



Managing Helicoverpa in Bt cotton

It is not uncommon to see large Helicoverpa larvae surviving in Bt cotton fields.

In most cases these are isolated individuals, however in some seasons there are occasional reports of larvae surviving for several weeks at threshold levels in Bt fields. Most affected fields are at mid to late flowering and the survivors include *H. armigera* and *H. punctigera*.

What are 'survivors'? Are they resistant?

Work conducted by CSIRO and Monsanto in 2011 on Bollgard II cotton showed that larvae did not survive on Bollgard II due to Bt resistance or because of the absence of Bt genes in the cotton. Recent work suggests that larvae exhibit strong behavioural responses to the Bt proteins in the plant. Detection and avoidance of the Bt toxins results in frequent movement of larvae, potentially within and between plants, resulting in an apparent feeding preference for flowers. These behaviours, coupled with the sometimes temporal and spatial variability of Bt toxin expression in Bt cotton, can result in a proportion of larvae becoming established on some plants in a field.

Control of Helicoverpa larvae in Bollgard 3

For resistance management reasons, it is recommended that if larvae reach thresholds in Bollgard 3 fields they should be controlled. This is to prevent any potentially resistant larvae surviving and mating. Work conducted by both Monsanto and CSIRO suggests that it is unlikely that there will be a yield penalty associated with larvae survival in Bollgard 3 fields.

This is supported by a study that used the distribution of larval damage in fields that carried larvae at the current thresholds as the basis for an artificial damage experiment. The work showed that Bollgard II plants could tolerate up to 100 percent square loss at early flowering, up to 100 percent square removal alone or in combination with 30 percent boll damage at peak flowering, and 30 percent boll damage at late flowering, without impacting yield or quality.

Therefore Bt cotton seems to compensate well for damage caused by larvae and the current threshold can be used in most situations without causing significant yield reduction.

Helicoverpa thresholds

Do not include any larvae less than 3mm long in spray threshold counts. For economic management of Helicoverpa, larval populations should be controlled with an insecticide if a threshold of:

- 2 larvae/m > 3 mm long are found over 2 consecutive checks; or,
- 1 larvae/m > 8 mm long is found in any check.

When using these thresholds to make a spray decision, it is critical that consecutive checks are used across a number of different areas in a field.

It is common for Helicoverpa survivors to have a patchy distribution within a field and for larvae to be above threshold in one check, and then numbers reduce to below threshold numbers in subsequent checks. More information on how to effectively sample crops can be found in the Cotton Pest Management Guide (available from the CottonInfo and CRDC websites: www.cottoninfo.com.au, www.crdc.com.au).

Insecticide selection for Bollgard 3 crops

When controlling Helicoverpa within Bollgard 3 crops, insecticide selection should comply with the cotton industry's Insecticide Resistance Management Strategy (IRMS). The predator/pest ratio (described in the Cotton Pest Management Guide) should also be given careful consideration when the application of an insecticide is being considered. If an insecticide is required, try to choose the most effective product that is the least disruptive to the beneficial complex. Refer to the *Impact of insecticides and miticides on predators, parasitoids and bees in cotton* table contained in the Cotton Pest Management Guide for more information.

It is also important to consider the risk of flaring other pests, such as Silverleaf Whitefly or Mealybug when making a spray decision as the benefits of spraying the Helicoverpa larvae could be outweighed by the risk of having to control other pests later in the season.

For more information, contact:

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