

MANIPULATION OF BENEFICIAL INSECTS WITH ENVIROFEAST® FOR INSECT PEST MANAGEMENT IN AUSTRALIAN COTTON

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Abstract

Envirofeast® is an effective foundation for IPM programs in cotton, providing a food source for predatory insects which both attracts them into the crop and sustains them in the absence of pest eggs and larvae. Insect monitoring includes counts of beneficial insects as well as pest numbers in order to assess the need for either Envirofeast® sprays or sprays of compatible chemistry. Production costs and yield under an Envirofeast® based IPM program compare favourably with conventional cotton production systems.

Introduction

Achieving effective pest management through the use of predatory insects has been a long term challenge of agriculture. Typically, the laws of population dynamics mean that predator populations lag behind those of their prey with the result that serious crop damage may be caused by pests before they can be effectively controlled by significant numbers of predatory insects.

This is clearly true in cotton where pests, such as *Heliothis* and *Helicoverpa* spp. are attacked by a number of predators, but due to their voracious appetites, they cause serious loss of production before predatory control can be achieved.

Rhône-Poulenc's Envirofeast® technology aims to manipulate predator populations to achieve effective numbers prior to pest attack so that control can be imposed upon the pest as soon as it appears.

This is achieved in two ways:

Firstly, Envirofeast® acts as a beneficial attractant, drawing beneficial insects into the cotton crop from either natural vegetation or from strategically planted alternative crops which act as a refuge for beneficial insects.

Secondly, Envirofeast® is a food source, providing sustenance to beneficials within the crop, thus maintaining numbers and in some cases leading to an effective increase in beneficial insect numbers.

Discussion

Envirofeast® has been trialled in Australia over a period of three years. Experiments were initially conducted by Dr Robert Mensah of the NSW Department of Agriculture in 1992. Rhône-Poulenc entered into an agreement with NSW Agriculture in 1994 to develop Envirofeast® as a commercial product.

Data gathered during the period of trials with Envirofeast® demonstrate the effectiveness of the product in increasing beneficial insect numbers.

Predatory insects attracted into Envirofeast® plots include *Coccinella repanda*, *Harmonia arcuata*, *Diomus notescens*, *Dicralaius bellulus*, *Geocris lubra*, *Nabis capsiformis*, *Chrysopa* spp., *Lycosa* spp. and *Oxyopes* spp.

Figures 1-4 illustrate the response of several predatory insects collected by D-Vac.

Rhône-Poulenc is developing Envirofeast® to provide a solid foundation for IPM systems in cotton and potentially other crops. By ensuring that predatory insect numbers are sustained at levels which can provide effective *Helicoverpa* control, suitable chemistry can be integrated into the program to manage other pests and augment the activity of predators when excessive pressure occurs. Temik®, applied pre-plant has been effective in controlling early sucking pests and creating an attractive environment for beneficials. Larvin® ovicide, Bt and NPV sprays have all been effective in managing *Helicoverpa* peaks without disrupting the activity of beneficials.

Bug checking requires the monitoring of both pest numbers and the presence of beneficials. Spray decisions for both Envirofeast® and "soft" chemistry are based on the relationship between pest numbers and numbers of beneficials as well as seasonal conditions.

Table 1 records pest and predator numbers, along with the ratio of predators to beneficials from crop establishment to cut-out under an Envirofeast® program. Pest numbers were effectively controlled by predatory insects, with support from compatible chemistry.

Crops grown under an Envirofeast® IPM program have shown yield performance equivalent to crops managed under a conventional program.

Summary

Envirofeast® can be used as an effective IPM tool when combined with strategic compatible chemical sprays. Numbers of beneficial insects must be monitored along with pest numbers to make spray decisions. Economic returns are similar to conventional farming systems.

Acknowledgements

Commercial development of Envirofeast® is conducted by Rhône-Poulenc Rural Australia Pty Ltd under an agreement with New South Wales Agriculture (NSW Ag). We acknowledge the work of Dr Robert Mensah of NSW Ag in this project.

Table 1. Pest and predator numbers recorded at the Norwood trial site during the 1995/96 cotton season.

Date	Pest Nos. (no./m)	Predator Nos. (no./m)	Ratio (pred/pest)
Oct. 25	9.00	0.05	0.006
Oct. 30	0.49	0.83	1.70
Nov. 6	1.56	1.72	1.10
Nov. 8	3.25	1.25	0.38
Nov. 13	0.72	1.27	1.77
Nov. 24	2.10	4.55	2.16
Nov. 29	3.48	5.30	1.52
Dec. 4	1.18	3.47	2.94
Dec. 13	3.27	1.94	0.59
Dec. 15	3.05	0.95	0.27
Dec. 19	2.70	1.88	0.69
Dec. 28	13.2	1.22	0.14
Jan. 4	3.78	1.77	0.46
Jan. 10	4.25	1.38	0.32
Jan. 15	0.87	0.11	0.12
Feb. 7	5.26	0.16	0.03

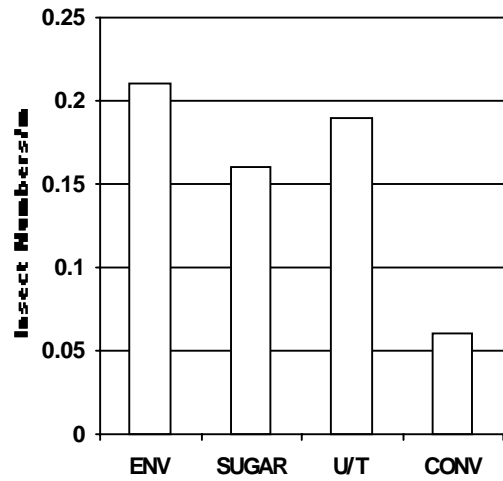


Figure 2. Numbers of *Dicalaius bellulus* collected by D-Vac from variou

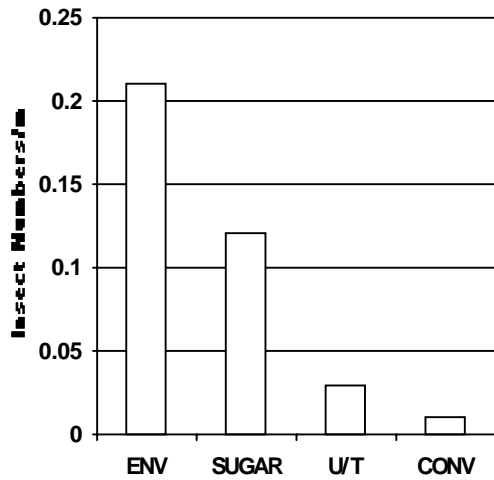


Figure 1. Numbers of *Coccinella repanda* collected by D-Vac from various treatments.

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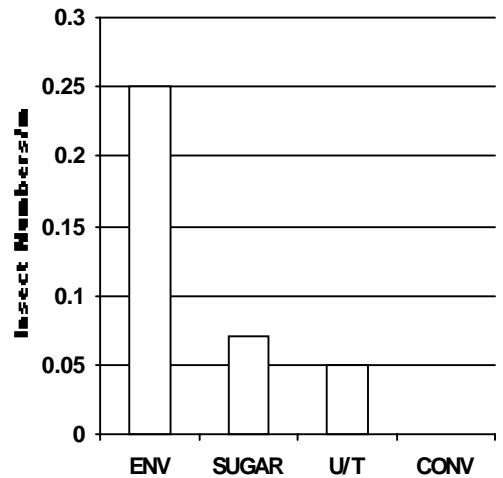


Figure 3. Numbers of *Geocris lubra* collected by D-Vac from various treatments.

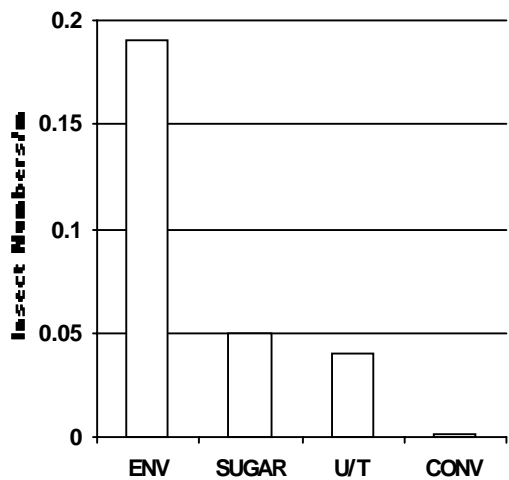


Figure 4. Numbers of *Nabis capsiformis* collected by D-Vac from various treatments.