Salt mixtures for mirid management

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Recent trials have shown that reduced rates of insecticide combined with salt have given effective control of mirids — with reduced negative affects on beneficials.

Green and brown mirids have become important mid to late season sucking pests in cotton — particularly Ingard cotton —causing considerable damage (see The Australian Cottongrower July–August 2001, p.6). This is mainly due to the marked reduction in the use of non-selective Helicoverpa insecticides which previously also coincidentally controlled mirids.

Further reduction in the use of broad-spectrum insecticides is expected with two-gene cotton (Bollgard II), increasing the chance that mirids will be more of a problem.

Over this past cotton season, two or three insecticide sprays were required to manage mirids in some valleys, including the South Burnett. Most of the registered mirid chemicals are non-selective and are highly disruptive to a wide range of beneficial species. Use of these disruptive chemicals will minimise the potential value of IPM approaches.

Low rates of existing chemicals have been used to reduce their disruptive effect, but they do not always control the pests.

An adult green mirid.

Low rate insecticide plus salt experiments

A mixture of table salt (NaCl) and lower rates of insecticides was effective against green vegetable bug (GVB) (see 11th Australian Cotton Conference Proceedings 2002, p.401). Salt mixtures enhanced the efficacy of chemicals against GVB and reduced the impact on beneficial insects.

We conducted a trial in irrigated cotton at Byee

in the South Burnett to investigate whether a mixture of salt and low rates of existing chemicals would give similar results against mirids.

A small plot replicated trial evaluated two insecticides — Regent and Steward — at different rates with or without salt (Table 1).

Pre-treatment counts (0 days after treatment — DAT) were made the day before treatments were applied. Post-treatment counts were made at three and six DAT. Mirids and beneficial insects and spiders were sampled using the beat cloth method on three one metre row sections per replication.

Pre-treatment insect number

Pre-treatment mirid numbers were high, ranging from 19 to 27 per metre with five to seven beneficial insects per metre. The proportions of mirid stages (nymphs and adults) and different beneficial insects are given in Figure 1. Seventy per cent of the mirid population were small (1st and 2nd instar) nymphs. The most predominant beneficials were spiders (38 per cent), followed by big-eyed bug (BYB – 20 per cent), damsel bug (DB – 19 per cent), red and blue beetle (RBB – five per cent) and brown smudge bug (BSB – four per cent).

Effect of salt mixtures on mirids

The mixture of Regent at 40 mL per hectare plus salt significantly reduced the number of mirids and was as effective as full rate Regent (Figure 2). The Regent– salt mixture killed 88 per cent and 90 per cent of mirids at three and six DAT respectively — which was 20 per cent more than low rate Regent alone.

Full rate Regent killed 94 per cent and 98 per cent of mirids at three and six DAT respectively. The low rate Regent–salt mixture killed about 15 per cent more adults and large nymphs (3rd, 4th and 5th instar) than small nymphs (1st and 2nd instar Figure 2). This might be due to the presence of nymphs hatched from eggs after treatment.

Steward at 350 mL per hectare plus salt reduced mirid numbers 82 per cent and 76 per cent at

An adult brown mirid.

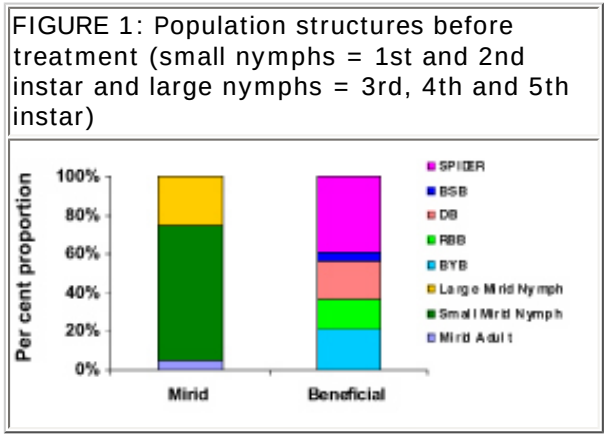

FIGURE 1: Population structures before treatment (small nymphs = 1st and 2nd instar and large nymphs = 3rd, 4th and 5th instar)

three and six DAT respectively. This was 30 per cent greater control than Steward 350 mL per hectare alone and was as effective as the full rate of Steward (800 mL per hectare) which reduced mirids by 85 per cent and 83 per cent at three and six DAT respectively.

Steward provided good knockdown of mirids but by six DAT mirid numbers increased, presumably through hatching from eggs. This compares with Regent that still had very high efficacy at six DAT).

Impact on beneficial insects

The overall impact of treatments on beneficial insects was low. On the untreated plots, numbers of beneficial insects increased throughout the trial. But at six DAT, numbers of beneficial insects in full rate Steward and Regent treated plots were significantly lower than other treatments.

Full rate Regent reduced RBB numbers at six DAT and BYB numbers at three and six DAT. Full rate Steward reduced DB and spider numbers at six DAT. In contrast the low rate insecticide plus salt mixtures generally had a much lower impact on most beneficial species. The exception being the high impact of Regent, with or without salt, on damsel bugs.

Conclusions

Low rates of Regent and Steward plus salt increased mirid mortality in cotton compared to the low rate alone without reducing residual effectiveness compared with the full rates. They also decreased the impact of treatments on beneficial insects and spiders. But Regent plus salt was highly disruptive to DB. So if DB is the major beneficial at the time of treatment, other selective options should be considered.

In Australian cotton, Steward is registered for control of Helicoverpa as well as mirids, and the effect of lower rates on Helicoverpa resistance development, is not known. Low rates plus salt may not be a sound option if both Helicoverpa and mirids are present.

But if mirids are the only major pest insect, lower rate Steward plus salt could be justified.

FIGURE 2: Effects of salt mixture on mirids in cotton

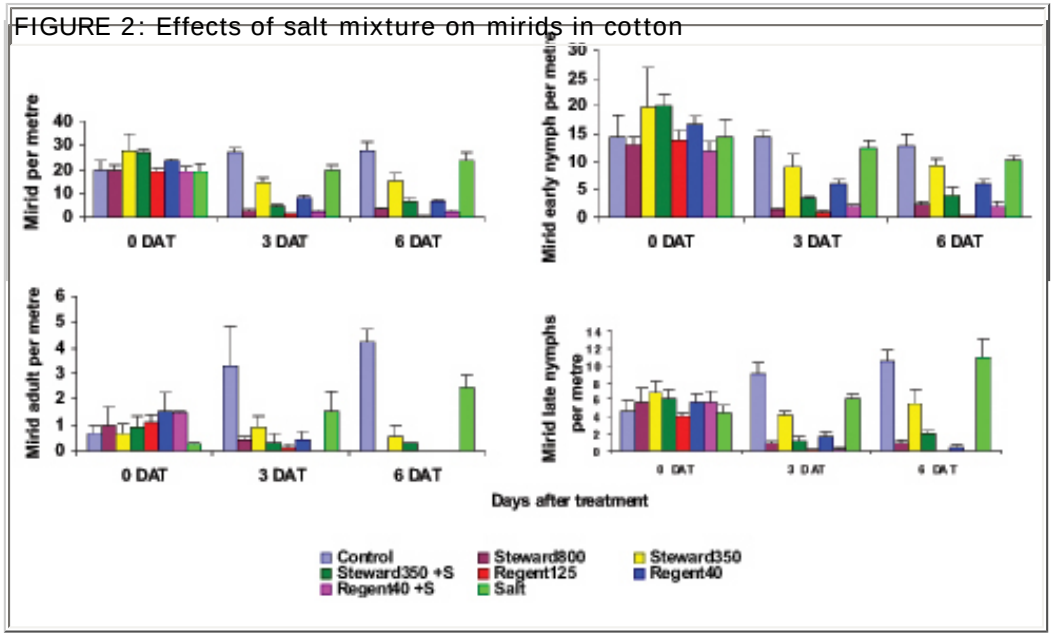

TABLE 1: Treatments and rates used in the trial

Treatment	Formulation (g/L)	Rate (mL/ha)
Regent	Fipronil (200)	125
Regent	Fipronil (200)	40
Regent + Salt	Fipronil (200) + Table salt	40 + 7 g/L of water
Steward	Indoxacarb (200)	800
Steward	Indoxacarb (200)	350
Steward + Salt	Indoxacarb (200) + Table salt	350 + 7 g/L of water
Control	Untreated	–

Use of low rates of either Steward or Regent should comply with the current recommendations of the Insecticides Resistance Management Strategy.

For Steward in particular this means that sprays targeted against mirids should be included in the total allowed against Helicoverpa. And in terms of the strategy, a low-rate application is counted the same as a full-rate application. If there is a maximum of three applications allowed then three low-rate applications is equivalent to three full-rate applications.

Mixing salt with chemicals should be approached cautiously as the synergistic effect we found here may not be found with other chemicals. But the advantage of mixing salt with reduced rates of Regent or Steward is two-fold.

Firstly it is very cost effective as it allows a reduction of more than 50 per cent of the recommended chemical rate. Secondly it reduces the impact of chemicals on beneficial insects and supports the adoption of IPM in cotton.

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