



COTTON PATHOLOGY 2003-2004

D. B. Nehl¹, S. J. Allen² and P. A. Lonergan¹
¹*NSW Agriculture, Locked Bag 1000, Narrabri NSW*
²*Cotton Seed Distributors, PO Box 17, Wee Waa NSW*
Australian Cotton Cooperative Research Centre



Commercial cotton crops across NSW and Queensland were inspected in November 2003 and March 2004. The incidence and severity of those diseases present was assessed and field history, trash carryover, ground preparation, cotton variety, planting date and seed rate were recorded for each of the 70 and 35 fields that were surveyed in NSW and Queensland respectively. This represents the 21st consecutive season of quantitative disease surveys of cotton in NSW.

In most areas, cool conditions were experienced during October and early November 2003. However, the absence of rain was a mitigating factor that reduced the incidence of seedling disease in most areas. Later in the season, the dry conditions toward the south tended to be less favourable to diseases than were the wetter conditions toward the north.

Seedling mortality

As part of the disease survey an estimate of the number of seeds planted per metre is compared to the number of plants established per metre. This comparison produces an estimate of seedling mortality which includes the impact of seedling disease (*Rhizoctonia* and *Pythium*) as well as seed viability, the activity of soil insects such as wireworms, physical problems such as fertiliser or herbicide burn and the effects of adverse environmental conditions.

Seedling mortality was near or lower than average in most areas of NSW and Queensland (Figure 1). Mean seedling mortality for the crops inspected in Queensland and NSW was 25% and 31%, respectively, which was substantially lower than in the previous season (31.5 and 37%). This reduction probably reflects the absence of rain in most areas.

Due to dry conditions some fields were given supplementary irrigation after emergence. These conditions were ideal for seedling disease and seedling mortality as high as 60% was observed along with symptoms consistent with infection by *Pythium*.

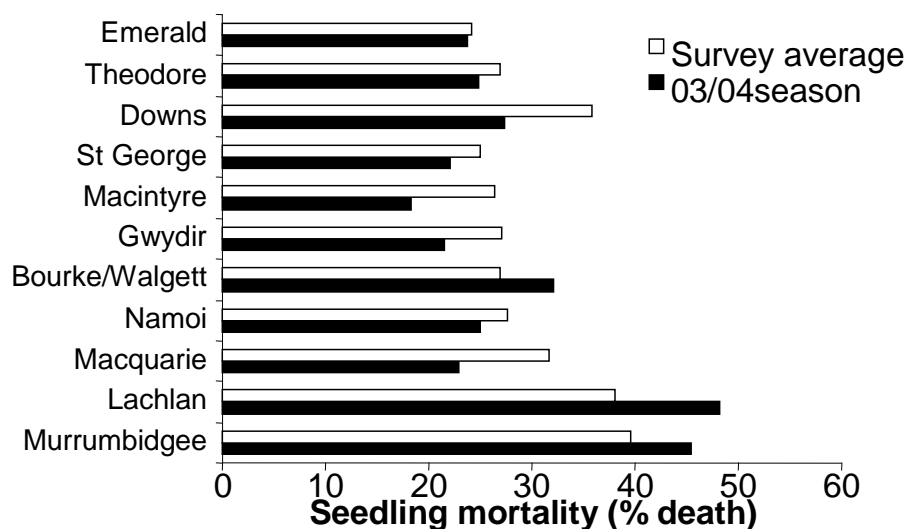


Figure 1. Seedling mortality in the 2003-04 season was near or below average in most areas except southern NSW and Bourke (n.b. Queensland averages are for two seasons, Bourke and Murrumbidgee averages are for 3 seasons)

Fusarium wilt

In the 2003-04 season there was one new report of Fusarium wilt (strain 11) in the Macquarie Valley, bringing the total count to 74 farms in NSW. The disease was observed on 20, 36 and 75% of fields inspected in the Gwydir, Macintyre and Darling Downs regions respectively. In NSW, Fusarium wilt has been observed on 31% of the 42 farms inspected regularly by NSW Agriculture. During much of the 2003-04 season, Fusarium wilt appeared to be less severe than in previous years. However, examination of disease progress at Moree and Boggabilla by Chris Anderson (NSW Agriculture) indicated that the incidence of internal infection was much higher than that of externally visible symptoms. By the end of the season external symptoms became severe, especially on the Darling Downs where, in several fields, less than 10% of Sicot 189 plants survived. The average incidence of Fusarium wilt in surveyed crops on the Darling Downs was found to be 10.6%.

It must be assumed that the Fusarium wilt pathogen is more widespread than reported. An epidemic of Fusarium wilt is clearly underway in Qld and is developing in NSW. If the pathogen continues to spread at the same rate, 90% of farms in NSW will be affected by 2010. Efforts to minimise this spread should not be relaxed, as many farms do not have the pathogen. It is important that growers and consultants confirm and declare if the disease is present in an area. The Fusarium wilt diagnostic service provided by the QDPI is funded by the cotton industry and is free to growers. The majority of samples submitted return a negative result and some growers who are withholding samples could be worried unnecessarily. Early detection of the disease and establishment of a control program has proven to be the best approach.

Black root rot

Black root rot now occurs in all production areas of Queensland and NSW, except Menindee, and its distribution continues to expand. In November 2003, black root rot was observed for the first time in one field in the Murrumbidgee Valley. The disease has now been observed in all of the farms that are regularly surveyed by NSW Agriculture in the Macintyre, Gwydir, Namoi and Macquarie Valleys (Figure 2). In these four valleys 78% of the crops inspected in 2003 had the disease, averaging 39% of plants (36% the previous season, Figure 2). Across the whole of NSW black root rot occurred in an average of 67% of cotton crops and 32% of plants (respectively 64 and 32% the previous season). The Namoi and Macquarie valleys were again the worst affected (respectively, 100% and 89% of crops inspected). The disease was also observed in 82% of fields in the Macintyre Valley which is the highest recorded to date for that area. In the St George area black root rot tended to be most severe in fields that were sown early. Black root rot was found to be widespread in crops on the Downs but the average incidence was low.

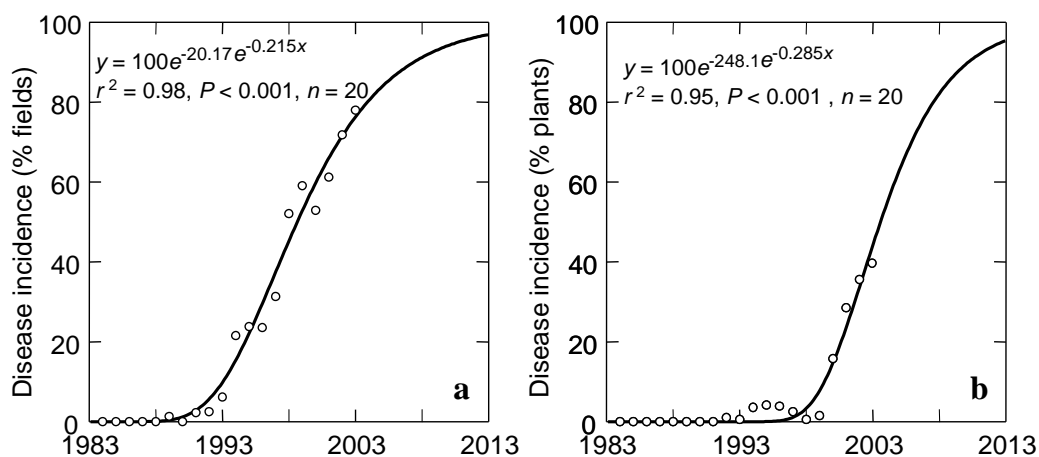


Figure 2. Observed (○) and predicted (—) increase in the incidence of black root rot of cotton in NSW (data for Macintyre, Gwydir, Namoi and Macquarie Valleys only)

The severity of black root rot increases with successive cotton crops. There are currently no adequate control measures for black root rot. Many farms do not have the disease and farm hygiene should be practiced to minimise further spread.

Verticillium wilt

In March 2004, the mean incidence of the Verticillium wilt across NSW was 4 % of plants, slightly lower than in the previous season (5.6%). The Namoi valley continues to have the highest incidence of the disease, although the level was lower in 2004 (Figure 3). These falls in the incidence of Verticillium wilt may reflect the greater use of resistant varieties (79% of crops inspected in NSW in 2003-04, 64% in 2002-03). Verticillium wilt has not been recorded in the Emerald area but was observed in 0.2% of plants inspected at Theodore.

The overriding factor in the severity of Verticillium wilt is prior cropping history. In some fields severe Verticillium wilt resulted in premature defoliation of isolated plants late in the season; symptoms that could be confused with Fusarium wilt. Growers are urged to observe the distribution of Verticillium wilt on their farms and sow resistant varieties accordingly.

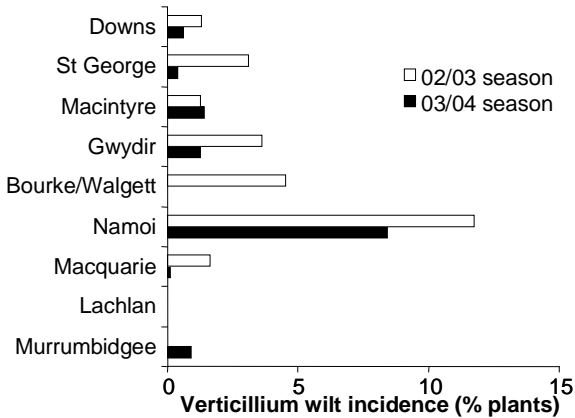


Figure 3. The incidence of Verticillium wilt in the March 2004 was generally lower than in the previous year

Boll rots

Phytophthora boll rot develops when low bolls are inundated with flood or irrigation water or when soil is splashed up onto low bolls as they approach maturity. Boll rots caused by other pathogens tend to be more frequent in crops with tall dense canopies. Phytophthora boll rot was generally the predominant type of boll rot in 2003-04. In NSW the average incidence of all boll rots was 1.1% (0.13% the previous season), with 3.1% in Queensland (Figure 4). Early maturing crops at Emerald were exposed to extended periods of wet weather in late January and early February and were most affected.

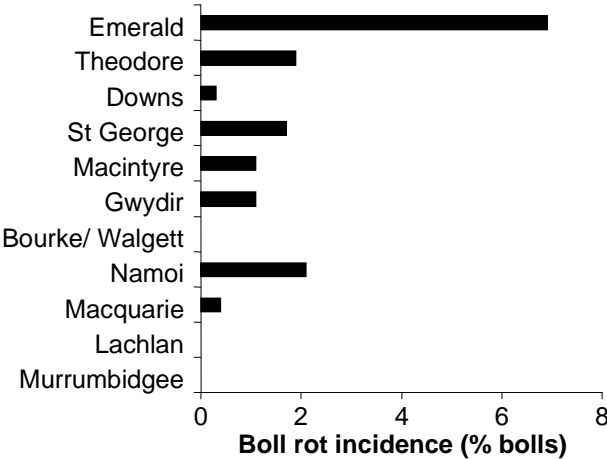


Figure 4. The incidence of boll rots in 2003-04 tended to be greatest in areas where more summer rainfall was experienced

Alternaria leaf spot

The pathogen that causes *Alternaria* leaf spot survives on crop residues from the previous season. Its survival is favoured by dry winter conditions and the retention of cotton crop residues on the soil surface. No substantial damage to seedlings by *Alternaria* was observed in the 2003-04 season. *Alternaria* leaf spot was observed in most field fields surveyed throughout NSW and Queensland in March 2003 but the severity was generally very low. In some crops the pathogen was present in higher numbers in senescing plants.

Cotton bunched top

Symptoms of cotton bunched top include small bolls, small leaves and short internodes, usually accompanied by a distinctive light-green angular mottle occurring around the margins of the leaves (the leaf mottle may be masked if infestation by aphids or mites is severe), and usually confined to a few plants or a distinct patch. The leaf mottle symptoms occasionally occur unaccompanied by the bunched growth habit if plants acquire the disease late in the season. In the 2003-04 season, a single plant was observed with symptoms of cotton bunched top in NSW. The disease was observed in 1.3 and 0.1% of plants in two fields respectively in Theodore.

Other diseases and disorders

Sudden wilt was observed as isolated plants in a number of crops. Sudden wilt is caused by 'ordinary' species of *Fusarium* that are usually non-pathogenic and it is often associated with waterlogging. Affected plants wilt, defoliate and die. Plants may produce regrowth in some situations. Sudden wilt does not re-occur in the same places in the following crop.

Patches of stunted seedlings were observed in several fields on the Downs and at Theodore during the November survey. Attempts to establish the cause of this slow early season growth were unsuccessful. Black root rot, bacterial stunt and nematodes were eliminated as possible causes.

A single plant with charcoal rot, caused by the fungus *Macrophomina phaseolina*, was observed in a field at St George.

Reniform nematode was observed at trace levels in association with roots of stunted cotton plants on one farm at Emerald (J. Kochman, pers. Comm.).

Acknowledgments

This research was made possible with the financial support of the Cotton Research and Development Corporation, Cotton Seed Distributors and NSW Agriculture. Sincere thanks are extended to Dr Joe Kochman and Dr Linda Swan for assistance with surveys in Emerald and Theodore.