The ESD tool helps you stay in control of your Bollgard® II crop

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What is the ESD tool?

The Early Season Diagnostic (ESD) tool has been developed by the cotton management support systems team based at the Cotton CRC's Technology Resource Centre. The tool was released on the Australian Cotton CRC web site (cotton.crc.org.au) during the 2003 – 04 season, and has been developed to help growers identify growth problems in their cotton crop.

By identifying potential problems sooner, the ESD tool can help growers achieve optimal crop growth, maturity and yield. The system is based on graphically comparing the observed crop development data with an optimum or target line. This target development rate has been generated from data over many years of research conducted by Dr. Greg Constable and colleagues.

How to use the ESD tool

Users begin by entering the sowing date of the crop, the nearest weather station, the data collection date and the squaring node or nodes above white flower count, as shown in Figure 1.

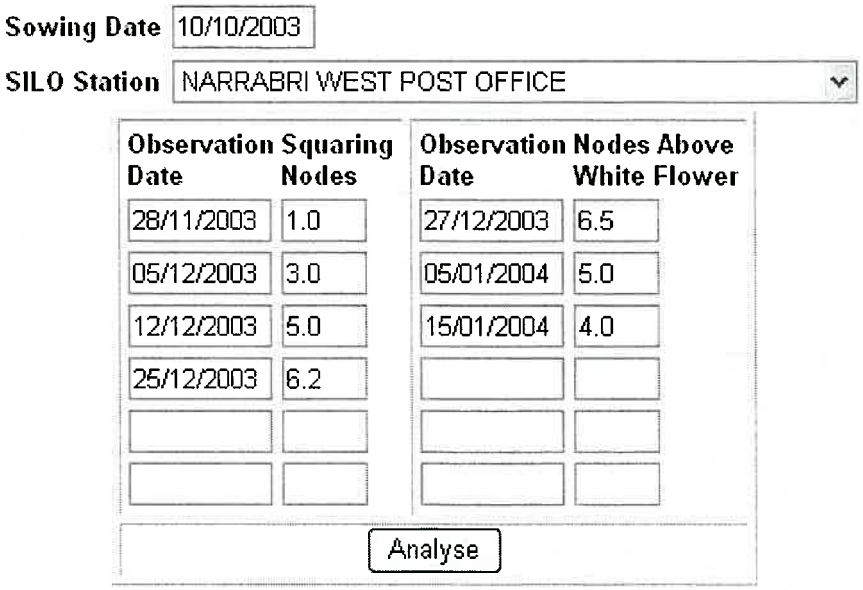

Figure 1. ESD tool data entry

The ESD tool then calculates the number of accumulated day degrees (DD) from sowing for the selected weather station, and graphs the observations against a potential crop development rate as shown in Figure 2.

If the actual crop development is ahead of schedule, or to the left of the target development line, then management such as growth regulators can be employed. If it is behind schedule, or to the right of the target development line, then a management solution like irrigation or fertiliser may be required, depending on the reason for delay.

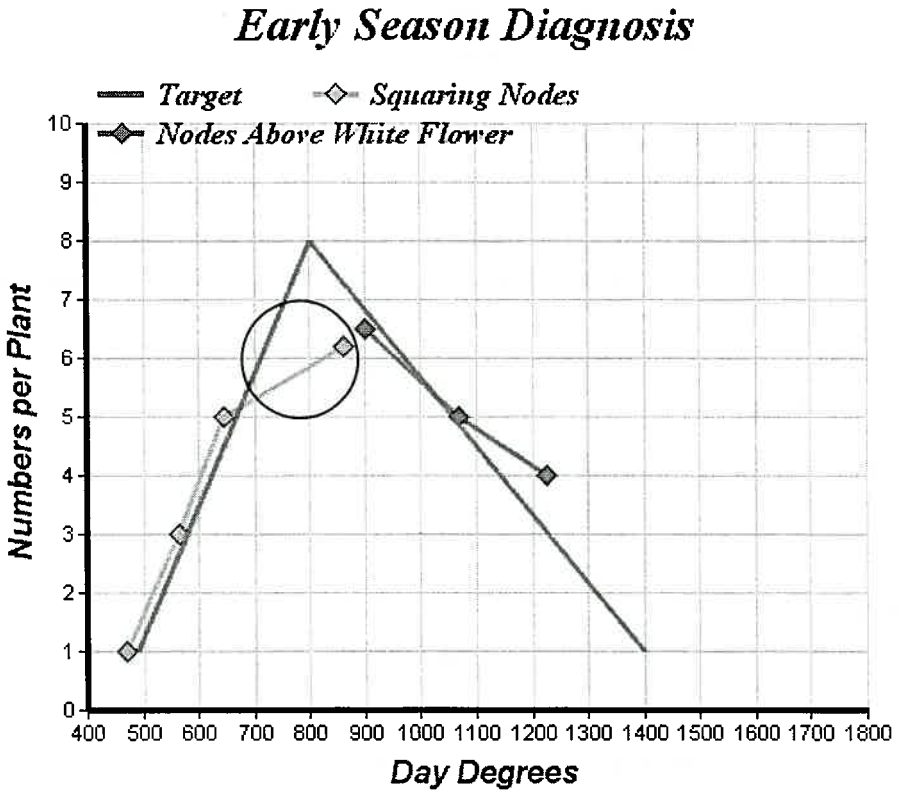

Figure. 2. This diagnosis indicated that between 700 – 900 DD the crop was behind schedule. A management solution like irrigation or fertiliser may have been the solution.

Managing Bollgard® II crops

The ESD tool has been especially useful for the management of Bollgard® II crops. Bollgard® II contains proteins which provide control of *Helicoverpa* spp. under field conditions. It has been recognized that without the need to control Helicoverpa and its associated damage, the crop will have less tipping out and retain more fruit compared to a conventional crop. So in theory, Bollgard® II cotton will retain a full boll load early and if it has been managed as a conventional crop, physiologically mature (cut-out) earlier. In some

cases this earliness is premature and the crop has been given no option but to finish without reaching its full yield potential.

The ESD tool can help keep track of the rate at which the Bollgard® II crop is producing squaring nodes, and the number of nodes above the first position white flower. Monitoring these growth indicators can help prevent a situation of premature cut-out or the over-production of vegetative structures.

Testing the ESD tool in the field

Experiments were conducted at the Australian Cotton Research Institute during the 2003 – 04 season to evaluate Bollgard® II and its response to various agronomic inputs and management practices. These experiments were used to test the functionality of the ESD tool. The experiments covered:

- nitrogen fertiliser rates
- sowing dates
- row configuration
- water allocations
- farming systems
- rotation systems.

The ESD tool was also tested regionally. Industry Development Officers in each cotton growing region monitored a Bollgard® II crop throughout the season taking weekly measurements of squaring node (SqNodes) counts and the number of nodes above the first position white flower (NAWF). The counts were entered into the ESD tool to validate the system in each region.

This article will discuss the results from the nitrogen fertiliser experiment at the Australian Cotton Research Institute.

This experiment was conducted by Dr. Ian Rochester and examined the response of Bollgard® II to a range of nitrogen rates. To test the ESD tool, we collected data from treatments with 35, 140, and 280 kg of N / ha. The measurements taken were the number of squaring nodes and nodes above white flower (NAWF). After recording the first squaring node the measurements were taken weekly until cut-out or 4 nodes above the first position white flower.

As shown in Figure 3, all treatments followed a similar pattern of growth until flowering. However, all treatments were a large distance from the target line, which was a reflection of the 14 cold shock days this crop experienced between sowing and the first SqNode measurement. At 1380, 1545 and 1673 DD significant differences ($P < 0.05$) were found between the 35 kg rate and the two higher rates.

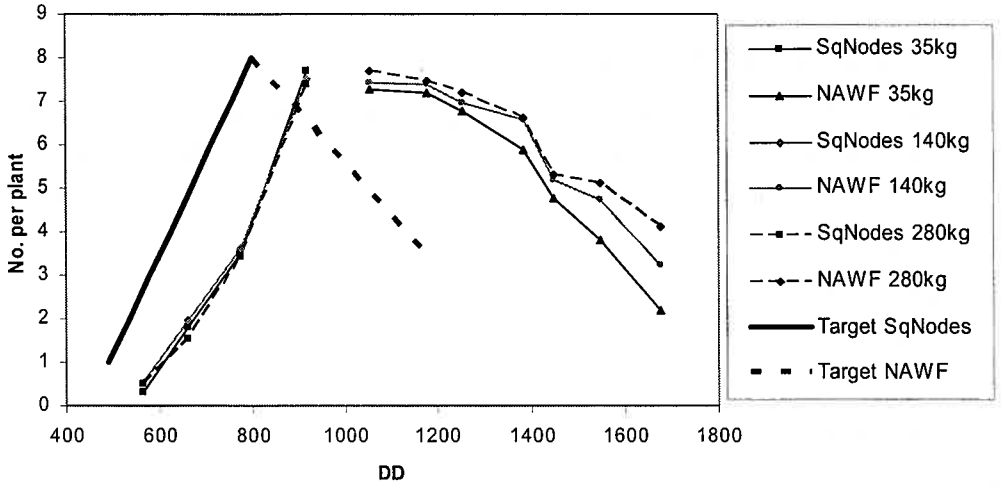

Figure 3. Comparing results from N fertiliser treatments with the target SqNodes and NAWF rate.

In summary the high rate treatments were significantly slower to cut-out and after measuring the yields for each treatment, the optimum nitrogen rate of 125 kg N/ha achieved 9.65 bales/ha. High N rates did not increase lint yield.

In this experiment, it was difficult to use the ESD tool as a guide because the crop was behind the target line throughout the season. However, the line being parallel with the potential showed that development was adequate, but delayed.

Conclusion

The ESD tool can be used effectively to keep track of Bollgard® II crop development. By detecting problems early in the season, the grower can manage the crop before major set-backs occur.

Field testing is essential in the process of developing a useful tool. During the 2003 – 2004 season, various modifications occurred to the ESD tool as a result of extensive field validation.

The NAWF line has been altered, determining day degrees has been automated, a squaring node identification tool has been included and the system now stores past counts.

The cotton management support systems team are continuing to explore new means of delivering information and developing new decision tools that utilize the power that the internet holds.

Acknowledgements

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