

# How to collect *Helicoverpa* for resistance testing

By Sharon Downes<sup>1</sup>, Louise Rossiter<sup>2</sup>, Tracey Parker<sup>1</sup>, Fiona McKenzie<sup>2</sup> and Trudy Staines<sup>1</sup>

Conventional insecticides and Bollgard II play a vital role in the effective management of *Helicoverpa armigera* and *H. punctigera*. *H. armigera* has an exceptional record of evolving resistance to insecticides, with transgenic crops not immune to this threat.

To ensure that these important management tools are available for cotton protection in the long term, the Cotton Research and Development Corporation (CRDC) supports programs that monitor insecticide resistance in field populations.

The program for conventional insecticides monitors resistance to all heliocides, (especially the softer IPM-compatible chemistries which are widely used), while the program for transgenic cotton screens larvae for susceptibility to the two toxins (Cry1Ac and Cry2Ab) produced by Bollgard II.

The Transgenic and Insect Management Strategy (TIMS) Committee uses these results to formulate the Insecticide Resistance Management Strategy and, if required, recommends changes to the Bollgard II Resistance Management Plan. The quality and integrity of our results, and thus the recommendations from TIMS, improves with an increase in the number of eggs and larvae tested.

This season the CRDC will support dedicated *Helicoverpa* collectors in the St George, Emerald, MacIntyre, Darling

Downs and Lachlan valleys. The support will be administered by the Cotton Consultants Association of Australia whose key members will supervise the collections and work with Regional Cotton Extension Officers (RCEO) to post the material.

Even with this assistance, it remains important that volunteer collectors, growers, and consultants gather and submit material. Small egg collections from many people require minimal effort and provide vital information when accumulated across a large area.

We especially rely on voluntary collections for sporadic events like suspected spray failures and the presence of live larvae on Bollgard II plants. This article outlines the protocols for collecting and dispatching *Helicoverpa* material for resistance testing.

## Collecting eggs

Field collected eggs are the most significant component of the monitoring programs.

**Step 1:** From any host plant collect the parts that carry eggs: e.g. cotton (leaves, flowers), sorghum (heads), maize (tassels, leaf cuttings), pigeon pea (leaves, flowers), etc. Select from plants located throughout fields that have not been sprayed with heliocides for 7-10 days.

**Step 2:** Ideally, collect at least 100 eggs per field, but all collections regardless of size are valued.

**Step 3:** Material from each field should be placed into separate paper bags (available from your RCEO). Complete the details on the label:

- Date collected;
- Location (farm, field, area);
- Crop (distinguish Bollgard II and conventional cotton);
- Collector;
- Last spray (date and insecticide, if known); and,
- Approximate number of leaves, heads or tassels.

## Collecting larvae from suspected spray failures

Larvae that survive a spray can be tested to determine if resistance is the cause of the failure.

**Step 1:** Collect as many larvae as possible — the more the better.

**Step 2:** Place larvae in paper bags (available from your RCEO) with leaves of any host except Bollgard II for food. If larvae are maintained in high densities they will damage or even eat each other. Therefore, be sure to divide samples between bags and provide adequate food.

## Collecting large larvae found on Bollgard II

We are interested in larvae of *H. armigera* and *H. punctigera* that are at least six mm. Ideally, the larvae would be accompanied by associated leaf samples that can



Larvae that survive a spray can be tested for resistance.



Collection materials can be obtained from Regional Cotton Extension Officers.

be tested for the presence of Bt but even if you cannot complete Step 2 below, your contribution of larvae will be valuable.

If you have numerous larvae in a field, it is more useful to collect many larvae with just the leaf from the host plant than few larvae with leaves from host plants and surrounding plants. If you have numerous fields with larvae, it is more useful to spread the collections across a number of fields rather than have more larvae from one field. There is no minimum number of larvae per site or region — even one larva is useful to us!

We have modified our 2006–07 collection kit to include larger bags for plant leaves and a labelled collection bag per sample for easy completion of details. Contact Trudy Staines on 02 6799 1500 if you would like some posted to you or your group.

**Step 1:** Collect the larva and place it in the small container with air holes and some food other than Bollgard II (e.g. conventional cotton). If you have numerous larvae contact your RCEO immediately and they will provide collecting trays filled with artificial diet.

**Step 2:** If possible, collect a leaf from the plant that the larva was feeding on (indicated by the rectangle in the figure) and place it into the paper bag labelled 'HOST

PLANT'. Collect a leaf from each of the four plants that surround the host plant (that is, the two plants in the same row, as indicated by the circles in Figure 1) and place them all into the paper bag labelled 'SURROUNDING PLANTS'. **Please remove the 3rd unfurled leaf from the top of the plant as the sample.** It is critical that the leaf material is fresh.

**FIGURE 1**



**Step 3:** Place the host leaf bag and surrounding leaf bag, and/or the pot containing the larvae, into the main collection bag and fill in the following details on the label: date, farm, field, plant variety, and collector. Please ensure that the two leaf bags, larvae pot, and main collection bag have the same sample numbers. If you did not

collect leaves from host plants, it is fine to place multiple larvae (pots) from the same field in the same main collection bag.

**Despatching collected material**

All tests are conducted at the Australian Cotton Research Institute in Narrabri, NSW by Dr Sharon Downes (Bt resistance), and Dr Louise Rossiter (conventional chemistry).

**Step 1:** Keep material alive and fresh by storing it in a refrigerator or esky with a freezer brick that has been wrapped in paper.

**Step 2:** Within 24-48 hours, arrange to deliver the material to your Regional Cotton Extension Officer or arrange to have the larvae or the larvae plus associated plant parts delivered directly to Australian Cotton Research Institute, 21888 Kamilaroi Highway, Narrabri NSW 2390.

We can pay for the postage (tick the 'receiver pays' option on the freight form collected from your RCEO). If your property is in the Namoi valley, deliver the material to the ACRI or call Tracey Parker or Fiona McKenzie on 02 6799 1500 to arrange a pick up.

**For further information contact your RCEO or call Louise or Sharon on 02 6799 1500. <sup>1</sup>CSIRO, <sup>2</sup>NSW DPI. All Cotton Catchment Communities CRC.**

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