Evaluation of insecticides for controlling pale cotton stainer bug

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With the increased adoption of Bollgard II cotton in recent years, higher levels of pale cotton stainer (PCS) infestations have been reported from different areas. PCS cause damage to bolls by inserting their long proboscis to feed on developing and mature seeds. This feeding activity causes black spots on the boll, warty growths inside the boll wall and brown coloured lint. Feeding on seeds results in tight lock, preventing the lint from fluffing out as the boll opens.

In Australia there are no insecticides registered for the control of PCS and they are often incidentally controlled by broad-spectrum insecticides such as synthetic pyrethroids, carbamates and organophosphates that target other pests. As an occasional pest, PCS received very little attention with regard to insecticide evaluation. To date, only one trial has been conducted to identify effective insecticides for PCS (see The Australian Cottongrower 29(2) 2008, pages 41–42). But it is essential to identify which insecticides are effective against this pest whilst also compatible with existing IPM.

In cotton, PCS infestation occurs late in the season when large numbers of whitefly and aphids are also common. Therefore insecticides that are effective against PCS, as well as whitefly and aphids are highly sought after. Pegasus is recommended for both whitefly and aphids (see Cotton Pest Management Guide 2011–12) and was therefore used in this trial to test its efficacy against PCS.

The broad aim of this study was to identify insecticides that were effective against PCS.

Table 1: Insecticides used in the trial

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Formulation (g/L)</th>
<th>Rate (mL/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pegasus 400</td>
<td>Diazinon 500 SC</td>
<td>400</td>
</tr>
<tr>
<td>Pegasus 800</td>
<td>Diazinon 500 SC</td>
<td>800</td>
</tr>
<tr>
<td>Pegasus 400+salt</td>
<td>Diazinon 500 SC + NaCl</td>
<td>400 + 10 g/L of water</td>
</tr>
<tr>
<td>Shield 125</td>
<td>Clothianidin 200 SC</td>
<td>125</td>
</tr>
<tr>
<td>Shield 250</td>
<td>Clothianidin 200 SC</td>
<td>250</td>
</tr>
<tr>
<td>Shield 125+salt</td>
<td>Clothianidin 200 SC + NaCl</td>
<td>125 + 10 g/L of water</td>
</tr>
<tr>
<td>Danadim 300</td>
<td>Dimethoate 400 EC</td>
<td>300</td>
</tr>
<tr>
<td>Danadim 500</td>
<td>Dimethoate 400 EC</td>
<td>500</td>
</tr>
<tr>
<td>Danadim 300+salt</td>
<td>Dimethoate 400 EC + NaCl</td>
<td>300 + 10 g/L of water</td>
</tr>
<tr>
<td>Control</td>
<td>Untreated</td>
<td>—</td>
</tr>
</tbody>
</table>

Trial

The trial was conducted at the late boll stage of Bollgard II cotton (variety Sicot 71BRF) at the Kingaroy Research Station. The trial comprised 10 treatments, each with three replications in a randomised block design. Treatment details are given in Table 1. Trial plots were five rows wide by 15 metres long. There was a buffer row between each replication to facilitate spray equipment and to minimise insecticide drift between plots. The insecticides were applied as a single spray 4 DAT (days after treatment) using an air-induction sprayer with a flat-fan nozzle at 200 L/ha. The experiment was conducted over two seasons, August–September 2012.

Figure 1: Per cent corrected mortality to PCS for different treatments trialled in Bollgard II cotton

August–September 2012

The Australian Cottongrower — 55
were applied with a Kubota B7100 highboy boom sprayer at 110 L/ha with 3.5 bar pressure. The sprayer was fitted with XL 01 non drift nozzles, three per row (one each side of the row on droppers and one over the top of the row on a rigid frame).

Pre-treatment assessments were made the day prior to treatment application. Post-treatment assessments were made at four, nine and 14 days after treatment (DAT). Pest and beneficial numbers were determined using a beat sheet at 3 x 1 metre row sections per plot.

PCS mortality was corrected by using the Abbott (1925) formula. The data was subjected to analysis of variance and mean results were compared using Tukey’s family error rate.

Pre-treatment population

The pre-treatment cotton stainer population was two to seven per metre, 99 per cent of which were adults. Only two groups of beneficials, brown smudge bug (BSB) and spiders, were present in the trial. The population of BSB was 2 to 5 per metre and spider numbers were five to eight per metre.

Effect of insecticides on PCS

Percent corrected mortality of PCS for different treatments are presented in Figure 1. These results show that Pegasus consistently outperformed the other treatments, by reducing the PCS population by 70 to 87 per cent at 4 DAT, 71 to 83 per cent at 9 DAT and 56 to 78 per cent at 14 DAT.

While Shield at a low rate plus salt reduced the population by 75, 66 and 70 per cent at 4, 9 and 14 DAT respectively, Shield at full rate and low rate alone had very little effect.

Danadim reduced the population by 53 to 70 per cent only at 4 DAT with efficacy diminishing thereafter. The results also show that when salt is mixed with a low rate of Pegasus and Danadim, efficacy did not increase. But when salt is mixed with a low rate of Shield, efficacy increased significantly (by up to 50 per cent) compared to a low rate of Shield alone.

Impact on beneficials

The brown smudge bug population was reduced by more than 60 per cent across the treatments after spraying, but also in the control plots. BSB numbers never recovered and therefore this data was not analysed any further.

The impact of the insecticides on spiders is summarised in Figure 2. The terms ‘very low’, ‘low’, ‘moderate’ and ‘high’ used in this document were adopted from the Cotton Pest Management Guide 2011–12. The results show that the impact of all rates of Pegasus on spiders was high (>50 per cent reduction) and that of Danadim was low to moderate (12 to 27 per cent reduction). The impact of Shield on spiders was very low to low (0 to 18 per cent reduction).

Conclusions

Pegasus provided a high level of control of PCS up to 9 DAT. Thereafter effectiveness was reduced, but provided more than 50 per cent control (see Figure 1) suggesting that residual effect of Pegasus against PCS was adequate. Shield provided control only when mixed with salt. The Shield and salt mixture also provide good control of mirids (see The Australian Cottongrower 30(4) 2009, page 37–38). Danadim provided little effect on PCS suggesting that this insecticide may not be suitable for PCS control.

Given the fact that PCS usually infests cotton late in the season when whitefly and aphids are also likely to occur, the use of Pegasus for the control of all these pests will give an added advantage to growers.

We would like to thank Scot Campbell of DAFF Queensland, Kingaroy for his assistance with spraying and Kate Charleston of DAFF Queensland, Toowoomba for valuable suggestions. This work was funded by The Cotton Research and Development Corporation.

Disclaimer: Please note, there are currently no insecticides registered for control of pale cotton stainer in cotton. Always read and follow label directions.