# COTTON PATHOLOGY 2005-2006

***D. B. Nehl[1], S. J. Allen[2] , P. A. Lonergan[1], G. McNamara[2] and L. Swan[3]***
*Cotton Catchment Communities CRC*
*[1]NSW Department of Primary Industries, Locked Bag 1000, Narrabri NSW*
*[2]Cotton Seed Distributors, PO Box 17, Wee Waa NSW*
*[3]Qld Department of Primary Industries and Fisheries, 203 Tor Street, Toowoomba, Qld*

Commercial cotton crops across NSW and Queensland were inspected in November 2005 and February-March 2006. 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 93 and 52 fields that were surveyed in NSW and Queensland respectively. This represents the 23rd consecutive season of quantitative disease surveys of cotton in NSW.

In most areas, very warm conditions at the end of September were followed by cool conditions later in October but the cool period tended to be shorter than in previous years. Severe hail storms in October in the Emerald area affected many crops and significant areas were replanted in late October and early November. Wet weather during late spring on the Darling Downs also resulted in many crops being planted in late October and early November. Periods of very hot dry weather were experienced during summer in most areas. In general, the season was less favourable for soilborne diseases than in previous years.

**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 relatively low in most areas of NSW and Queensland (Figure 1). Mean seedling mortality for the crops inspected in Queensland and NSW was 28.5 and 23.8%, respectively, (27.1 and 27.4% in 2004-05). Seedling mortality was high in the Murrumbidgee Valley (45.7%, Figure 1) but still consistent with the long-term average (41%) for that area. The hail in the Emerald area contributed to seedling mortality in that area and negated some of the possible benefits of the recently adopted later planting window.

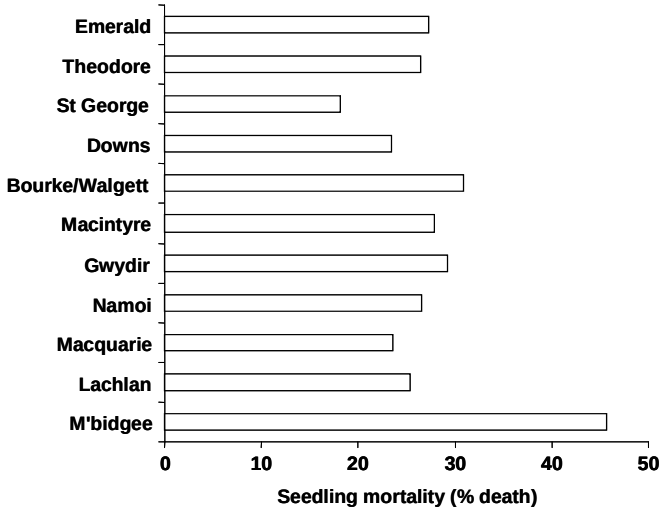


**Figure 1. Seedling mortality of cotton in the 2005-06 season was relatively low in most areas except the Murrumbidgee Valley**

**Fusarium wilt**

There were two new reports of Fusarium wilt from St George and one new report in the Theodore area. Two new cases of Fusarium wilt were reported from the Macquarie valley in NSW, bringing the total count to 79 farms in NSW. A new strain of the Fusarium wilt pathogen has been collected from a farm in the Macintyre valley and identified by pathologists of the QDPI&F at Indooroopilly. The disease was observed on 12.5, 50, 16.7, 76.9 and 30.8% of fields inspected in the Gwydir, Macintyre, Bourke, Darling Downs and Theodore regions, respectively (Fig. 2). The incidence of the disease was generally similar to that of the previous season. However, the climatic conditions in 2005-06 were less favourable to the expression of severe symptoms than in the previous season. There is increasing evidence that the severity of Fusarium wilt increases with increasing rainfall in October/November. Rainfall in October 2005 was close to average in NSW and tending above average in Queensland. In November, rainfall tended to be above average in NSW, grading to below average in central Queensland. The apparent disparity between incidence of the disease and the relatively low severity may reflect the impact of hot conditions over summer, which could potentially slow disease progress within the plant. In successive surveys in NSW, Fusarium wilt has now been observed on 39% of the 44 farms inspected regularly by NSW DPI. Fusarium wilt was observed in one rain-grown crop inspected on the Darling Downs. This crop was growing in a field that had been irrigated in previous seasons and subject to inundation during significant rainfall events.

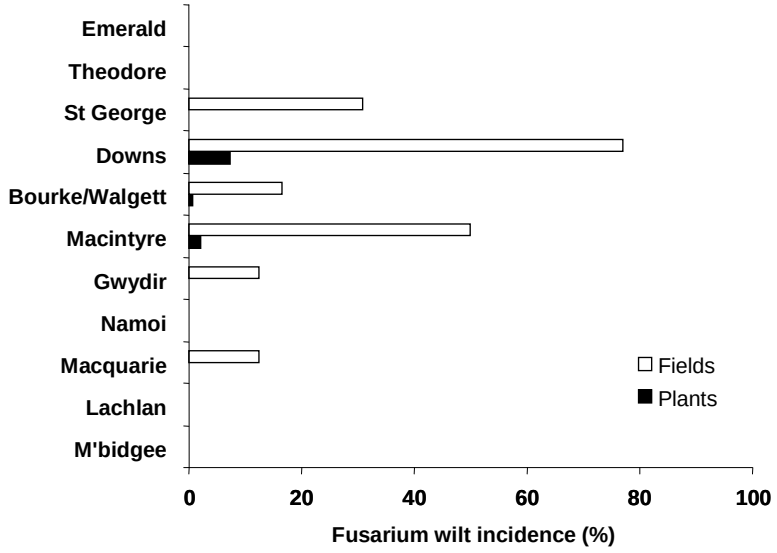


**Figure 2. Incidence of Fusarium wilt of cotton in the 2005-06 season.**

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. The rate of reporting of new cases of Fusarium wilt in NSW has declined, with only two new cases reported in each of the past two seasons. This slower rate of reporting probably reflects a combination of (i) farm hygiene measures, (ii) decreased cropping area due to drought and (iii) increased use of less-susceptible varieties. In the 2005-06 season, 89% of crops sown in NSW were varieties with an F-rank of 100 or more, compared to only 12% six years earlier. Most new cases reported in the past few seasons have been observed as either a few scattered plants or relatively small patches of dead plants. Given the wider use of higher-F-rank varieties, it is unlikely that new cases will now be found as large sections of dead and dying plants within crops, as occurred in the 1990's. Where growers combined the use of a high F-rank variety with a late planting date, the severity of Fusarium wilt in the 2005-06 season was greatly reduced.

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. The disease was observed in 66% of fields and 28% of plants surveyed in the major valleys in NSW (Macintyre, Gwydir, Namoi and Macquarie); down from 66% and 24% respectively in the previous year. This decline may reflect the effects of drought, as many fields had extended periods of fallow. The Namoi and Macquarie valleys were again the worst affected (respectively, 92 and 88% of crops inspected, Figure 3). The distribution of black root rot is expanding in the Lachlan and Murrumbidgee Valleys where the disease was observed in 67 and 50% of fields inspected (Figure 3). The incidence of black root rot in Queensland production areas was very low and probably reflects the later planting dates and subsequent good conditions for early season growth. 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.

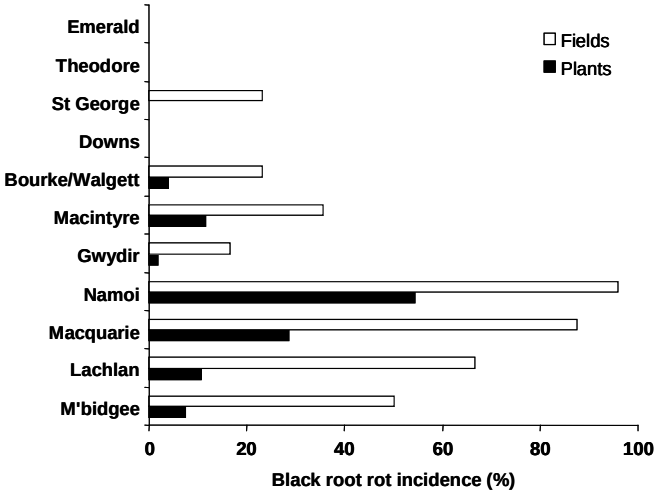


**Figure 3. The incidence of black root rot of cotton in the 2005-06 season was high in the Namoi and Macquarie Valleys and expanding in the Lachlan and Murrumbidgee Valleys.**

## Verticillium wilt

In March 2006, the mean incidence of Verticillium wilt across NSW was 3.4% of plants, (5.8% in the previous season). The NSW mean includes the incidence of Verticillium wilt in the Namoi Valley, which was % of plants in March 2006 (Figure 4). Over the previous six seasons an average of 43% of crops in the Namoi had a V-rank of less than 90 (i.e. susceptible), compared with 11% of crops in the five years preceding that. In the 2005-06 season, all crops inspected were moderately to highly resistant, having a V-rank of 90 or more. Verticillium wilt incidence may rise further in areas where resistant varieties are not used. Growers are urged to observe the distribution of Verticillium wilt on their farms and sow resistant varieties accordingly.

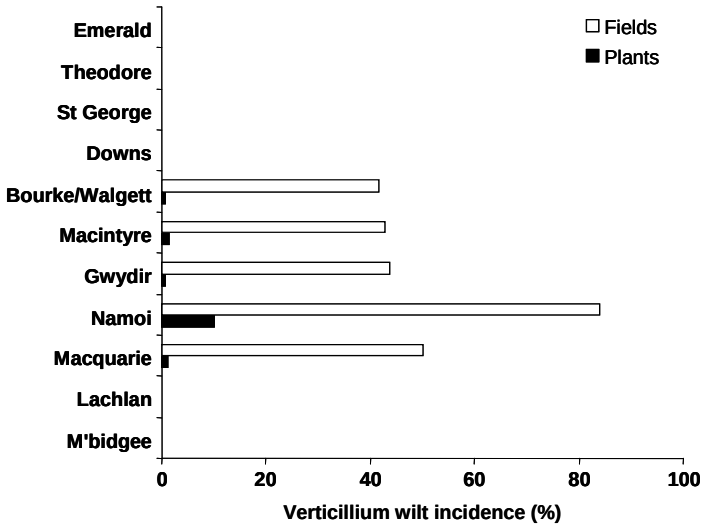


**Figure 4. The incidence of Verticillium wilt in March 2006 was greatest in the Namoi Valley**

## 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. Virtually no symptoms of *Alternaria* leaf spot were observed on cotton seedlings in the November 2005. Alternaria leaf spot was observed in many, but not all, crops surveyed throughout NSW and Queensland in February-March 2006 (affecting a mean of 0.02% leaf area) but the severity was generally very low. This low level of infection is consistent with hot dry conditions experienced in many areas during summer.

## 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 the predominant type of boll rot in 2005-06. In NSW the average incidence of all boll rots was very low 0.9% (0.2% the previous season), with 1.6% in Queensland (1.0% the previous season). As a result of the later planting dates in the Emerald area and on the Downs crops were less mature in mid February than crops inspected during surveys in mid February in previous seasons (Figure 5). Consequently the incidence of boll rots was lower than that observed in previous seasons.

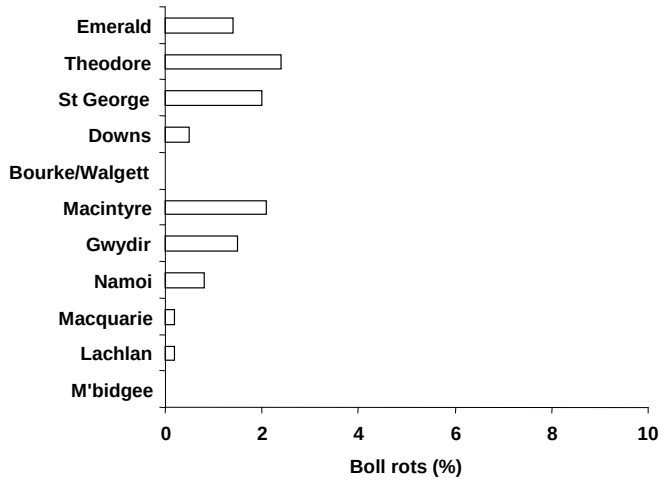


**Figure 5. The incidence of boll rots, including those caused by *Phytophthora* and other fungi, in 2005-06 tended to be greatest in areas where more summer rainfall was experienced**

**Cotton bunchy top**

Symptoms of cotton bunchy 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 bunchy growth habit if plants acquire the disease late in the season. One small patch (~15$m^2$) of stunted plants with symptoms of cotton bunchy top were observed in a field near Emerald during the surveys in Queensland in 2005-06 and two plants with the leaf mottle symptoms were observed in the NSW surveys.

**Other diseases and disorders**

Sudden wilt was observed as isolated plants in a number of crops in NSW (mean of 0.1% of plants). 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.

Symptoms of hormone damage caused by the herbicide 2,4-D were observed in 5.0% of plants inspected in the surveys in NSW, with the greatest incidence being in the Namoi Valley (14.5% of plants affected). Hormone damage was less severe than in the previous season (11.7% of plants).

**Acknowledgments**

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