

A background image of a mango tree with green leaves and several ripe, reddish-orange mangoes hanging from the branches. The image is slightly blurred, focusing attention on the text overlay.

# DISEASES OF MANGO CROP

Session-9

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# ANTHRACNOSE

- **Economic importance:** Disease found in all mango growing state and it causes loss upto 13% in field and 40% -50% loss in post-harvest condition .

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- **Symptoms:**

- The fungus produces leaf spots, blossom blight, wither tip, twigs blight and fruit rot.
- On leaves initially circular, light yellow brown spots are produced which soon enlarge with dark brown to black margins.
- The disease spreads rapidly during rainy season and covers the tender twigs and floral axis causing them to turn black and become dry.
- If infection is severe individual spots coalesce leading to twisting of foliage and premature defoliation.
- On fruits Spots appear near the stem end as small brown areas that enlarge rapidly and become black.
- In some cases the areas involved are in the form of streaks running down from the stem end.
- Fruit pulp beneath the spots become hard followed by cracking and decay at ripening.
- Infected fruits may also drop off prematurely. The latent infection is carried from the field and develops further which causes rotting in the storage.
- Generally all varieties of mango susceptible to anthracnose .Neelum and Banglora variety are more susceptible.



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# ANTHRACNOSE ON MANGO LEAVES



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# ANTHRACNOSE ON MANGO PANICLE AND INFLORESCENCE







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# ANTHRACNOSE ON MANGO STEM AND FRUIT



Streaking symptoms in fruit





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# ANTHRACNOSE ON MANGO FRUIT





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# CAUSAL ORGANISM

Causal organism: *Colletotrichum gloeosporioides*  
(sub.division: *Deuteromycotina*)

Perfect stage(teleomorph stage): *Glomerella cingulata*

- Mycellium consist of septate, branched and slightly dark coloured hyphae.
- The hyphae developed the fruiting body known as acervulus.
- The acervulus produce closely packed, single celled, colourless conidiophore that produce oval to oblong conidia on their tip.
- Conidia are non septated measuring about  $12-16 \times 4-6 \mu$  in dia. and some time possess oil globulase.
- Acervulus produce sterile hair like structure known as setae.



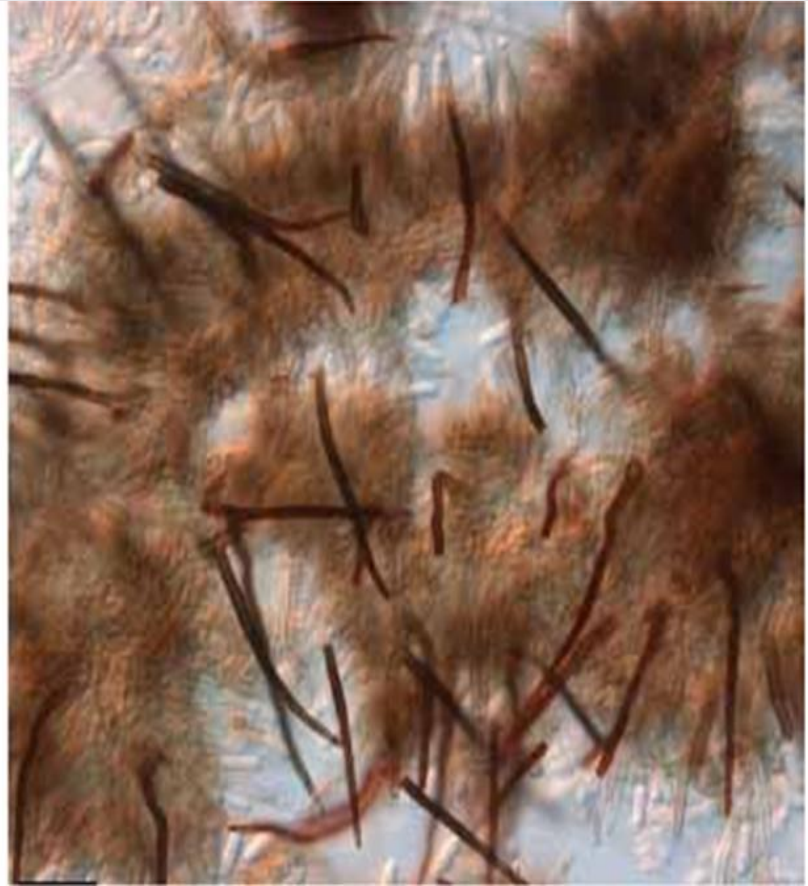


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# CONIDIA AND ACERVULLI



CONIDIA



ACERVULLI





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# DISEASE CYCLE

**Primary infection(P.I):** Mainly through previous season infected leaves, defoliated branches, mummified flowers and flower brackets.

**Secondary infection(S.I):** Mainly due to conidia driven rain splash or wind .

- **Favourable conditions:** Temperature of 25 °C and R.H 95-97%.Moist and humid condition favourable for the disease.
- **Management**
  - Avoid over-crowding of orchards.
  - Tree sanitation is important. Diseased twigs are to be pruned and burnt (along with fallen leaves.)
  - Spray carbendazim or Topsin M (0.1%) or Chlorothalonil (0.2% at 14 days intervals until harvest.
  - Before storage, treat the fruits with hot water (50-55 °C), for 15 minutes or dip in Benomyl solution (500ppm) or Thiobendazole (1000ppm) for 5 minutes control disease in storage condition.



# MANGO MALFORMATION

## **Economic importance:**

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- This is one of the severe diseases of mango and is important in North India.
- In A.P. this was first noticed in Aragonda village in 1971.
- In India it is known to occur in U.P., Maharashtra, Haryana, Bihar, Punjab and A.P. Particularly severe in U.P. causing much damage .
- In North-West India nearly 50% incidence on orchards were recorded.
- Where as in north-East and south the incidence may go up to 10%.
- Coastal areas are free from the disease.





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# SYMPTOMS

There are two types of symptoms namely **floral malformation** and **vegetative malformation**.

## **Vegetative malformation:**

- Vegetative malformation is more pronounced in young seedlings and seedling trees than in grafted plants.
- The affected plants develop excessive vegetative branches which are of limited growth, swollen and have short internodes.
- Sometimes the branches show a bunchy top appearance, compact leaves are formed in a bunch at the apex of shoot or in the leaf axil.
- The axillary buds of affected branch usually swollen in case of older plants but growth of the branch not impaired

## **Floral malformation:**

- The flowering panicles instead of coming out as a normal one into just compact bunch of hard flowers. Individual flower is greatly enlarged and has a large disc.
- The inflorescence gets hypertrophied. The percentage of bisexual flowers in malformed panicles is very low.



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# Floral malformation







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# Vegetative malformation





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# CAUSAL ORGANISM

**Causal organism: *Fusarium moniliforme var.subglutinans*.**

- Several biotic and abiotic factors are reported to cause mango-malformation such as physiological disorder, Eryophyid mite and virus.
- It is now established that the disease is caused by a fungal pathogen, *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.





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# DISEASE CYCLE

✓ **P.I:** Through malformed inflorescence

✓ **S. I:** Either by air borne conidia or by conidia carried by eriophid mite *Aceria mangiferae*.

## Epidemiology

- ✓ Younger plants are more susceptible, vegetative malformation reduces with growing age.
- ✓ Mild temp. (8-27 °C) and high RH > (85%) are conducive.
- ✓ The incidence of mango malformation has been found to vary from season studies have revealed that temperature is closely related with the variation in the incidence of mango malformation.
- ✓ The seasonal variation in temperature at the time of flowering was correlated with the intensity of malformation. The incidence of the disease is most severe in North-West region of India where mean temperatures preceding flowering is between 10-20 °C, sporadic at 20-15 °C and nil over 25 °C.
- ✓ This trend is also reflected in the world distribution of disorder and its incidence is mainly recorded where mean temperature during winter is less than 16 °C. However, the temperature does not appear to have a major role, once symptoms have appeared the panicles because affected panicles continue to grow producing excessive growth in dry hot summer.



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# Management Practices

1. It is advisable to avoid scion-stick from trees bearing malformed inflorescence for propagation. Indexing of healthy mango trees be done to serve as material for propagation.

2. Only certified saplings should be used for propagation.
3. As soon as the disease symptoms is expressed, the affected terminals should be pruned along with continuous 15 – 20 cm apparently healthy portion and burnt.
4. Healthy orchards located in disease prone pockets should be sprayed with fungicides like carbendazim (0.1%) as a prophylactic measure to avoid further recurrence of the disease.
5. Acaricide is also advocated if prevalence of mite is noticed.
6. Spraying of 200 ppm NAA in the first week of October is advocated followed by deblossoming at bud burst stage.
7. Early flower should be de-blossomed





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# POWDERY MILDEW OF MANGO

## Economic importance:

The disease is worldwide in distribution. Reported from India, Pakistan, Ceylon and South Africa. In India the disease is particularly destructive in U.P. Maharashtra and Karnataka severe particularly during the months of December-March, i.e. cooler months.

## Symptoms:

- The disease can easily be recognized by whitish or grayish powdery growth on the inflorescence and tender leaves.
- Generally the infection starts from the inflorescence and spreads downwards covering the floral axis, tender leaves and stem. Leaves become twisted, curled and defoliate.
- Infected floral parts are severely damaged and drop off. If the fruits are set, they do not grow in size and may drop before attaining pea size.
- Fruits are sometimes malformed, discolored due to severe mildew attack.
- Because of poor fruits set and heavy flower and fruits drop, the loss due to the disease may go as high as 70-80%.



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# POWDERY MILDEW SYMPTOM IN MANGO





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## Favourable conditions

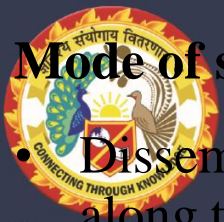
Disease spread is favoured by warm humid weather with cool nights.

**Pathogen:** **Causal organism:** ***Oidium mangiferae***

**P.S:** *Erysiphe polygoni* -(Rare) in India.

- Mycelium branched, hyaline, superficial, septate, haustoria lobate.
- Conidia hyaline, unicellular, elliptical, borne singly or rarely in chains of two, conidiophores simple, erect with two or more basal cells.





## Mode of spread:

- Dissemination is by wind and the progress of the disease in the orchard is along the direction of wind.

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- **Primary infection:** Through infected plant debris by conidia.

The pathogen survives in soil as Cleistothecia on infected plant debris and ascospores attack the lower most leaves.

- **Secondary infection:** Wind borne conidia of *Oidium mangiferae*.

## Management

- Can be controlled with two preventive sprays with wettable sulphur 0.3% once before the flowers open and 2nd after the fruit set.
- Dusting twice or thrice with fine sulphur will check the disease.
- Spraying with Karathane 0.1% before flowering and after fruit set (peanut stage).
- Resistant varieties: Neelum, Banglora, Torapari-khurd and Janardhan pasand



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# SOOTY MOULD AFFECTED LEAF, FLOWER AND FRUIT





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# SCAB AND STEM ENDROT OF MANGO

- Scab (*Elsinoe mangiferae*)

- Incidence(%): 6.45 – 11.80



- Stem end rot (*Diplodia natalensis*)

- Incidence(%): 18.25 – 23.30



- Management: Frequent sprays with COC (0.3%) to protect new flushes of growth are effective for scab control.





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# DIE BACK OF MANGO





# MANGO BACTERIAL CANCKER

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## Economic importance:

• Canker is a serious disease in India. The disease causes fruit drop (10-70%), yield loss (10-85%) and storage rot (5-100%).

- Many commercial cultivars of mango including Langra, Dashehari, Arnrपाली, Mallika and Totapuri are susceptible to this disease.

## Symptoms:

- The disease is found on leaves, petioles, twigs, branches and fruits.
- The disease first appears as minute water soaked irregular lesions on any part of leaf or leaf lamina.
- Several lesions coalesce to form irregular necrotic cankerous patches. In severe infections the leaves turn yellow and drop off.
- Cankerous lesions also appear on petioles, twigs and young fruits.
- The water soaked lesions also develop on fruits which later turn dark brown to black. They often burst open, releasing highly contagious gummy ooze containing bacterial cells.

**Causal organism: *Xanthomonas campestris* pv. *mangiferae* indica (gram –ve bacteria)**



# Cont.....

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## Mode of spread and survival:

- Infected nursery trees have been a major source of disease in new orchards.
- Bacterium enters the leaf through stomata , in fruit and twig through lenticels . The bacterium survives in infected parts on the tree.
- The pathogen survives up to 8 months in the leaves. Bacteria from cankers on the twigs are the cause for primary infection on the fruits.
- Disease spread is rapid during rainy days. Disease spread to the new area through infected planting material.
- When fruits are found in bunches disease spreads when they contact each other.

## Control:

- Three sprays of Streptocycline (0.01%) or Agrimycin-100 (0.01%) after first visual symptom at 10 day intervals .
- Monthly sprays of Carbendazim (Bavistin 0.1%) or Copper Oxychloride (0.3%) are effective in controlling the disease.



# Mango Bacterial Canker

