COTTON PATHOLOGY 2004-2005

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Commercial cotton crops across NSW and Queensland were inspected in November 2004 and February-March 2005. 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 86 and 40 fields that were surveyed in NSW and Queensland respectively. This represents the 22nd 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 and November 2004. In most areas north of the Macquarie Valley substantial rain occurred during October and November. Unusually cool periods also occurred in November, December, January and February. Although the season was favourable for stand establishment, the spring rains and cool periods favoured both black root rot and the vascular wilts.

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 27.1 and 27.4%, respectively, (25 and 31% in 2003-04). Seedling mortality was unusually high in the Macquarie Valley. This reflects the small number of fields surveyed and marginal levels of soil moisture at sowing. At 25%, seedling mortality in the Lachlan Valley was relatively low (mean of 38% over the previous five seasons). Wet weather and some cool night temperatures in late October caused some establishment problems in the Emerald area where seedling mortality exceeded 40% in three of the eleven crops inspected.

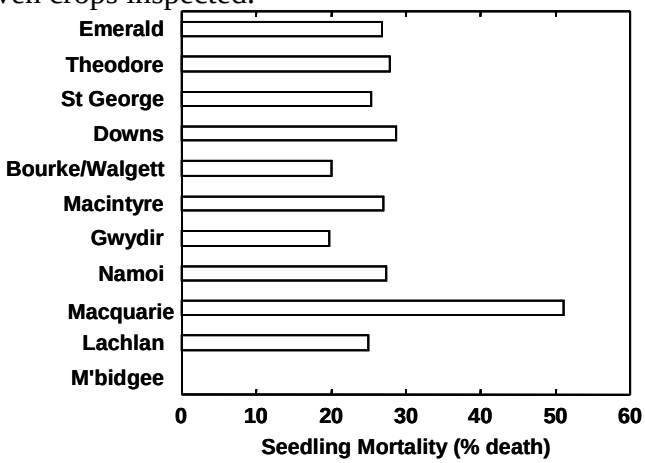

Figure 1. Seedling mortality of cotton in the 2004-05 season was relatively low in most areas except the Macquarie Valley, where crops were sown on marginal soil moisture (Murrumbidgee not assessed)

Fusarium wilt

There were new reports of Fusarium wilt from St George and from the Queensland side of the Macintyre. Two new cases of Fusarium wilt were reported in the Gwydir Valley, bringing the total count to 77 farms in NSW. The disease was observed on 22, 40, 64 and 29% of fields inspected in the Gwydir, Macintyre, Darling Downs and Theodore regions, respectively (Fig. 2). In successive surveys in NSW, Fusarium wilt has now been observed on 32% of the 42 farms inspected regularly by NSW DPI. Fusarium wilt was observed only in irrigated crops on the Darling Downs and not in any of the rain-grown crops that were inspected. The climatic conditions in 2004-05 were more favourable to the disease than in the previous season. In fields with a history of the disease, symptoms of wilting and dieback were well advanced early in the season and followed the development of internal vascular symptoms closely. In contrast, in the previous season, external symptoms tended to lag internal infection by up to two months. There is increasing evidence that the severity of Fusarium wilt increases with increasing rainfall in October/November. Spring rains were greater in 2004 than in 2003, which corresponds with the differences in disease severity observed between the two seasons.

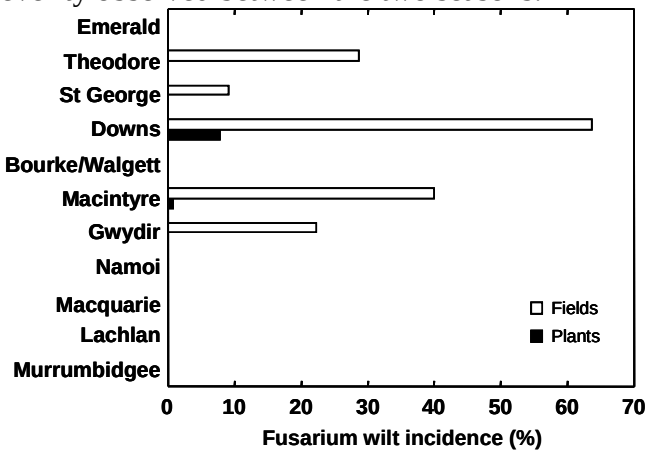

Figure 2. Incidence of Fusarium wilt of cotton in the 2004-05 season.

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 2004-05 season, 77% of crops sown in NSW were varieties with an F-rank of 100 or more, compared to only 12% five 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 incidence of Fusarium wilt 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, except Menindee. The disease was observed in 66% of fields and 24% of plants surveyed in the major valleys in NSW (Macintyre, Gwydir, Namoi and Macquarie); down from 78% and 39% 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 100% of crops inspected, Fig 3). Black root rot was observed in 18% of crops inspected on the Darling Downs but the average incidence was very low (0.1% plants).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.

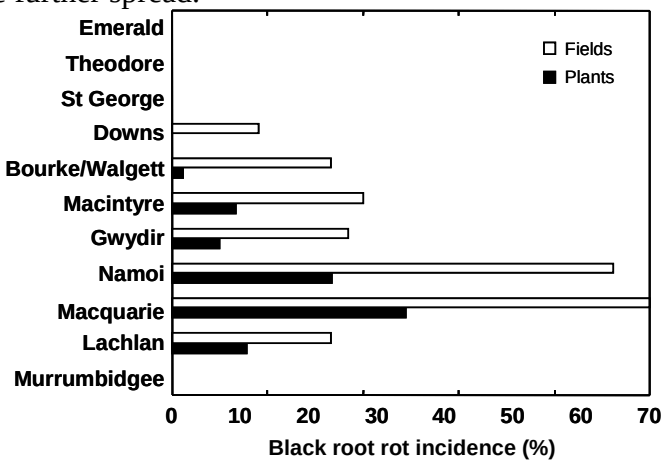

Figure 3. The incidence of black root rot of cotton in the 2004-05 season was high in the Namoi and Macquarie Valleys (Murrumbidgee not surveyed).

Verticillium wilt

In March 2005, the mean incidence of Verticillium wilt across NSW was 5.8% of plants, slightly higher than in the previous season (4%). The NSW mean includes the incidence of Verticillium wilt in the Namoi Valley, which was 13.2% of plants in March 2005 (Fig. 4). Over the past six seasons an average of 44% of crops in the Namoi had a V-rank of less than 90, compared with 11% of crops in the preceding five years. Verticillium wilt incidence will rise further unless resistant varieties are used. Growers are urged to observe the distribution of Verticillium wilt on their farms and sow resistant varieties accordingly.

There were several reports of crops in the Namoi and Gwydir valleys with a very high incidence of Verticillium wilt. One of the crops surveyed in the Namoi valley was found to have 85% of plants affected. Cotton plants become more susceptible to Verticillium wilt when exposed to periods of cool weather especially if these periods coincide with irrigation. In late December, early January and early February daily minimum temperatures in the Namoi and Gwydir valleys dropped below 15^0C on 15 days and below 12^0C on 5 days.

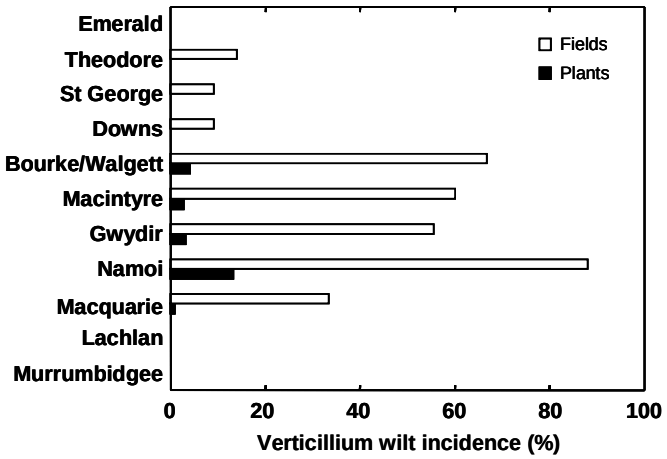

Figure 4. The incidence of Verticillium wilt in March 2005 was greatest in the Namoi Valley

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 2004. Alternaria leaf spot was observed in many, but not all, crops surveyed throughout NSW and Queensland in February-March 2005 (affecting a mean of 0.17% leaf area) but the severity was generally very low. Alternaria leaf spot was observed at slightly higher levels in the upper canopy of several crops in the Murrumbidgee Valley (mean 1.15% leaf area) and further development of the disease was reported by growers in the Lachlan Valley late in the season. The location of these leasions in the upper canopy, with mid-height leaves being less affected, suggests that dews on the upper canopy were enhancing infection late in the season. It is probable that this late infection had little influence on cotton yields.

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 2004-05. In NSW the average incidence of all boll rots was very low 0.2% (1.1% the previous season), with 1.0% in Queensland (3.1% the previous season). Early maturing crops at Emerald, exposed to periods of wet weather in late January and early February, were most affected (Fig.5).

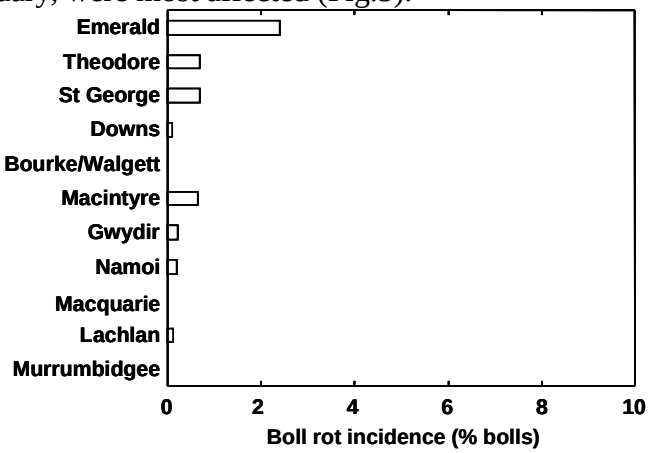

Figure 5. The incidence of boll rots, including those caused by *Phytophthora* and other fungi, in 2004-05 tended to be greatest in areas where more summer rainfall was experienced

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. No symptoms of cotton bunchy top were observed in surveys in NSW or Queensland in 2004-05.

Other diseases and disorders

Sudden wilt was observed as isolated plants in a number of crops in NSW (mean of 0.01% 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.

The nematode *Helicotylenchus dihystera* was observed in the roots of cotton in two fields in the uppper Namoi Valley by Dr Oliver Knox (CSIRO) and Mr Chris Anderson (NSW DPI). They are continuing to investigate whether or not this nematode is acting as a pathogen but overseas experience suggests that it has little impact on cotton.

Symptoms of hormone damage caused by the herbicide 2,4-D were observed in 11.7 % of plants inspected in the surveys in NSW. In some crops the damage was severe and impending yield losses were apparent.

Acknowledgments
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