Executive Summary

This report is based on data gathered with the assistance of the membership of Cotton Consultants Australia Inc. (CCA) and covers all major cotton growing regions in Australia. The data analysed are drawn from a sample of 110 paired comparisons of Ingard and conventional cotton crops. The sample draws on data from 7,634 ha of Ingard cotton, which represents approximately 9% of the 85,000 ha of transgenic cotton grown in 1998/99.

Section 1 of this document was prepared by David Clark on behalf of the CCA and discusses the impact of Ingard cotton on pesticide use by product and by pest. Section 2 is a separate report on the economic performance of Ingard cotton by Tony Long of Michael Boyce and Company. Both Sections are based on the same data set but were analysed independently of each other. The following summary draws on conclusions taken from both Sections of this report and where appropriate compares these results with the previous two seasons.

The 1998/99 season was one of the worst for insects for many years. In most districts, the 1998 winter was extremely wet and it remained cool well into spring. These conditions favoured the development of weed hosts of many pests. The wet conditions also discouraged cotton farmers from effectively controlling overwintering heliothis pupae in the soil through tillage. The high pest numbers are reflected in the high number of sprays applied to both conventional and Ingard cotton crops in 1998/99.

In 1998/99 Ingard cotton reduced average pesticide use by 5.4 sprays (37%) compared 4.4 sprays or 44% in 1997/98 and 5.3 sprays or 52% in 1996/97. For specific pesticide groups, the impact of Ingard cotton varied according to which stage of the season they were predominantly used. For example, endosulfan (used early in the season) was reduced by 71% (81% in 1997/98 and 84% in 1996/97), synthetic pyrethroids (used mainly mid season) were reduced by 33% (30% in 1997/98 and 49% in 1996/97) and major organophosphates (used mainly late season) were reduced by approximately 30% (18% in 1997/98 and 15% in 1996/97).

In comparison to conventional crops, Ingard cotton reduced the number of sprays required for the key pests *Helicoverpa* spp., by approximately 43 % (44% in 1997/98 and 57% in 1996/97). Although there was some variability in the relative importance of the minor pests between regions, overall there was a small increase in sprays on Ingard for mirids; aphids and thrips; and a similar numbers for mites. Cotton tipworm was a significant pest in 1998/99 following a wet cool finish to winter that favoured carry-over of weed hosts into the cotton season. Ingard cotton provided very effective control of tipworm, reducing the number of sprays applied by 85%.

On average, the cost of each spray applied to Ingard cotton was $3.97 per ha higher than for conventional comparison crops ($4.17/ha in 1997/98 and $7.34/ha higher in 1996/97). The average combined cost of applied pesticides and license fee for Ingard cotton was $ 90.74 lower per ha than the average cost of applied pesticides for conventional crops ($35.31/ha higher in 197/98 and $42.78/ha higher in 1996/97).

The overall average yield of comparative crops of conventional crops was 7.5% higher than for Ingard cotton crops. This differs from the 1997/98 survey result which suggested that the Ingard and conventional cotton yields were very similar. However, it should be noted that in 1998/99 yields for conventional and Ingard crops in most regions did not differ greatly with the exception of the Gwydir valley where on average Ingard crops yielded 12% less than conventional. The survey was unable to establish any reasons for this result.

When all individual economic performance results are grouped, the average Ingard cotton crop returned a small economic benefit of $5.66 more per ha than conventional cotton. ($22.13 more per ha in 1997/98) However, there was considerable variability between regions (ranging from a benefit of $421.90 per ha in central Queensland to a $325.05 per ha loss in the Gwydir Valley). As occurred in 1997/98, the variability between individual farms was even more extreme than between regions (ranging from two farms benefiting by over $1,000/ha to six having a loss in excess of $1,000/ha).

The economic performance of Ingard Cotton presented in Section 2 has not included any extra monitoring or scouting costs associated with the technology. However, a majority of survey respondents indicated that Ingard Cotton required more time to check and required more frequent checking than conventional cotton. This may need to be considered as an additional cost for managing Ingard Cotton crops.

The current public debate over genetically modified organisms (GMOs) in the human food chain, in Australia appears to have ignored any potential benefits to the environment that might be achieved through the application of some GM crops. In the case of Ingard cotton there is a clear benefit to the environment through the 40-50% reduction in pesticide use measured. While this has not translated into any significant economic benefit to cotton farmers, they, along with the whole community are benefitting from the positive environmental impact of this technology.