INTEGRATED DISEASE MANAGEMENT FOR Bacterial Blight in Susceptible Varieties

THE PATHOGEN

Xanthomonas campestris pv. *malvacearum* (*Xanthomonas axonopodis* pv. *malvacearum)*
There are over 20 races described on the basis of their ability to overcome different resistance genes in the cotton plant. Race 18 is the most prevalent race of the pathogen in Australia. Two races that originated in parts of Africa and have been used in field plots in the USA are described as hypervirulent and could possibly be pathogenic on Australian varieties.

SYMPTOMS

- Leaves and bracts – 'Angular leaf spot' - dark green, watersoaked, angular lesions – 1 to 5 mm across - especially obvious on the undersurface of leaves. Sometimes extensive dark green, watersoaked lesions along the veins. Symptoms are usually more prevalent on lower leaves than on upper leaves. Lesions dry and darken with age and leaves may be shed prematurely resulting in extensive defoliation.

- Bolls – Dark green, watersoaked, greasy, circular lesions – 2 to 10mm across – especially at the base of the boll under the calyx crown. As the boll matures the lesions dry out and prevent normal boll opening.

- Stems – 'black-arm' – black lesions which girdle and spread along the stem or branch – can be associated with hail damage.

ECONOMIC IMPACT

Bacterial blight cost Australian cotton farmers millions of dollars in the 1980's. Most cotton varieties now grown in Australia have excellent resistance to the blight pathogen and only the older US varieties and Pima are susceptible. When the pathogen is present and weather conditions are favourable then bacterial blight can be devastating to Pima cotton. In recent years a crop of Pima at Bourke was completely defoliated and 80% of bolls were affected by Bacterial blight.

ASSESSMENT

Seedlings – disease incidence can be assessed by inspecting 20 randomly selected sets of ten plants – carefully checking the undersurface of cotyledons and leaves for the presence or absence of bacterial blight.
Leaf symptoms – disease severity can be assessed on the basis of 'percentage leaf area infected' using a pictorial assessment key (See – 'Assessing Disease on your Farm'). Either assess every leaf on ten randomly selected plants or assess disease severity on the lowest one, two or three mainstem leaves on each of 20 randomly selected plants.
Bolls – The percentage of bolls with blight can be estimated by inspecting all bolls on at least ten randomly selected plants. It is important to peel back the calyx crown when checking each boll.

DISEASE CYCLE

Pathogen inoculum may either be present in the field on infected crop residues from a previous season or it may be introduced at planting within infected seed. Lesions on cotyledons may be initiated by inoculum within the seed during germination. Inoculum from infected crop residues may be splashed onto the foliage and into the growing point of young seedlings where it can survive saprophytically on leaf surfaces. When environmental conditions are favourable the bacteria enter the plant via the stomates or wounds. As lesions develop bacteria exude out onto the leaf surface for further dispersal.

The pathogen is able to enter the seed when mature, open, blight-infected bolls are exposed to wet weather prior to harvest.

FAVOURED BY

Symptoms of bacterial blight develop when the temperature is over 25ºC and relative humidity exceeds 85%. Wind driven rain, hail and sand-blasting significantly increase disease severity. Under glasshouse conditions bacterial blight will not become apparent if temperatures are below 25ºC or if the leaves are kept dry.

DISPERSAL

Seed borne inoculum allows long range dispersal and introduction of the pathogen (or new races of the pathogen) into new areas, new countries and new fields.

There is evidence that the pathogen is also capable of symptomless epiphytic transfer that enables undetected passage through quarantine. Seed-borne inoculum can move to a symptomless, saprophytic existence on the leaf surfaces of growing plants under glasshouse conditions where the leaves are kept dry.

Dispersal within the crop is accomplished by rain splash from crop residues to cotyledons and lower leaves. Once established in the growing point then all leaves become 'inoculated' as they are produced.

SURVIVAL

The pathogen is able to survive for long periods on infected crop residues and within the seed. Survival on crop residues is favoured by dry conditions.

As mentioned previously the pathogen can also survive in a saprophytic phase on leaf surfaces and in the terminals of otherwise healthy plants.

HOST RANGE

The bacterial blight pathogen is specific to *Gossypium* spp. and there are no other known crop or weed hosts in Australia. Most Australian varieties of *Gossypium hirsutum* are completely resistant to the races of the blight pathogen that occur in Australia. Some of the older US varieties are susceptible. Pima varieties *(G. barbadense)* are very susceptible and cotton breeders are developing new blight resistant varieties for Australian conditions. Bacterial blight has been observed on several of the native Australian *Gossypium* spp.

A CONTROL STRATEGY FOR Bacterial Blight in Susceptible Varieties

PREVIOUS SEASON

- Seed companies should ensure minimal carryover of the pathogen in planting seed

PLANNING

- Do not plant susceptible varieties in or near fields that contain residues of susceptible varieties grown in the previous season

IN CROP

- Avoid rank growth and a dense crop canopy if possible

AFTER HARVEST

- Thoroughly incorporate crop residues as soon as possible

AT ALL TIMES

- Practice good farm hygiene – COME CLEAN, GO CLEAN