

Sustainable use of biotechnology in Australian cotton

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We are about to enter the 10th year of biotech cotton in Australia and both the industry and Monsanto are implementing strategies to maximise the effectiveness and longevity of the current GM technology. To ensure we stay ahead of the game we must maintain our competitive edge in yield, quality and reliability, and Monsanto remains focused on preserving and improving the value of the technology to growers.

The development of Bollgard II has offered the industry a sustainable tool to combat the most serious pests without upsetting the natural control of minor pests. During the 2004–05 season, approximately 70 per cent of the cotton grown in Australia was Bollgard II and growers, communities and the environment gained significant benefits from this.

HIGHER SELECTION PRESSURE

The most recent predictions are that around 75 per cent of the cotton crop will be Bollgard II this year. While this will reduce pesticide usage even further, the more the technology is used, the higher the selection pressure will be for resistance to develop to the technology.

Various mathematical models suggest that with good management, Bollgard II technology may last another 20–30 years before any commercial resistance develops. The key is to continue to protect the technology and the benefits the technology brings to Australian farmers. Bollgard II is very robust in terms of its defence against the development of resistance but it is not impregnable.

Monitoring has been conducted by NSW DPI, CSIRO and Monsanto since the

first plantings of Ingard cotton in 1995 and no changes have been detected in the levels of susceptibility to insecticidal protein produced by Ingard since that time.

Since the introduction of Bollgard II (which produces the same protein as Ingard cotton plus an additional insecticidal protein), monitoring has continued and no resistance has yet been found to either protein in the field. But, as expected, genes conferring resistance to the second protein, Cry2Ab, are now known to exist in populations of the target pest, demonstrating the importance of the Resistance Management Plan (RMP).

The RMP is protecting the technology. It was developed by the industry research community and Monsanto and has the ability to ensure that Bollgard II is still around for the next generation of farmers

to use. The key component of this is the refuge.

Refuges can be looked at in many ways — some growers use sprayed cotton as a refuge which to some means zero cost of refuge. But obviously, the net increase in pest control costs on the refuge over the Bollgard II is effectively the cost of the refuge, along with any change in yield, environmental impact and any additional time required to manage the non-Bt cotton field.

Some growers opt for commercial crops of corn or sorghum (or a combination) and many of these farmers make cash from their refuge, as they are combining their refuge requirement with their mixed cropping portfolio. The use of pigeon pea and unsprayed non-Bollgard II cotton as refuges have less tangible commercial benefits and are often looked on as economic drains.

Some growers estimate a mean yield of over 1.5 bales of cotton to the acre from unsprayed cotton refuges over the course of several years. It is true that unsprayed non-Bollgard II cotton can, and has, yielded reasonable crops at times — although under more extreme pressures it has also yielded nothing.

Pigeon pea only produces seed for the following year's refuge (if harvested) and does not significantly contribute financially. But pigeon pea uses about a quarter of the water per hectare as a refuge compared to unsprayed non-Bollgard II cotton (half the area required and half the water usage per hectare) which significantly reduces its cost.

INVESTING IN SUSTAINABILITY

Farmers investing in a refuge crop as part of their farm practice are actually investing in the sustainability of their busi-

ness. Protecting the Bollgard II technology significantly increases the assurance that cotton farms will still be viable in the future and that the next generation of farmers will have an inheritable business to look forward to.

The technology is here to be used and, if we as an industry want to continue to use this and other such technologies, then we must all be prepared to invest in protecting them. Good refuge maintenance is essential to this.

Monsanto is increasing its investment, both through human resourcing and direct funding, into the protection of the technology through additional audits and expansion of the trial program. During 2005–06, Monsanto is introducing an educational-focused audit over all farms to assist growers in ensuring that their refuges meet the standards required to offer protection.

The audit will identify shortcomings in refuge crops and offer advice to improve the refuge efficiency. Monsanto is also conducting a range of commercial trials to re-evaluate the current refuge options, investigate cheaper refuge alternatives, determine methods to enhance refuge crops and assess the contribution of natural refuges.

The cotton industry has been provided with valuable tools that have the potential to see the industry into the future. Ways have also been determined to maintain these tools, and if we are all prepared to invest in these, we can ensure that we have a viable future to offer both our businesses and our children.

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FIGURE 1: Number of sprays on Bollgard II and non-Bollgard II crops

