

The efficacy of AMINO-FEED UV[®] in manipulating beneficial abundance in dryland cotton.

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Introduction

An integrated approach to insect pest management, particularly for *Helicoverpa* spp., within cotton-grain farming systems has gained strong impetus in recent seasons. Current integrated pest management (IPM) practices in cotton focus on promoting the conservation of beneficial predators and parasitoids. In addition, the use of selective insecticides early season is recommended to delay the use of disruptive broad-spectrum insecticides for as long as possible. This strategy has had some success on the Darling Downs, South Queensland. However, a problem arises mid-late season when the fruit load is most vulnerable to heliothis attack. Typically, on the Darling Downs, adequate control of heliothis is achievable with beneficials and selective insecticides until peak squaring. After this time, IPM is disregarded as pest pressure increases, disruptive pesticides are used and input costs escalate.

Minimising input costs is a prerequisite for profitable dryland cotton production and any tools that may reduce our dependence on expensive conventional insecticides will help achieve this goal. A huge void in our knowledge of IPM is how to move beneficials into crops when they are needed. Several products are available in the marketplace that claim to have predator-attracting capabilities. Amino-feed UV[®], made by Agrichem Manufacturing Industries Pty Ltd, is a concentrated protein, amino acid and complex sugars formulation that is widely promoted and used in the cotton industry as a food spray and attractant for beneficials.

The aim of this study was to evaluate the efficacy of Amino-feed UV[®] in moving beneficials into dryland cotton from an adjoining unsprayed cotton strip in mid-late season.

Materials and Methods

This trial was carried out at St. John and Edwina Kents' property "Coondarra" near Jimbour on the Darling Downs. Each of two 30 ha blocks of single-skip cotton (Sicot 289i) was divided into four plots, each 350 m long, resulting in four treatments replicated twice. There were 72 row-pairs of cotton in each block with half of the total length of the first 9 row-pairs being season-long unsprayed strips. The remaining 63 row-pairs in each block

adjoining the unsprayed strip and the entire 72 row-pairs in the other half of each block were treated with insecticides as required during the season. At the commencement of the trial, seven insecticide sprays had been applied to the treated sections of each block with the last (profenofos + parathion-methyl) applied 14 days prior to the Amino-feed UV[®] application.

The treatments used in the trial were:

1. Nine row-pairs of unsprayed cotton, adjoining 63 row-pairs of sprayed cotton treated with Amino-feed UV[®].
2. Nine row-pairs of unsprayed cotton, adjoining 63 row-pairs of sprayed cotton with no Amino-feed UV[®] applied.
3. Nine row-pairs of sprayed cotton, adjoining 63 row-pairs of sprayed cotton treated with Amino-feed UV[®].
4. Nine row-pairs of sprayed cotton, adjoining 63 row-pairs of sprayed cotton with no Amino-feed UV[®] applied.

Amino-feed UV[®] @ 3 L/ha and 50 L water/ha was applied to treatments 1 and 3 on the 5th March 2002 by ground rig incorporating one XR110015 and two XR8002 nozzles per row. Crop development was approaching boll opening and pest activity had declined to a low level. Beneficial assessments were done by beating 1 row metre onto a drop sheet with a conduit rod, and counting and recording pest and beneficial invertebrates *in situ*. On each sampling occasion, four 1 m samples were randomly selected per plot in each of row-pairs 3, 5, 7, 11, 15, 25, 41 and 69. Sampling occurred at -1, 1, 3 and 7 days after treatment (DAT). The various invertebrate categories counted are shown in Appendix 1. Data for the various beneficial groups were analysed by ANOVA using the statistical software package Statview.

Results

Pretreatment sampling showed there were 13.6 beneficials per metre in the unsprayed strip, consisting mainly of spiders, predatory bugs and predatory beetles (Figure 1). The insecticide treated bulk area had 1.8 beneficials per metre.

Beneficial abundance in the bulk area (row pairs, 10-72), with and without Amino-feed UV[®] and with and without an adjoining untreated strip is shown in Figure 2. No significant differences between treatments were found for each of the three key predator groups or for total pooled predators at 1, 3 and 7 DAT.

Data for the individual row-pair samples showed there was virtually no movement out of the unsprayed strip, even for the Amino-feed UV[®] treated rows immediately adjoining the unsprayed strip (Figure 3).

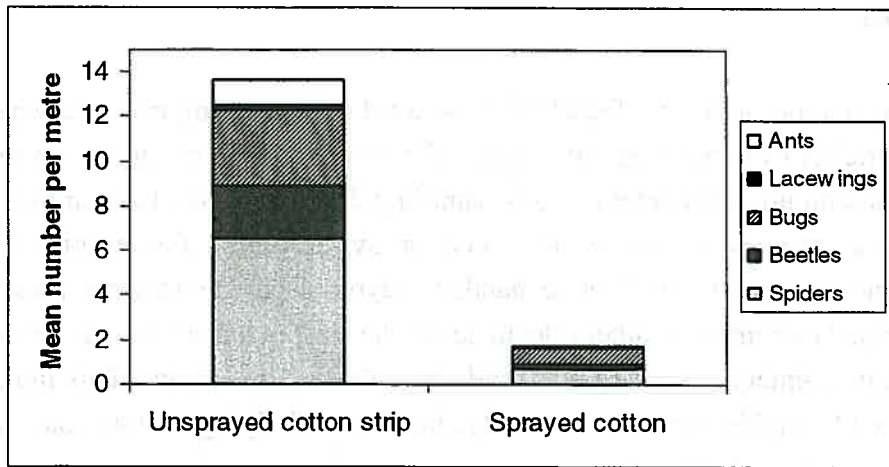


Figure 1. Pretreatment composition of beneficial fauna in the trial area.

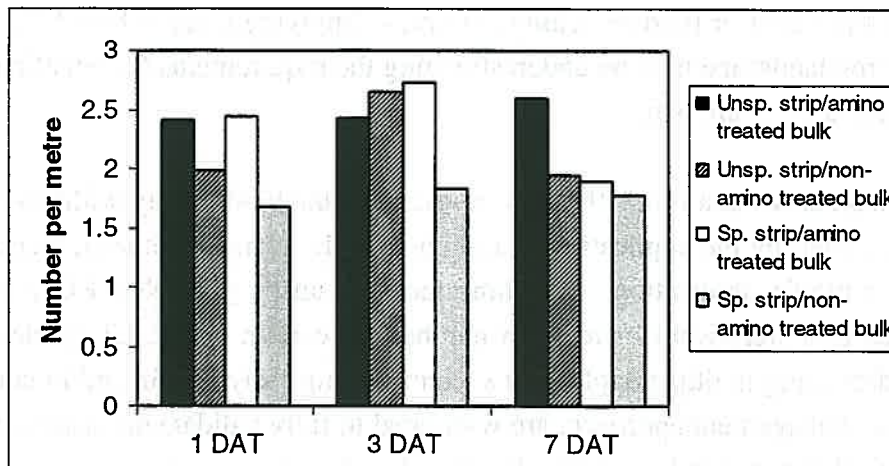


Figure 2. Pooled density of total predators for the bulk area (row-pairs, 10-72) in the various treatments at 1, 3 and 7 DAT.

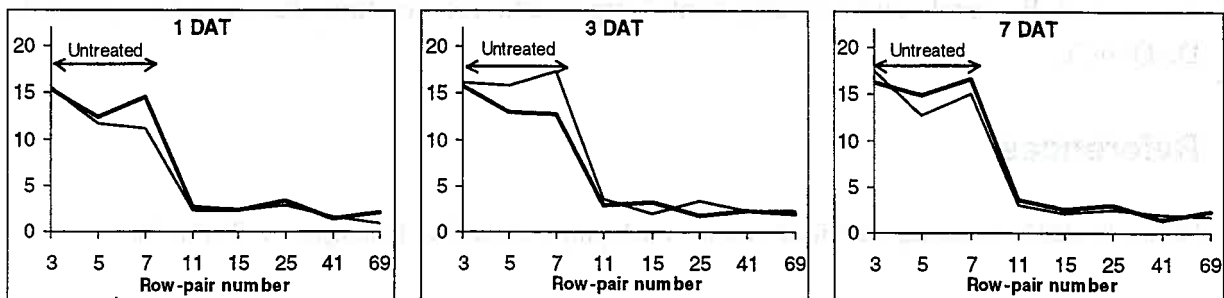


Figure 3. Spatial distribution of total predators/m for individual row-pairs sampled in Amino-feed UV[®] (thick line) and non-Amino-feed UV[®] (thin line) treated plots (row-pairs 10-72) adjoining unsprayed cotton strips (row-pairs 1-9) at 1, 3 and 7 DAT.

Discussion

The single application of Amino-feed UV[®] to sprayed cotton during mid-late season failed to attract beneficials from the adjacent unsprayed cotton. Weather conditions were very dry during the trial with no dew evident on any sampling days. This may have impacted on the ability of some species to access the food spray particles. Just prior to the trial commencement, an average of 8 three banded ladybirds per metre were present in the unsprayed strip. Overnight, numbers declined in the unsprayed strip and increased in a “booting” (panicle emergence) sorghum field about 400 metres away. This indicates that large numbers of ladybirds can move easily, but the underlying factors that drive such movement are poorly understood.

Clearly, as reported here, the application of “food” sprays alone will not always attract predators. Insects have keen receptor systems that respond to very specific chemical and visual cues in their host or food searching activities. Applying a sugar-based “food” to an essentially barren landscape may be underestimating the requirements for beneficial insects to be attracted to a particular site.

Our research has shown that it is difficult to re-establish the biodiversity within a crop once it has been disrupted by the application of insecticides. In a small plot trial, Nemic (2002) reported that multiple applications of Amino-feed[®] to unsprayed INGARD cotton mid-season resulted in a significant increase in numbers of certain beneficial species. Further large plot studies using multiple applications, commencing early season and in conjunction with a soft pest management approach, are warranted to fully validate the worth of Amino-feed[®] and other attractant/food sprays in attracting beneficials into crops.

Acknowledgments

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References

Nemic, S. (2002). Assessing the effectiveness of food sprays. *Australian Cottongrower* 23 (1): 76.

Appendix 1. Pest and beneficial fauna counted.

GROUP	SCIENTIFIC NAME	COMMON NAME
Pest	<i>Creontiades dilutus</i>	Green mirid
	<i>Campylomma liebknechti</i>	Apple dimpling bug
	<i>Nezara viridula</i>	Green vegetable bug
	<i>Helicoverpa</i> spp.	Jassids, leafhoppers Heliothis larvae
Predatory beetles	<i>Diomus notescens</i>	Minute two-spotted ladybird
	<i>Coccinella transversalis</i>	Transverse ladybird
	<i>Micraspis frenata</i>	Striped ladybird
	<i>Coelophora inaequalis</i>	Variable ladybird
	<i>Harmonia octomaculata</i>	Three-banded ladybird
	<i>Harmonia conformis</i>	Common spotted ladybird
	<i>Hippodamia variegata</i>	Spotted amber ladybird Ladybird larvae
Predatory bugs	<i>Deraeocoris signatus</i>	Red & blue beetle Brown smudge bug
	<i>Nabis kinbergii</i>	Damsel bug
	<i>Geocoris lubra</i>	Big-eyed bug
	<i>Orius</i> sp.	Pirate bug
	<i>Oechelia schellenbergii</i>	Predatory shield bug
	<i>Cermatulus nasalis</i>	Glossy shield bug
Predatory lacewings	<i>Micromus tasmaniae</i>	Brown lacewing
	<i>Mallada</i> sp.	Green lacewing
Ants	<i>Iridomyrmex</i> sp.	Small black ant
	<i>Iridomyrmex</i> sp.	Large black ant
Predatory flies	Family Syrphidae	Hover fly larvae
Spiders	Family Theridiidae	Tangel web spider
	Family Salticidae	Jumping spider
	Family Miturgidae	Nightstalking spider
	Family Thomisidae	Flower spider
	Family Oxyopidae	Lynx spider
	Family Corinnidae	Swift ground spider

