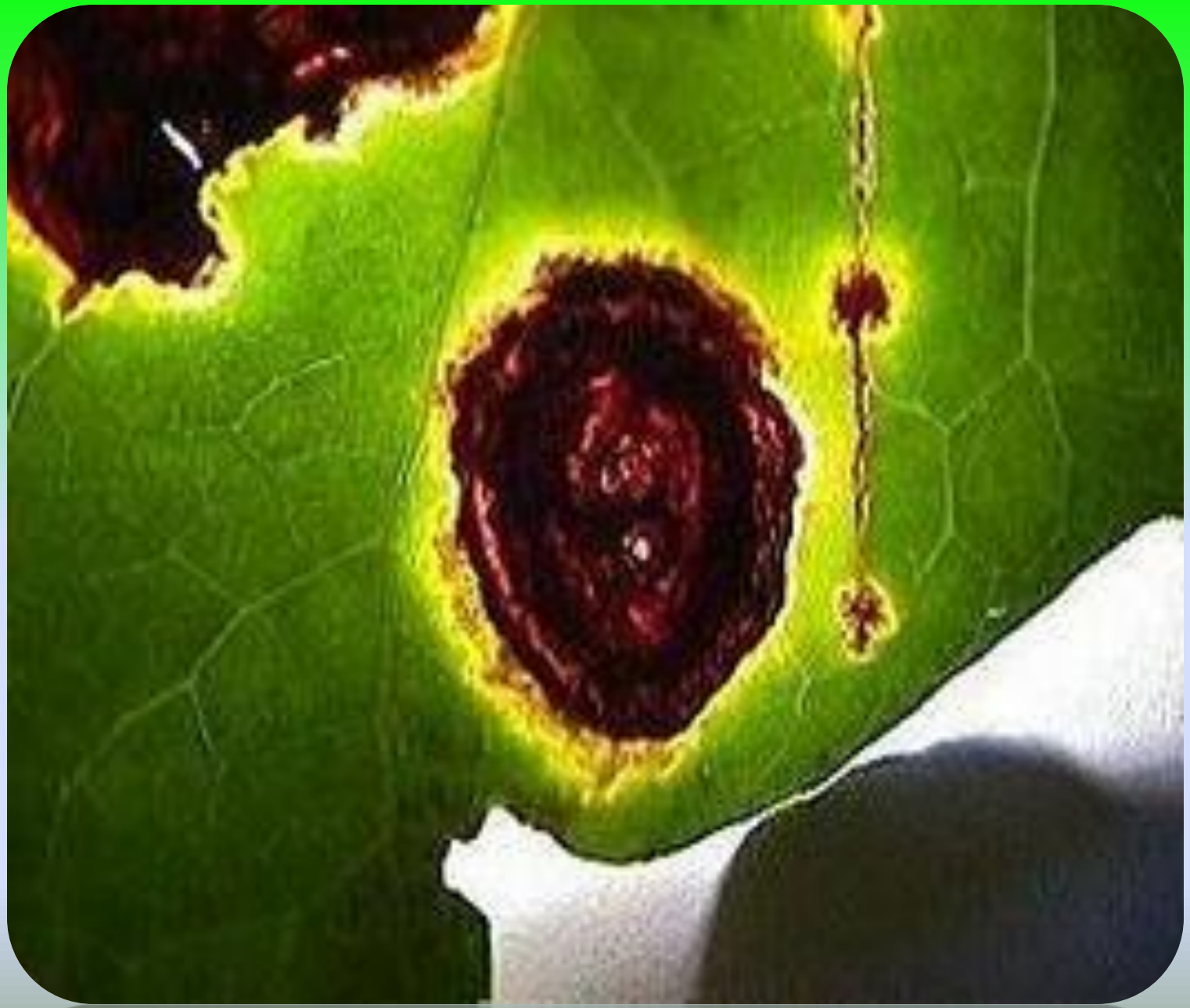
It is gram negative, rod shaped, monotirchos flagella.

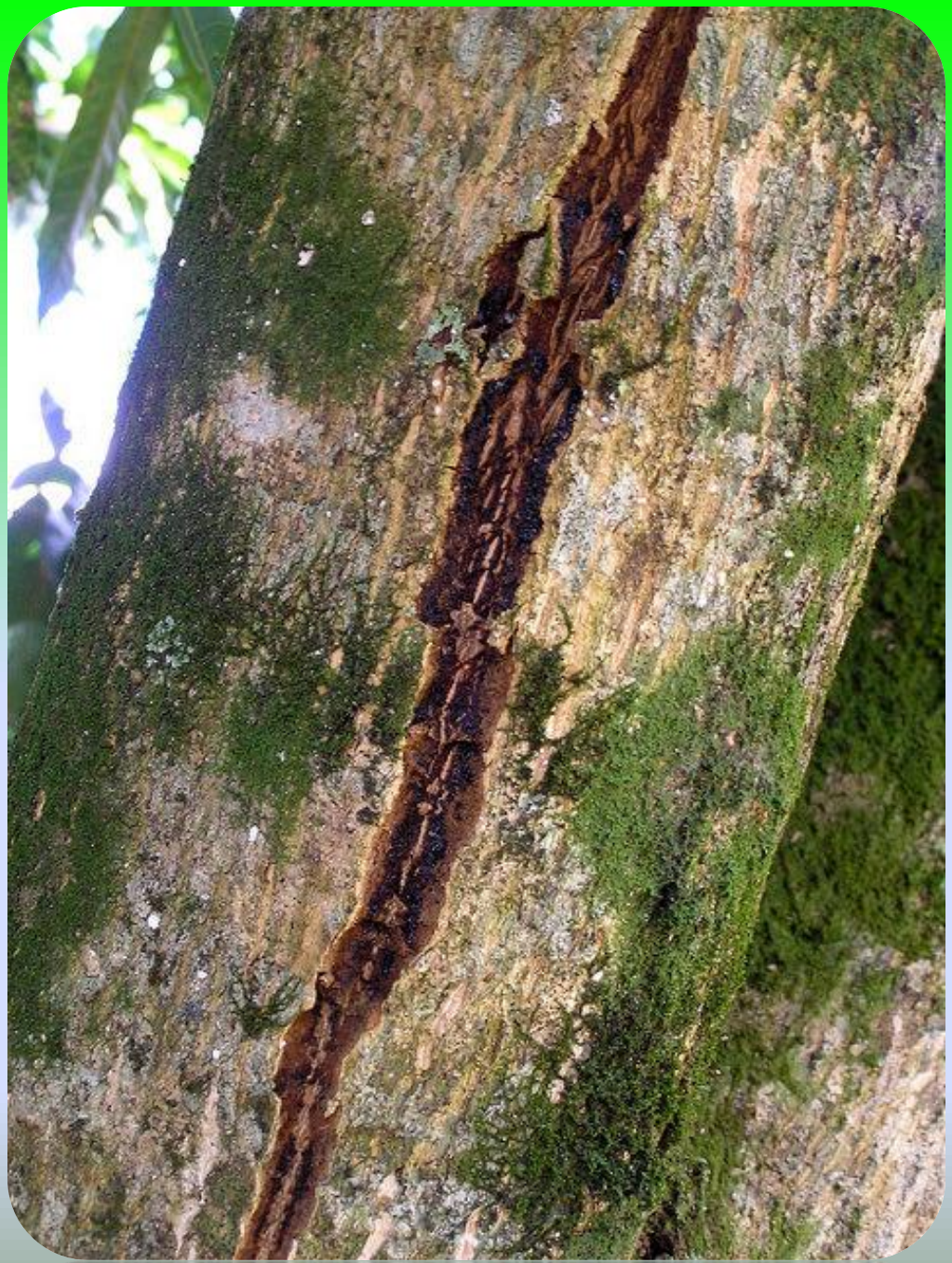
Symptom:

- It attacks leaves, leave stalks, stems and fruits.
- Initially water soaked irregular lesions develops.
- Then turn black and surrounded by chlorotic halo areas.

Due to vein limitation it develops into rough cankerous necrotic and raised lesions.

- In fruits also water soaked lesions first developed which later become dark brown to black and causes severe cracking of the fruit with bacterial gummy exudations.
- On branches and twigs the lesions become raised with longitudinal fissures along with gummy ooze.





Mode of spread and survival:

Bacterium survives in infected parts of the tree. It can survives up to 8 months in the leaves. Bacteria from cankers on the twigs is the cause for primary infection of the fruits. Disease spread is more during rainy days. Spreads to new area through infected planting materials.

Epidemiology:

Disease spread is rapid during rainy seasons.

Management:

- Use certified seedlings.
- Two sprays of Streptocycline 200 – 300 ppm at 20 days interval reduces the fruit infection.
- Dipping the fruit in 200 ppm solution of Agrimycin 100 is effective.

Giant Mistletoe

Etiology: **Loranthus**

Dendrophthoe parasiticus, D. philippensis

•It is a phanerogamic (flowering) parasite ,parasitizes slender branches of the host by bulged haustoria which serve as absorbing organ.

• It derives its nutrients and water from the host and makes the branch to die.

• Severely infected trees weakened and their productivity is lowered.

• Sometimes trees die.

Symptom:

- It parasitizes slender branches of the host tree at intervals by means of bulged haustoria which serve as absorbing organs.

- It derives nutrients and water from the host and make the host branches to die thereby leads to low productivity.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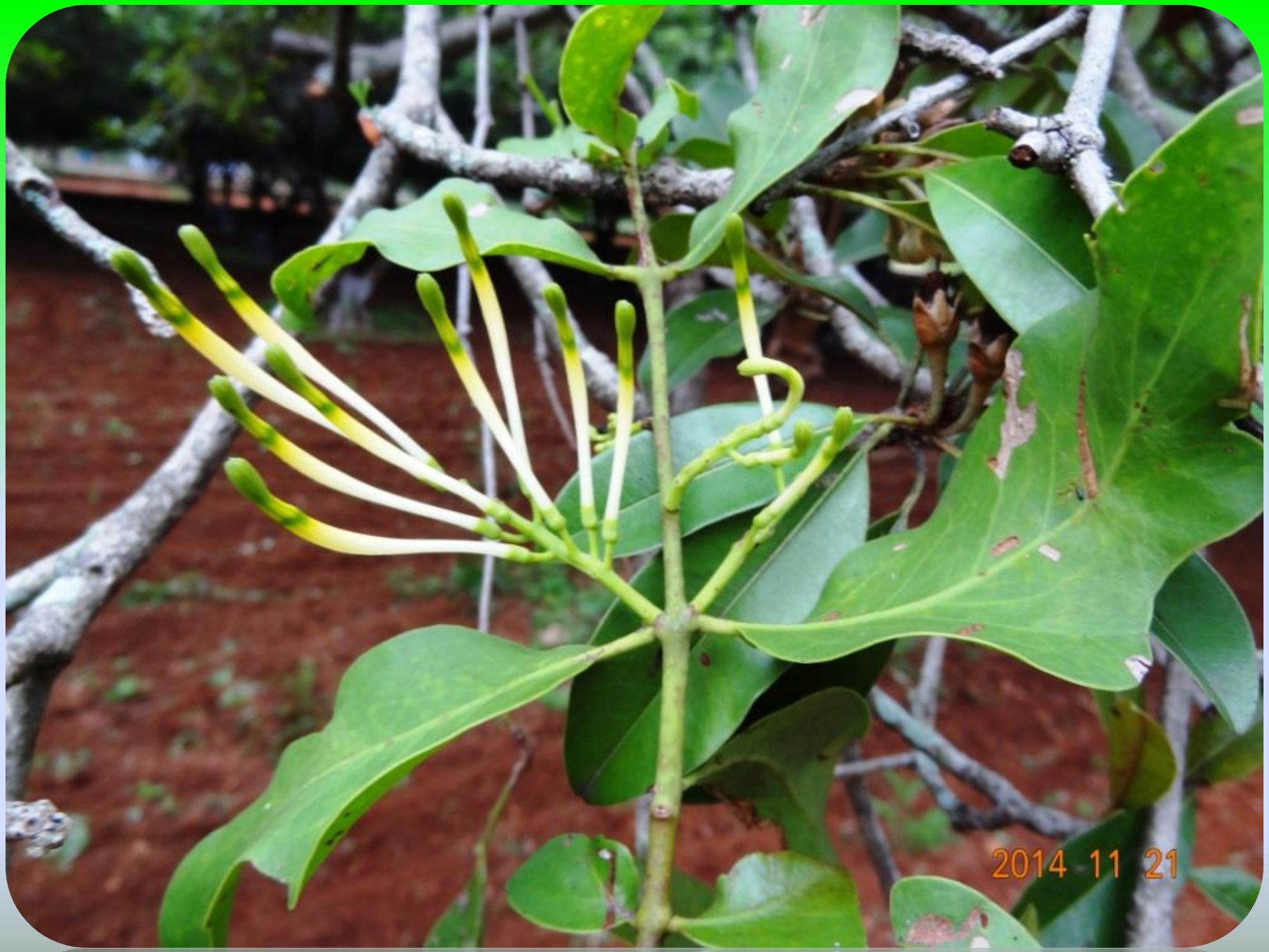
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Mode of spread and survival:

It survives in the host plant, produces enormous flowers and fruits. Birds eat the fruits and excrete the seeds on the branches of other trees. Seeds germinates and establish on the new host.

Epidemiology:

Trees in poorly maintained or neglected plantations are highly susceptible.

Management:

- Cut the parasite before berry formation.
- Cut the branches 2.5 cm below the point of attachment.
- Cut end should be protected with Bordeaux paste.


Thank you!