Raja N.L.Khan Women's College (Autonomous)

Botany

UG-SEM-II Paper – C3T

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Angular Leaf spot of cotton

Introduction

Angular leaf spot of cotton (bacterial blight) is found in all the major cotton-producing areas of the world. However, it remains a potentially important disease because of the variability of the pathogen and the appearance of new races. The main cause of yield loss is the blackarm symptom, which results from the loss of the fruiting branches. Boll rot can occur when the bacterium is introduced through the carpel wall on the stylet of insects such as species of Dysdercus. In India, losses of 5-20% were common in crops (Verma and Singh, 1971). Meshram and Raj (1992) reported that disease intensities of 56.4 and 53.2% resulted in losses of 25.08% and 23.68%, respectively. Meshram et al. (1988) reported losses of between 19 and 27% in different cultivars of cotton. Bacterial blight continues to cause substantial losses in India where losses of 20-27% have been reported (Meshram et al., 1988; Meshram and Raj, 1992).

Symptoms

- The most common and conspicuous symptom is angular leaf spot which begins with dark-green, water-soaked spots, initially more clearly visible on the underside of the leaf lamina; the spots are angular in shape, being delimited by the smaller veins.
- Older spots become dark-brown or black and are visible on the upper surface of the leaves.
- The angular spots may be few in number in more resistant host material but, on susceptible cultivars, they can cover much of the leaf, causing chlorosis, followed by necrosis and distortion of the lamina.
- Similar spots may be found on the cotyledons of young seedlings where infection occurs from the soil or seed during germination and emergence.
- Under favorable conditions, infection may spread from the seedling cotyledon or the leaf onto the petiole and then to the main stem, leading to seedling mortality in susceptible cultivars.

- In older plants, the lesions can girdle the main branches causing them to break, with the loss of leaves and fruiting branches. This phase of the bacterial blight syndrome is known as black arm because of the blackened appearance of the affected petioles and branches.
- Sometimes infection on the leaf occurs as water-soaked tissue, which later turns black, on either side of the main veins. This is referred to as vein blight and can occur together with, or occasionally in the absence of, angular leaf spot.
- In older plants, water-soaked lesions can occur on the bracts of the epicalyx and more commonly on the developing boll.
- Bacterial boll rot begins as roughly spherical water-soaked spots on the boll surface which can expand to >1 cm in diameter on susceptible cultivars, becoming black as they age and penetrating the boll cortex to cause internal boll rot.
- The blight bacterium can also be introduced into the young boll during feeding on the seed by the cotton stainer (Dysdercus spp.). This causes the lint to become stained yellow or brown and sometimes leads to internal boll rot.

Causal organism

Xanthomonas axonopodis pv. malvacearum

- A Gram negative, motile rod-shaped, non spore-forming bacterium with a single polar flagellum.

Scientific classification

- Kingdom: Bacteria
- Phylum: Proteobacteria
- Class: Gammaproteobacteria
- Order: Xanthomonadales
- Family: Xanthomonadaceae
- Genus: Xanthomonas
- Species: axonopodis

Host plants / species affected

- *Ceiba pentandra* (kapok)
- *Gossypium barbadense* (Gallini cotton)
- *Gossypium herbaceum* (short staple cotton)
- *Gossypium hirsutum* (Bourbon cotton)
- *Jatropha curcas* (Jatropha)

Disease cycle

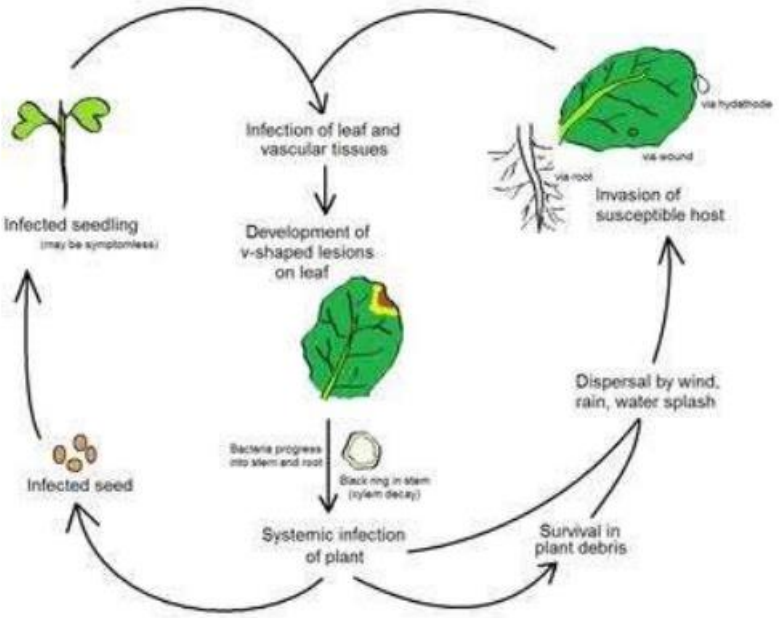

Fig:- Disease Cycle of Angular Leaf Spot

Disease management

Control measures against bacterial blight are necessary in all the main cotton-growing areas of the world. Control is achieved mainly through the use of resistant varieties which have reduced the disease to a minor status on Upland cottons in many countries where it was once a serious problem. To ensure that it remains a minor disease, it is necessary to avoid the introduction of exotic races of the pathogen on imported seed and to continue screening for blight resistance in cotton breeding programs.

Host-Plant Resistance

- There is considerable genetic variability for resistance to bacterial blight within the genus Gossypium.
- The highest degree of resistance is found in G. hirsutum var. punctatum. Little natural resistance occurs in G. barbadense. Knight (1945, 1946, 1954) identified 10 major

genes for blight resistance (B-genes) to which he ascribed the symbols B1 to B10. Eight of these genes were dominant or partially dominant in their expression.

Cultural and Sanitary Methods

- Crop rotation
- Deep ploughing
- Soil sanitization
- Seed treatment with 2gms of carbendizam per kg of seed.
- Use infection free and certified seeds.
- late sowing, early thinning, good tillage, early irrigation and addition of potash to the soil minimize the disease.
- Destroy the infected-plant debris.
- IPMPrograms- One of the earliest successful integrated control programs for bacterial blight was carried out in the 1950s and 1960s in California, USA.

Chemical and Antibiotic control

- As it occurs in months of September and November, 100 mg of tetracycline, streptomycin sulphate, plantamycin, poshamycin; should be sprayed for 3 or 4 times in every 15 days gap.
- Chemicals linked with copper should be sprayed at their recommendation of 3gm per litre of water to reduce the disese.
- Acid delinting followed by seed dressing with carbendazim @3-4g/kg of seed eliminates seed borne inoculum.
- Foliar spray of combination of Poshamycin/Plantomycin 100 mg + 3 gms of Copper Oxychloride per lit of water for 3 or 4 rounds at 15 days interval from the **time of disease appearance.**

References

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https://aaqua.persistent.co.in/aaqua/forum/viewthread?thread=6738