

Major Diseases of Cotton

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List of Diseases-

1) **Bacterial blight or Angular leaf spot or Black arm:** *Xanthomonas campestris* pv.

Malvacearum: This disease was first observed in Tamil Nadu in 1918.

Symptoms: The bacterium attacks at all stages from seed to harvest. Usually, five common phases of symptoms are noticed.

i) **Seedling blight:** Small, water-soaked, circular or irregular lesions develop on the cotyledons. Later, the infection spreads to stem through petiole and causes withering and death of seedlings.

ii) **Angular leaf spot:** Small, dark green, water-soaked areas develop on the lower surface of leaves, enlarge gradually and become angular when restricted by veins and veinlets and spots are visible on both the surface of leaves. As the lesions become older, they turn to reddish-brown color and infection spreads to veins and veinlets.

iii) **Vein blight or vein necrosis or black vein:** The infection of veins causes the blackening of the veins and veinlets, gives a typical 'blighting' appearance. On the lower surface of the leaf, bacterial oozes are formed as crusts or scales. The affected leaves become crinkled and twisted inward and show withering. The infection also spreads from veins to petiole and causes blighting leading to defoliation.

iv) **Black arm:** On the stem and fruiting branches, dark brown to black lesions are formed, which may girdle the stem and branches to cause premature drooping off of the leaves, cracking of stem and gummosis, resulting in breaking of the stem which hangs typically as dry black twig to give a characteristic "black arm" symptom.

v) **Square rot / Boll rot:** On the bolls, water-soaked lesions appear and turn into dark black and sunken irregular spots. The infection slowly spreads to the entire boll and shedding

occurs. The infections on mature bolls lead to premature bursting of bolls. The bacterium spreads inside the boll and lint gets stained yellow because of bacterial ooze and loses its appearance and market value. The pathogen also infects the seed and causes a reduction in the size and viability of the seeds.

Pathogen: The bacterium is a short rod with a single polar flagellum. It is gram-negative, non-spore forming. The bacterium enters through natural openings or insect caused wounds.

Favorable Conditions: Optimum soil temperature of 28°C, the high atmospheric temperature of 30-40°C, relative humidity of 85 percent, early sowing, delayed thinning, poor tillage, late irrigation and potassium deficiency in the soil. Rain followed by bright sunshine during the months of October and November is highly favorable.



Management:

- ❖ Remove and destroy the infected plant debris
- ❖ Follow crop rotation with non-host crops.
- ❖ Grow resistant varieties like HG-9, BJA 592, G-27, Sujatha, 1412 and CRH 71. Suvin is tolerant.
- ❖ Delint the cotton seeds with **concentrated sulfuric acid** at 125 mL/kg of seed.
- ❖ Treat the delinted seeds with Carboxin at 2 g/kg seed or soak the seeds in 1000 ppm Streptomycin sulfate overnight or treat the seed with hot water at 52-56°C for 10-15 minutes.
- ❖ Spray with Streptomycin sulfate (Agrimycin 100), 500 ppm along with Copper Oxchloride at 0.3%

2) **Fusarium wilt**- *Fusarium oxysporum*f.sp. *vasinfectum*

Symptoms: The disease affects the crop at all stages. The earliest symptoms appear on the seedlings in the cotyledons, which turn yellow and then brown. The base of the petiole shows a brown ring, followed by wilting and drying of the seedlings. In young and grown-up plants, the first symptom is the yellowing of edges of leaves and area around the veins, *i.e.* discoloration starts from the margin and spreads towards the midrib. The leaves lose their turgidity, gradually turn brown, droop and finally drop off. Symptoms start from the older leaves at the base, followed by younger ones towards the top, finally involving the branches and the whole plant. The defoliation or wilting may be complete leaving the stem alone standing in the field. Sometimes partial wilting occurs; wherein only one portion of the plant is affected, the other remains free. The taproot is usually stunted with less abundant laterals. Browning or blackening of vascular tissues is the other important symptom, black streaks or stripes may be seen extending upwards to the branches and downwards to lateral roots. In severe cases, discoloration may extend throughout the plant starting from roots extending to stem, leaves and even bolls. In the transverse section, a discolored ring is seen in the woody tissues of the stem. The plants affected later in the season are stunted with fewer bolls, which are very small and open prematurely.



Pathogen: The fungus produces three types of spores. Macroconidia are 1 to 5 septate, hyaline, thin-walled, falcate with tapering ends. The microconidia are hyaline, thin-walled, spherical or elliptical, single or two-celled. Chlamydospores are dark-colored and thick-walled.

Favorable Conditions: Soil temperature of 20-30°C, hot and dry periods followed by rains, heavy black soils with an alkaline reaction, increased doses of nitrogen and phosphatic fertilizers, soil amendment with manganese and wounds caused by a nematode (*Meloidogyne incognita*)

Management:

- ❖ Treat the acid-delinted seeds with Carboxin or Chlorothalonil at 4 g/kg or Carbendazim @ 2 g/kg seed.
- ❖ Remove and burn the infected plant debris in the soil after deep summer ploughing.
- ❖ Multiply *Trichoderma viride* (2 kg) in 50 kg of farmyard manure for 15 days and then apply to the soil.
- ❖ Grow disease-resistant varieties of *G. hirsutum* and *G. barbadense*

3) Verticillium wilt- *Verticillium dahliae*

Symptoms: The symptoms are seen when the crop is in squares and bolls. Plants infected at early stages are severely stunted. The first symptoms can be seen as distinct mottling of leaves with pale yellowish irregular areas at the margins and between the principal veins. The yellowish areas become pale, more whitish and extensively necrotic. The necrosis spreads from lower to upper leaves and there is heavy defoliation. The affected leaves fall off leaving the branches barren. Infected stem and roots, when split open, show a pinkish to pinkish-brown discoloration of the woody tissue which may be continuous or interrupted. Pinkish streaks alternating with healthy tissue (Tiger stripe) are seen on removing the bark of the roots, stem and petiole. The affected plants may bear a few smaller bolls with immature lint.

Pathogen: The fungus produces hyaline, septate mycelium and two types of spores. The conidia are single-celled, hyaline, spherical to oval, borne singly on verticillate conidiophores. The micro sclerotia are globose to oblong, measuring 48-120 x 26-45 µm.

Favorable Conditions: The low temperature of 15-20°C, low lying and ill-drained soils, heavy soils with alkaline reaction and heavy doses of nitrogenous fertilizers favor the disease.

Management:

- ❖ Treat the delinted seeds with Carboxin @ 4 g/kg or Carbendazim at 2 g/kg.
- ❖ Apply heavy doses of farmyard manure or compost at 10 t/ha.
- ❖ Grow disease-resistant varieties like Sujatha, Suvin and CBS 156.

