Performance of Selected Insecticides to Control Sri Lankan Weevil on Lychee
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PROJECT JUSTIFICATION AND OBJECTIVE:

IR-4 has received requests for the registration of insecticides to control the Sri Lankan weevil (*Myllocerus undatus*.) on lychee. Efficacy data is needed to support an insecticide registration to control the pest. Adherence to Good Laboratory Practices (GLPs) is not required for trials conducted under this research plan.

IR4 requested the UF-IFAS-TREC Tropical Fruit Entomology laboratory to test commercial formulations of Cyantraniliprole, Zeta cypermethrin + bifenthrin and Dinotefuran to control *M. undatus*.

METHODS:

Source of insects: *Myllocerus undatus* weevils were collected from naturally infested unsprayed *Litchi chinensis* and *Chrysobalanus icaco* plants and kept in the laboratory inside plastic cages provided with bouquets of lychee leaves for 1-5 d before the start of the efficacy trial.

Insecticide treatments: Individual branches of separate trees were sprayed on November 6, 2018 with the insecticide treatments described in Table 1. Products were mixed with water using an application volume of 100 gallons per acre which is the common gallonage used by growers. Branches were sprayed to run off with a 2- gallon sprayer and allowed to dry. Nine individual branches (= 9 replicates) were sprayed per treatment and nine untreated branches were used as controls. Treated and control branches were covered with a mousseline cage. Five active and healthy weevils were released inside each cage twelve hours after the insecticide applications. Mortality was scored over time at 2, 6, 9, 19 and 22 days after treatment. Weevil feeding was recorded as the number of notches along the leaf margins at day 22 after treatment.

Data analysis: Two-way ANOVAs. Differences among the treatments were detected through Tukey's HSD range tests (SAS 9.4)

Table 1. Treatments

Trt#	Formulated Product	Active ingredient	Rate of formulated product per acre	Rate of active ingredient per acre	Application Type	Spray Volume (GPA)
01	Untreated	N/A	N/A	N/A	N/A	N/A
02	Exirel- high	cyantraniliprole	20.5 fl oz	0.133 lb	Foliar	100
03	Exirel- low	cyantraniliprole	10 fl oz	0.065 lb	Foliar	100
04	Hero- high	zeta cypermethrin + bifenthrin	10. 3 fl oz	0.10 lb	Foliar	100
05	Hero- low	zeta cypermethrin + bifenthrin	4 fl oz	0.04 lb	Foliar	100
06	Venom- high	dinotefuran	4 fl oz	0.175 lb	Foliar	100
07	Venom- low	dinotefuran	2 fl oz	0.088 lb	Foliar	100

RESULTS:

Two days after treatment, Hero (high and low rates) was more effective than any other insecticide (Figure 1, Tables 2 & 3). There were no differences between the mortality levels achieved by high and low rates of Hero. The second most effective insecticide was Venom, which was significantly more effective at the high rate compare with the low rate. The least effective insecticide was Exirel, which caused mortality levels similar to the control regardless of the rate.

Six days after treatment the high rate of Hero caused 100% mortality, which was statistically similar to the low rate. Venon at high rate continued to be the second most effective insecticide. Venom (low), Exire (high), and Exirel (low) were not significantly different causing weevil mortalities ranging from 68-48 % (Figure 1, Tables 2). No mortality was recorded in the control treatment.

Nine days after treatment all insecticides except Exirel (low) had caused mortality rates approaching 100%. Exirel low caused significantly lower mortality than Hero at high and low rates (Figure 1, Table 2). At this time mortality in the control was approximately 2%.

By days 19 and 22 after treatment all insecticides had caused nearly 100% weevil mortality and no differences were observed among treatments. Mortality in the control treatment did not surpass 5% (Figure 1, Table 2).

Weevil feeding was significantly reduced by all insecticides treatments. No feeding damage was observed in the Hero (high) treatment and very little damage was recorded in all other insecticide treatments when compared with the untreated control (Table 3, Figure 2).

Conclusions

Hero provided a fast knock down effect on *M. undatus*. Other insecticides had a delayed effect but eventually caused high mortality levels at high and low rates. All insecticide treatments significantly reduced damage by the weevils.

Table 2. Percent of weevil mortality (means ± standard error).

	Days After Treatment				
Formulated Product	2	6	9	19	22
Untreated	0 ± 0 d	0 ± 0 d	2.2 ± 2.2 c	4.4 ± 2.9 b	13.3 ± 6.7 b
Exirel - high	13.3 ± 4.7 cd	68.9 ± 10.1 bc	95.6 ± 2.9 ab	100 ± 0 a	100 ± 0 a
Exirel – low	13.3 ± 3.3 cd	48.9 ± 7.5 c	82.2 ± 6.2 b	97.8 ± 0 a	100 ± 0 a
Hero – high	91.1 ± 3.5 a	100 ± 0 a	100 ± 0 a	100 ± 0 a	100 ± 0 a
Hero – low	80.0 ± 9.4 a	93.3 ± 4.7 ab	97.8 ± 2.2 a	100 ± 0 a	100 ± 0 a
Venom – high	56.7 ± 4.1 b	90.6 ± 3.8 ab	97.8 ± 2.2 ab	100 ± 0 a	100 ± 0 a
Venom - low	24.4 ± 6.5 c	68.9 ± 7.5 bc	93.3 ± 3.3 ab	100 ± 0 a	100 ± 0 a

Values not followed by the same letter in a column are significantly different (P < 0.0001; df = 56).

Figure 1. Average number of dead weevils on days 2 (A.), 6 (B.), 9 (C.), 19 (D), 22 (E) after treatment. *One bag (out of 9) in this treatment had only 4 weevils instead of 5.

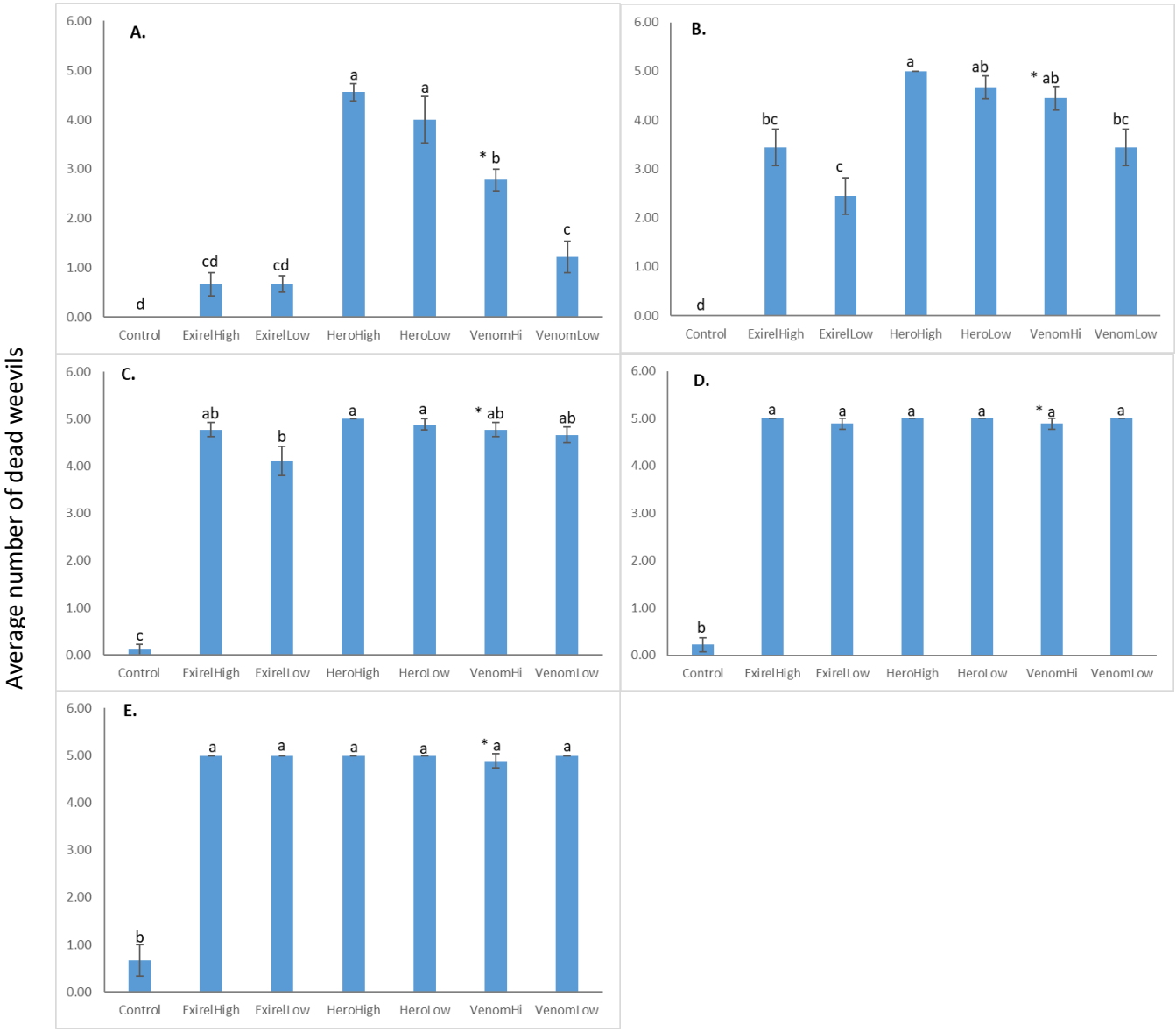

Table 3. The average number of notches per leaf at the end of the experiment (means ± standard error).

Formulated Product	22 Days after treatment
Untreated	100 ± 0 a
Exirel - high	1.67 ± 0.58 bcd
Exirel – low	2.89 ± 0.68 b
Hero – high	0 ± 0 d
Hero – low	0.33 ± 0.24 cd
Venom – high	0.67 ± 0.29 cd
Venom - low	2.22 ± 0.70 bc

Values not followed by the same letter in a column are significantly different (P < 0.0001; df = 56).

Figure 2. Average number of notches per leaf at the end of the experiment. The control had over 100 notches per leaf.