

This article is the first of a two part series to help growers maximise the benefits of using food sprays in cotton

The what, how and when of food sprays

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Over the past five years Australian cotton growers have come to realise the important role beneficial insects play in managing pests on their farms. With a strong push by the cotton industry to adopt truly integrated pest management (IPM), beneficial insects are increasingly assuming a major role.

The development of food sprays and the advent of the predator to pest ratio have already increased growers' understanding of the need to conserve beneficial insects in cotton, and the importance of using them in cotton pest management programs.

Applying food sprays to commercial cotton crops can attract predatory insects to the area being sprayed, keep them there, increase the rate at which they feed and lower helioverpa egg-laying activity.

But for growers to use food sprays to manage cotton pests effectively, they need to understand fully the types of food sprays commercially available, the performance of each of the food sprays for a particular pest situation and how and when to use food sprays.

TYPES OF FOOD SPRAYS

There are four commercially available food sprays in Australia:

- Envirofeast (yeast-based);
- PredFeed (yeast-based);
- AminoFeed (sugar-based); and,
- Mobait (sugar-based).

The two groups of food sprays perform

different functions and so should be used differently.

YEAST-BASED FOOD SPRAYS

Yeast-based food sprays can be used mostly to attract predators into cotton farms early in the season. The movement and build-up of predatory insect populations on cotton farms after an application of a yeast-based food spray is not instant but cumulative. The arrival of some predators after food spray application may attract more predators to move into the farm depending on food availability, mating partners, shelter and other factors.

This means about two to three consecutive applications of a yeast-based food spray at an interval of 10–14 days may be required to bring in reasonable numbers of predators. But yeast-based food sprays cannot make predators stay on-farm unless there is plenty of food (pests) available.

In addition, yeast-based foods are not particularly attractive to *Helicoverpa spp* and sucking pests and so are not commonly used as a feeding stimulant with products such as Bt and NPV.

SUGAR-BASED FOOD SPRAYS

Sugar-based food sprays can be used to make predators already present in the cotton crop stay there, especially in a field which may not have a large pest population. So sugar-based food sprays perform better as 'arrestants' rather than 'attractants'.

If sugar-based food sprays are mixed with biological pesticides, they can make helioverpa larvae feed more, increasing the amount of toxin ingested. In fact this is the main way in which they are used. Sugar-based food sprays can also be more attractive to helioverpa moths and sucking pests.

WHEN TO USE FOOD SPRAYS

Food spray application is determined by the predator to pest (helioverpa) ratio (see IPM guidelines for more information).

- When the predator to pest ratio is 0.5 or higher and helioverpa numbers are below the threshold of two larvae per metre. In this case there is no need to apply food spray (the system is working well).

- When the predator to pest ratio falls below 0.5 but is higher than 0.4, helioverpa numbers are below threshold, and the population is mostly eggs. In this case a food spray should be applied. The choice of a particular food spray will depend on whether predators are to be attracted from outside the field (use a yeast-based food spray) or predators are already on-farm (use a sugar-based food spray). The food spray used should increase your predator numbers, which in turn will feed on the helioverpa eggs to reduce pest numbers and subsequently bring the ratio back up to 0.5 or higher.

- When the predator to pest ratio falls below 0.5 but it is higher than 0.4, and helioverpa numbers are below threshold, the population is predominantly larvae (rather than eggs). In this case a sugar-based food spray or a UV-protected petroleum spray oil should be mixed with biopesticides (NPV or Bt) and applied to the crops to restore the predator to pest ratio to 0.5 or higher. The sugar-based food spray will increase feeding of larvae to ingest a toxic dose of either Bt or NPV, whereas UV-protected petroleum spray oil will prolong the persistence of Bt or NPV on the crop giving the larvae enough time

to eat and ingest a toxic dose of the biopesticides. All these strategies will help bring the predator to pest ratio back to 0.5 or higher.

- If *helicoverpa* larvae levels are above threshold in your next check following the food spray/biopesticide or UV-protected petroleum oil/biopesticide mixture, and the predator to pest ratio is 0.4 or lower, do not use the food sprays. Use one of the soft option insecticides to correct the insect pressure situation. After this, return to the use of yeast-based food sprays to build up beneficial insect numbers and continue with IPM (see IPM guidelines for more details).

HOW TO USE FOOD SPRAYS

Successful establishment of predatory insects in cotton crops may vary in the degree of attraction, the type of food product used and the stage of the growth of the crop when the application of the food spray began. Studies with food sprays (such as Envirofeast) have shown that the number of predatory beetles, bugs and lacewings per metre in cotton crops treated with Envirofeast food spray (yeast-based) at the four true-leaf stage were significantly higher than when the product was applied to cotton crops at two, six or eight true-leaf stages or an unsprayed control plot (Figure 1).

So the optimum time to start application of Envirofeast food sprays to achieve maximum conservation and abundance of

predatory insects, is when the cotton crops are at the four-true leaf stage.

The cost of food sprays can be reduced by 50 per cent or more by applying them as a band spray (33 to 50 per cent band) or as a skip row spray (to every second row) using a ground rig during the early cotton season.

Applying food sprays as a band or skip row spray can increase predatory insect populations to around the same level as entire field applications. When the cotton crop is at a four-true leaf stage, a food spray can be applied at a 33 per cent band to cotton plants using a ground rig or boom sprayer. As the cotton grows, the band width can be increased to 50 per cent.

Part 2 of this series will examine the effect of food sprays on pest and predator populations. 🌱

FIGURE 1: Effect of application of food sprays (Envirofeast) at different growth stages of cotton crops and populations of predators at Yarral near Narrabri 1998-99

