Black Arm/ Bacterial blight of Cotton

Pathogen: *Xanthomonas axonopodis* pv. *malvacearum*

Distribution & Importance: Black arm /Bacterial Blight, also called Angular Leaf Spot, is a disease caused by the bacterium. It was first described in 1891 by Atkinson from the United States. The disease has been reported from South America, Egypt, Sudan and other African countries, U.S.S.R., China, Australia, Sri Lanka, Pakistan and India. Cotton yield losses due to disease of 10% have been reported.

Symptoms: Bacterial Blight starts as small, water-soaked lesions on leaves and can be observed on seedlings as well as mature plants. Lesions progress into characteristic angular shapes when the leaf veins restrict the bacterial movement. Unlike many other lesions on cotton leaves that are more-or-less circular, those associated with Bacterial Blight are more triangular or rectangular. Bacterial Blight lesions may appear on the upper leaf surface; however, the water-soaked or "greasy" appearance of the lesions is often most clearly observed on the underside of the leaf. Lesions are sometimes encircled by a yellow ring or so-called "halo". Lesions turn black as they age and increase in size. Often, the affected leaves premature defoliated. Systemic infections follow the main veins of the leaf and appear as black streaks. In advanced cases, symptoms called "black arm" develop where the infected leaf petioles and stems also exhibit dark lesions. Symptoms may also appear on the bracts and the bolls. Symptoms on the bolls are characteristically water-soaked, greasy in appearance, and sunken lesions that turn black as they age or harbour secondary infections from other organisms. Internal boll rot leading to lint discoloration and seed contamination can be associated with insect damage or infection by opportunistic fungal pathogens.

Pathogen: The bacterium is a short motile rod, formed singly or in pairs and equipped with a single polar flagellum. It is gram negative, non acid fast non spore forming and measures 1-1.2 x 0.7 x 0.9µ. in culture, it produces a yellow, slimy colony on nutrient agar medium. The bacterium is aerobic.

Disease Cycle: The primary source of infection originates from infected crop residue from a previous season or be introduced on infected seed. Infections may be spread by wind-driven rain from an infested source or irrigation (furrow or sprinkler). The secondary spread is favoured by wind splashed rain

and dew. The pathogen can remain as slimy mass inside the seed or on the fuzz. The disease may be carried over through infected leaves, bolls and twigs on the soil surface. The secondary infection is through water, wind.

Factors Associated with Outbreaks of Bacterial Blight: Bacterial Blight will be more severe in a field if the disease develops early in the season, especially if plants at the seedling stage become infected. The bacterium can enter the plant through openings such as stomata, lenticels and hydathodes, and wounds when plants are damaged by wind-blown sand. Once pathogen is established in a field, rain-fall, especially shortly after planting, can lead to rapid increase and spread. After the canopy develops, periods of heavy rainfall followed by warm and humid conditions when relative humidity is greater than 85% further increases the development and spread of the Bacterial Blight. Throughout the season, conditions favourable for the development and spread of Bacterial Blight occur when day time temperatures are 90-100^0 F and night time temperatures are at least 62-68^0 F.

Management:

1. Field sanitation: Infected crop residue from a previous crop should be collected and destroyed carefully.
2. Crop rotation will also help to reduce the amount of inoculum that survives between cotton crops.
3. The use of resistant cultivars is the most economical option to minimize yield losses from Bacterial Blight.
4. **(a)** Externally seed borne infection can be eradicated by delinting the seed with Cone H_2SO_4 for 5 minutes, wash with lime solution to neutralise the effect and finally washing with running water to remove the residue and drying seeds.

   (b) Internally seed borne infection can be eradicated by soaking seeds overnight in 100 ppm streptomycin sulphate or Agrimycin.
5. Secondary spread of the disease can be controlled by spraying the crop with streptomycin sulphate 100 ppm + Copper oxychloride (0.25%) at an interval of 15 days.