DISEASES IN THE 1983/84 COTTON CROP AND FUTURE DIRECTIONS FOR DISEASE RESEARCH

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Commercial cotton crops in the major New South Wales production areas were inspected during the 1983/84 growing season. The purpose of these surveys was to assess the relative distribution, incidence and severity of the various diseases which were found to be present. Information obtained during these surveys can give direction for the work of plant pathologists, plant breeders and extension personnel and can also provide a basis for relating disease occurrence and severity to factors such as soil and climatic conditions or changes in cultural practices or crop cultivar.

The following information was recorded for each field that was inspected: Grower, location, cultivar, field history, diseases present and estimated severity. Wet weather and floods limited the number of surveys completed in some areas.

Diseases in the 1983/84 Cotton Crop (NSW Production Areas)

(i) Seedling Disease.

Environmental conditions that slow down or delay seed germination and seedling growth generally favour the growth of those fungi responsible for seedling disease. Despite the cool, wet conditions during the 1983/84 season, seedling disease was not a major problem. Some losses were associated with rainfall immediately after sowing, especially in poorly drained fields or where low hills were used.

(ii) **Bacterial Blight.**

This disease was common in crops growing in all NSW production areas with the exception of crops in the Boggabilla area (McIntyre) and crops in the Boggabri - Maules Creek area (Upper Namoi). Over 50 per cent of the crops examined during April 1984 were found to have more than 10 per cent of bolls infected with blight (Figure 1). The severity of the disease was further increased by hail damage in crops near Wee Waa. The occurrence of the disease in some cotton crops growing in new fields, isolated from other cotton crops, suggests that the pathogen is being transmitted with planting seed.

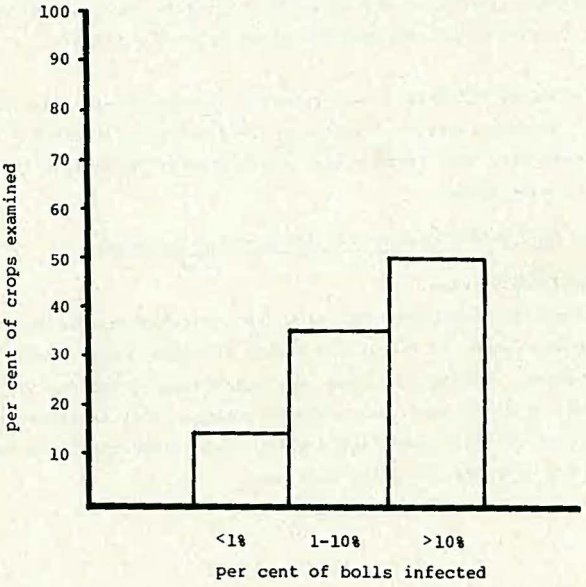

Figure 1. The incidence and severity of bacterial blight of bolls in cotton growing in NSW production areas during the 1983/84 season (assessed March/April 1984).

(iii) Verticillium Wilt.

The incidence of verticillium wilt was highest in fields with a long history of cotton. Three fields on one farm in the Macquarie Valley had an average of 75 per cent of plants infected by Verticillium sp. The disease was generally absent from new cotton growing areas and present at low levels in most other areas.

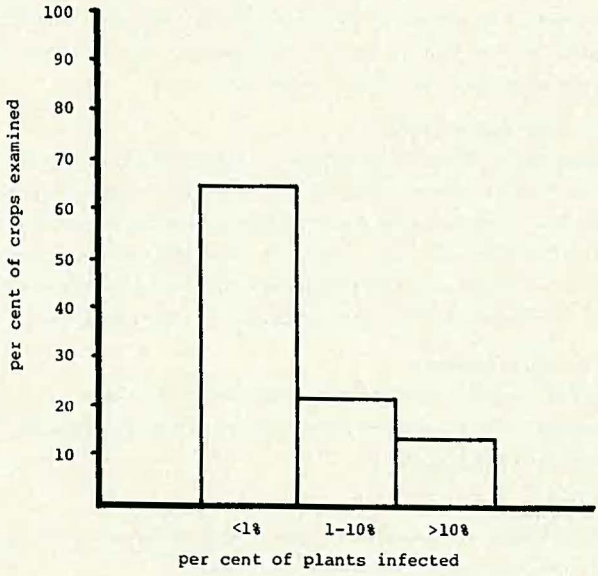

Figure 2. The incidence of verticillium wilt of cotton in crops growing in NSW production areas during the 1983/84 season.

(iv) **Sclerotinia Wilt and Boll Rot**

The fungus that causes this disease has a very wide host range which includes sunflower, soybean and safflower and requires cool moist conditions for infection to take place. Sclerotinia was observed in only five crops and the incidence of the disease was very low. All five infected crops were very tall and lush thereby providing ideal humid conditions for the pathogen within the canopy.

(v) **Wilt.**

This disease was noted in all NSW production areas. The symptoms, which usually appeared shortly after rain, included sudden wilting, dropping of all leaves, vascular discoloration and in some cases regrowth of apparently healthy shoots. The cause of this disorder may be either physiological or pathological and has not as yet been determined. The incidence of the disease was generally less than 0.1 per cent.

(vi) **Late Season 'Burn'**

During April 1984 a large number of cotton crops in both the Namoi and the Gwydir Valleys were affected by what appeared to be a "mis-application" of defoliant. However in nearly all cases no chemicals had been applied on or near to the affected crops. Only the more advanced crops appeared to show symptoms and in some situations other unrelated host plants were similarly 'burnt'. No explanation of this phenomenon has been developed.

(vii) **Other Diseases**

Several diseases of minor importance were also noted during the 1983/84 cotton season. These included a boll rot caused by Botrytis sp. and a leaf spot caused by Alternaria sp.

Disease Control

The incidence and severity of most cotton diseases can be reduced by cultural practices which include the following:-

* avoid sowing too early - low soil temperatures favour the fungi responsible for seedling diseases.
* prewatering is better than watering up - some of the fungi which cause seedling disease have mobile (free swimming) spores. Slow germination also favours seedling disease pathogens.
* use high hills and a well drained field - the soil in high hills is warmer and better drained than that in low hills.
* practise crop rotation e.g. with a cereal - apart from benefits

to the soil, rotation allows for a significant reduction of Verticillium sp. in the soil.

* destroy crop debris as soon as possible - the pathogens which cause bacterial blight and verticillium wilt can survive in crop debris.
* keep weeds to a minimum - Verticillium sp. thrives on noogoora burr, bathurst burr and datura.

FUTURE DIRECTIONS FOR DISEASE RESEARCH

Cooperative cotton disease research work is currently being undertaken by the NSW Department of Agriculture and the Queensland Department of Primary Industries. The emphasis is on bacterial blight with verticillium wilt being considered of secondary importance. Bacterial Blight

a) Race surveys. The existance of 18 races of the bacterial blight pathogen has been established. A new race of the pathogen has attacked previously resistant cotton varieties in Africa and Pakistan. There is a need to study the race situation in Australia particularly with the impending release of blight resistant varieties. Samples of blight from all NSW and Queensland production areas will be typed and the distribution and prevalence of the various races will be monitored.

b) Epidemiology. There is a need to identify those environmental factors that affect the development of disease epidemics. The results of this work will explain (i) why boll blight appears to be more severe in NSW than in Queensland, (ii) what conditions stimulate the blight pathogen to change from a saprophyte on the leaf surface to a parasite infecting the leaf and other plant parts, and (iii) why waterlogged plants appear to be more susceptible to blight than are normal plants.

c) Seed Transmission Studies. The importance of the seed-borne dispersal of the blight pathogen and its role in introducing the disease to new areas is being investigated.

d) Crop Loss Assessment. These studies are designed to improve our understanding of the reductions in yield quantity and quality that are being caused by bacterial blight of cotton in Australian production areas.

Verticillium Wilt

a) Pathogen Variability. The fungus responsible for causing verticillium wilt can also attack numerous other crop plants and weeds including safflower, sunflower, peanut, cowpea, soybean, noogoora and bathurst burr and datura. The apparent variability between different isolates of the pathogen is being investigated.

b) Crop Loss Assessment. Field studies are in progress to (i) determine if healthy plants are able to compensate for low levels of infected plants, (ii) to quantify yield reductions (quality and quantity) resulting from early infection by Verticillium sp. and (iii) to investigate yield increases which result from late infection of cotton by the wilt pathogen.

Seedling Disease

Seedling disease may be caused by several different fungi and the relative abundance of the major groups of these fungi will be determined using selective fungicides.

New Diseases

There are many diseases of cotton present in overseas countries but not recorded in Australia. These diseases include.

Fusarium wilt - nematode complex
Areolate mildew
Rust
Mosaic
Blue disease
Terminal stunt

Quarantine regulations and restrictions on the import of plant material should always be observed. Outbreaks of 'new' diseases should be quickly identified and dispersal restricted if possible.