



CSIRO PLANT INDUSTRY

# Bollgard® II – the new generation of GM cotton

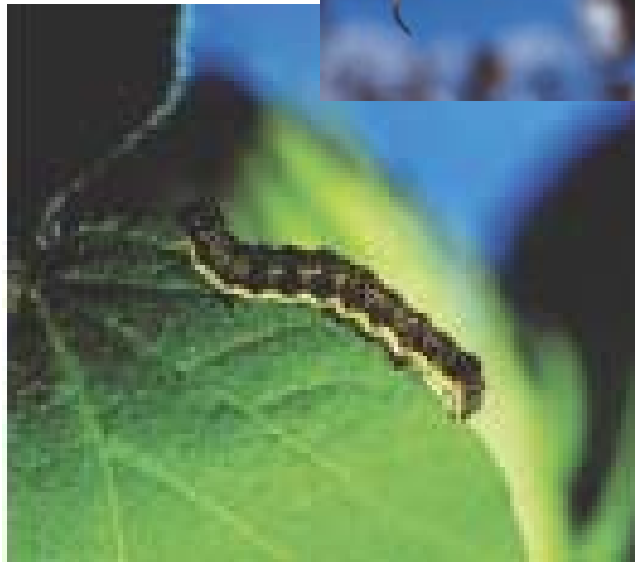
*Cotton is one of Australia's most significant agricultural industries, exporting nearly 90 per cent of cotton fibre, for use in clothing and fabrics. Australia is the third largest exporter of cotton in the world. Bollgard® II, a genetically modified (GM) cotton now available for Australian cotton growers, has reduced pesticide use by 80 per cent compared with conventional varieties, improving the environmental sustainability and profitability of this billion dollar industry.*

## Bollgard® II

Bollgard® II was developed by inserting two genes from the soil bacterium *Bacillus thuringiensis* (Bt) into cotton. These genes produce two proteins toxic to the main insect pest of cotton – *Helicoverpa* – so that when the *Helicoverpa* caterpillars eat the Bollgard® II cotton they die.

*Helicoverpa* have the capacity to completely destroy a cotton crop if not managed. Previously pesticides were used to control these pests, but many of these also kill the beneficial insects. The advantage of using Bollgard® II with Bt genes is that only *Helicoverpa* are affected.

Bt has been used as the basis of safe natural insecticides for many years. The Bt genes in Bollgard® II have been demonstrated to not harm humans or other animals.



*GM cotton with built-in insect resistance has significantly reduced pesticide use by helping address cotton's number one pest – *Helicoverpa*.*

## Environmental and human risk

To be approved for commercial release Bollgard® II demonstrated to the Office of the Gene Technology Regulator that it posed no greater risk than conventional or existing GM cotton in relation to various environmental and human safety parameters.

In the risk assessment undertaken by the Office of the Gene Technology Regulator it was shown that:

- Allergenicity and toxicity were very low risks and no greater than existing cotton varieties;
- Weediness was not a threat in the current cotton growing areas;
- Threat of insect resistance to the Bt proteins was less than for previous GM cotton, Ingard®, due to the presence of two insecticidal genes as it's less likely an insect would have resistance to both genes.

Part of the deployment of Bollgard® II involved the phase out of Ingard® in 2004 to minimise the exposure of the single gene in Ingard® and so reduce the risk of resistance.

Farmers have now chosen to plant 85 per cent of their cotton crop as Bollgard® II.

### Agronomic management

The next challenge for researchers is to identify optimal management techniques for Bollgard® II crops as they tend to grow faster because of the improved protection from insect attack.

Field trials have determined that cotton yield from Bollgard® II varieties is similar to or higher than in conventional non-GM varieties.

Preliminary results are also revealing that Bollgard® II may actually be more water efficient than conventional varieties and that its fibre quality is the same. Management to cater to Bollgard® II's different growth pattern will assist in ensuring water efficiency and fibre quality are maximised.

### Bollgard® II varieties

Cotton Seed Distributors is licensed by Monsanto to sell Bollgard® II and by CSIRO to sell its varieties bred by CSIRO Plant Industry. Varieties currently available include:

- Sicot 71B
- Sicot 289B
- Sicot 80B
- Sicot 43B
- Sicala 350B
- Siokra 24B
- Siokra V-18B

Bollgard® II has also been conventionally crossed with Roundup Ready® cotton, which is resistant to the herbicide Roundup® to produce a combination of insect and herbicide resistant cotton varieties:

- Sicot 71BR
- Sicot 289BR
- Sicot 43BR
- Sicala 60BR
- Siokra V-16BR

CSIRO has also just finished adding the new generation of herbicide tolerance gene Roundup Ready® Flex to a number of its Bollgard® II varieties. These new varieties include:

- Sicot 80BRF
- Sicala 60BRF
- Sicot 43BRF

More information on these varieties is available through Cotton Seed Distributors at [www.csd.net.au](http://www.csd.net.au).

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