SHORT NON-REFEREED PAPER

A PRELIMINARY ASSESSMENT OF NEW INSECTICIDES FOR THE CONTROL OF THE SUGARCANE BORER *ELDANA SACCHARINA* WALKER (LEPIDOPTERA: PYRALIDAE)

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Abstract

Since 2003 the synthetic pyrethroid, alpha-cypermethrin, has been successfully used as part of an integrated pest management (IPM) strategy against the sugarcane borer *Eldana saccharina* Walker (eldana). To obviate reliance on one insecticide, three others were assessed for their efficacy against this pest in a replicated field trial; indoxacarb, chlorantraniliprole and triflumuron.

Treatments were applied monthly for four months, commencing in October, to carry-over sugarcane. The standard treatment, alpha-cypermethrin, was included and applied at eight two-weekly applications (the registered practice) as well as five x one-monthly applications, both commencing in August.

Results showed that, compared to the untreated control, all treatments significantly reduced eldana damage (expressed as the percentage of internodes bored). Damage estimates in the final survey before harvest showed chlorantraniliprole to be the most effective insecticide, with the percentage of internodes bored in the treated and untreated plots being 3.5 and 18.4% respectively. Levels of damage in the indoxacarb, triflumuron and standard alpha-cypermethrin treatments were 5.8, 9.3 and 7.0% respectively. The least effective treatment was the five monthly applications of alpha-cypermethrin (estimated damage 10.5%).

Estimates of treatment effect on tons sucrose/ha. showed that all treatments significantly increased yield. The most effective treatment was again chlorantraniliprole (8.4 tons sucrose/ha compared to the control, 4.9 tons sucrose/ha). Yield estimates in the indoxacarb, triflumuron and standard alpha-cypermethrin treatments were 7.1, 7.6 and 7.1 tons sucrose/ha respectively. The least effective treatment was the five monthly applications of alpha-cypermethrin (6.9 tons sucrose/ha).

These results show that the insecticides tested, and the revised approach using alpha-cypermethrin, are effective in suppressing eldana damage and improving crop yield and offer potential alternative strategies for eldana control.

Keywords: Eldana saccharina Walker, control, insecticides, new approaches, sugarcane

Introduction

Insecticide use has been part of an IPM strategy against the sugarcane borer *Eldana saccharina* Walker (Lepidoptera: Pyralidae) (eldana) since 2003 (Leslie, 2003). However,

only the synthetic pyrethroid, alpha-cypermethrin, is currently registered for use against this serious economic pest. For stewardship and related reasons, reliance cannot be placed on one insecticide and alternatives are required. The study reported here examines the efficacy of three alternative insecticides against eldana in a field trial.

Trial Procedures

The trial was conducted on a ratoon crop of NCo376 (eight months old in August 2012). Treatments used are shown in Table 1. They comprised three insecticides as well as reduced application frequency of the standard alpha-cypermethrin treatment. Insecticides were applied in 350 L water/ha using modified knapsack sprayers, where the nozzles were arranged to spray behind the spray tank at right angles to the cane rows. By walking along an interrow, the rows on both sides were treated. Because of this, only every other interrow was walked, so reducing the time to apply a treatment. Gross plots were 25 m by 12 rows. Nett plots were 15 m by 6 rows. Treatments were replicated six times.

Alpha-cypermethrin treatments commenced in August. Other insecticide applications commenced in October, the aim being to have insecticides applied over the period when eldana damage tends to increase rapidly.

During the trial, four surveys were conducted by randomly collecting 50 stalks per plot. Treatment effects were determined by estimates of damage (per cent internodes bored (%IB) and crop yield. The latter comprised the near-infrared (NIR) analysis of 12 stalks/net plot collected at harvest.

Table 1. Insecticides used, rates and application frequency.

Insecticide	Type of chemistry	Rate applied (mL/ha)	Date of first application	Application frequency
Alpha-cypermethrin	Synthetic pyrethroid	200	August	Eight fortnightly applications
Alpha-cypermethrin	Synthetic pyrethroid	200	August	Five x monthly applications
Indoxacarb	Oxyadiazine	300	October	Four x monthly applications
Chlorantraniliprole	Anthranilic diamide	200	October	Four x monthly applications
Triflumuron	Chitin biosynthesis inhibitor	80	October	Four x monthly applications

Results

Treatment effect on eldana damage

The impact of treatments on eldana damage are summarised in Table 2. From November onwards, treatments significantly reduced eldana damage compared to the control and, in the final survey, all treatments did so. In the final survey, while no product treatment was significantly better than any other, the lowest level of damage was shown in the chlorantraniliprole treatment (3.5% IB) and the highest in the monthly alpha-cypermethrin application (10.5% IB). Damage in the control was 18.4% IB.

Table 2. The impact of treatments on *Eldana saccharina* damage (%IB) from September 2012 to March 2013.

Insecticide	Treatment	Month of survey			
		Sept	Nov	Jan	Mar
Nil	Untreated control	8.20	11.00	18.18	18.41
Alpha-cypermethrin	Eight fortnightly applications	9.11	7.11*	4.70*	6.95*
Alpha-cypermethrin	Five x monthly applications	9.63	7.75*	6.78*	10.52*
Indoxacarb	Four x monthly applications	7.26	7.50*	4.82*	5.80*
Chlorantraniliprole	Four x monthly applications	7.67	5.73*	4.67*	3.46*
Triflumuron	Four x monthly applications	9.40	8.25	8.26*	9.25*
LSD 0.05		3.05	2.76	2.78	3.35

*Values significantly different to the control

Treatment effect on crop yield

The effect of treatments on three measures of crop yield is shown in Table 3. Based on tons estimated recoverable crystal (ERC) and sucrose, all treatments significantly increased yield compared to the control. Chlorantraniliprole was the most effective treatment, improving tons sucrose/ha by 71% compared to the control, but this was not significantly better than other treatments tested. For tons ERC, chlorantraniliprole was again the most effective product, increasing yield by 82.5% compared to the control. Three of the five treatments significantly improved tons cane/ha: triflumuron, chlorantraniliprole and the monthly alpha-cypermethrin treatment. Of these, triflumuron was the most effective, increasing yield by 36% compared to the control.

Table 3. Effect of treatments on three measures of crop yield.

Insecticide	Treatment	Crop yield parameters		
		Cane (t/ha)	ERC (t/ha)	Sucrose (t/ha)
Nil	Untreated control	56.4	4.0	4.9
Alpha-cypermethrin	Eight fortnightly applications	67.7	6.2*	7.1*
Alpha-cypermethrin	Five monthly applications	71.2*	5.8*	6.9*
Indoxacarb	Four monthly applications	70.7	6.0*	7.1*
Chlorantraniliprole	Four monthly applications	73.7*	7.3*	8.4*
Triflumuron	Four monthly applications	76.5*	6.5*	7.6*
LSD 0.05		14.3	1.38	1.57

*Values significantly different to the control

Discussion

Since alpha-cypermethrin was first registered (in 2003), the standard recommendation has been to apply it eight times to selected carry-over fields at two-weekly intervals starting in August. These results suggest that five x one-monthly applications, also starting in August, are equally effective. This has implications not only for the economics of treating for eldana control, but also for reducing any environmental hazards that may arise from the use of this product.

In carry-over crops, eldana damage increases over summer, particularly from November to January (see for example, control plot values, Table 2). These results show that the insecticides applied, starting in October, did effectively suppress damage over this critical period. It may thus be possible to commence treatment application later than August and apply it less frequently with no loss in efficacy, so further reducing costs of eldana control.

This trial has also shown that three new insecticides are effective in reducing eldana damage and improving crop yield. Additional confirmatory trials are required but these insecticides provide promising alternatives to alpha-cypermethrin. Being effective and having differing modes of action they can, if registered, contribute to reducing the impact of eldana while reducing the risk of resistance arising from the repeated use of one insecticide alone. Such options will contribute significantly to the sustainability of this component of the eldana IPM strategy.

Conclusions

The insecticides indoxacarb, chlorantraniliprole and triflumuron have been shown to be as effective as alpha-cypermethrin for eldana control.

A revised (reduced) application frequency of alpha-cypermethrin was as effective as the current standard practice.

REFERENCE

Leslie GW (2003). Impact of repeated applications of alpha-cypermethrin on *Eldana saccharina* (Lepidoptera: Pyralidae) and on arthropods associated with sugarcane. *Proc S Afr Sug Technol Ass* 78: 104-113.