EVALUATION OF SELECTED INSECTICIDES AND INSECTICIDE MIXTURES AGAINST BEET ARMYWORM AND CABBAGE LOOPER ON COTTON

Osama El-Lissy, Wendy Shepard, Randal Schwartz, and Frank Myers
Texas Boll Weevil Eradication Foundation, Inc.
Abilene, TX

Abstract

Selected insecticides were evaluated for effectiveness against the beet armyworm and cabbage looper in commercially grown cotton fields in San Angelo, Texas. Best results were obtained with a combination of Pirate® and Karate®. Results of this experiment indicate that unusually heavy infestations can currently be controlled.

Introduction

The beet armyworm, *Spodoptera exigua* Hübner (BAW), and cabbage looper, *Trichoplusia ni* (CL) reached alarming levels in many of the cotton-growing areas in Texas in 1995. The infestation levels of BAW in many fields were uncontrollable, and in some areas growers had to abandon their crop due to the unavailability of effective materials. Others attempted to control the populations, spending up to $150 per acre and still experienced an economic loss. Although the BAW is considered to be an occasional pest, it can be devastating as evidenced in Mississippi in 1988 (Head, 1989), and 1993 (Layton, 1994), and in far West Texas in 1994, and in South Texas, the Coastal Bend and West Texas on seedling cotton in 1995 (Huffman et al., 1995).

Dimilin (diflubenzuron) is an insect growth regulator (IGR) that when ingested renders susceptible larvae unable to complete the next molt (Muldner and Gijswijt, 1973). Even if they succeed in molting, they usually die soon thereafter (Grosscurt, 1993). It has been determined previously that the BAW is susceptible to diflubenzuron through cuticular disruption after ingestion (Granett et al., 1983).

The effect of Dimilin has been observed to be slow as compared to some of the conventional insecticides. Under high levels of infestations, larvae may cause economic damage before they become affected by Dimilin.

In addition to evaluating these selected insecticides against the BAW and CL, another objective was to determine whether the effectiveness of some of these insecticides can be increased by applying them to populations that have been predisposed by Dimilin.

Materials and Methods

This study was conducted in San Angelo, Texas, on a commercially grown cotton (HS200) field that was planted on June 6 and 7, 1995. The field was evenly sectioned into 45 plots of 10 acres each. Plots were (120 ft. wide by 2,500 ft. long) arranged in a randomized complete block design and replicated five times, with eight insecticide treatments and one untreated control. The selected insecticides and rates were: (1.) Larvin at 0.8 lb/ac plus Curacron 8E at 1.0 lb/ac, (2.) Dimilin 4L at 0.125 lb/ac followed with Curacron 8E at 1.0 lb/ac after 48 hours, (3.) Dimilin 4L at 0.125 lb/ac followed with Lannate LV at 0.45 lb/ac after 48 hours, (4.) Dimilin 4L at 0.125 lb/ac, (5.) Lannate LV at 0.375 lb/ac, (6.) Capture 2EC at 0.025 lb/ac plus Orthene 90S at 0.5 lb/ac, (7.) Ammo 2.5EC at 0.06 lb/ac plus Orthene 90S at 0.5 lb/ac, and (8.) Pirate at 0.21 lb/ac plus Karate at 0.03 lb/ac.

Foliar applications of the insecticides were made with a high-clearance sprayer equipped with Teejet standard flat fan (8003 tip size) nozzles which delivered 10.5 gallons of finished spray per acre at 45 PSI pressure. The spray boom was set just above the plant canopy during application. Foliar fertilizer (15% nitrogen-2% phosphorus-8% potassium) at 32 oz/ac was added to all insecticide mixtures to buffer the water. The first set of applications was made when crop phenology was at the blooming stage on September 2. Curacron and Lannate were applied on September 4 to the Dimilin plots designated for evaluation of the predisposition concept. The second set of applications was made on September 9, and the Curacron and Lannate applications designated for the Dimilin plots were made on September 11.

Beet armyworm and cabbage looper larvae were sampled using a 14 x 20 x 5.5 in. plastic pan. A total of five samples were taken from each plot. The first sampling point was 50 feet from the edge of the field, with subsequent samples taken 25 feet apart lengthwise through the plot. With the pan near the plant terminal, each sample was taken by tapping the upper half of the plant three times with a 15 x 1 x ½ in. stick using, as much as possible, the same force on each plant to dislodge the larvae into the plastic pan. All larvae collected from 10 alternating plants were placed in a plastic bag, noted with the date, sampling point and sent to the laboratory. The different species were separated, and BAW larvae were classified by size---small (< 0.25 in), medium (0.25-0.5 in) and large (>0.5 in)---and recorded. Bollworm and budworm were not in sufficient numbers to analyze. A pretreatment sample was taken 24 hours prior to the first set of insecticide applications. Post-application sampling began at 24 hours after the first application and thereafter every 24 hours for the duration of the study except on September 9, 13, 14, 15, 19, and 20 due to rain.

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All statistical analyses were carried out using "ANOVA" and "RANGE" tests, MSTAT-C statistical software programs (Michigan State University, Copyright 1988).

Results

Results are presented in graphic form:

The mean number of small BAW larvae in the Pirate + Karate treated plots was significantly less as compared to all other treatments. There was no significant difference in the Ammo + Orthene treated and the untreated plots. There was no difference between the Dimilin (alone) treated plots and the Dimilin followed by Lannate or Curacron. (Figure 1)

Pirate + Karate provided the most control to the medium size BAW larvae as compared to all other treatments. Curacron after Dimilin significantly reduced the populations as compared to the untreated plots, and provided relatively better control as compared to other treatments. Ammo + Orthene did not provide any reduction over the untreated plots. (Figure 2)

Pirate + Karate provided the most control when the mean number of the large BAW larvae was compared to all other treatments. (Figure 3)

Pirate + Karate provided the highest level of control of CL larvae as compared to the other treatments. There was no difference between the number of larvae in the Dimilin (alone) treated plots and the Dimilin followed by Curacron or Lannate. (Figure 4)

The mean number of cotton bolls per plant was highest in the Pirate + Karate treated plots (5 bolls per plant), and lowest in the untreated plots (1.58). (Figure 5)

These results indicate that Pirate + Karate in a tank mix can be used as a curative material in providing a needed control under substantial levels of Beet Armyworm, and Cabbage Looper infestations.

Acknowledgments

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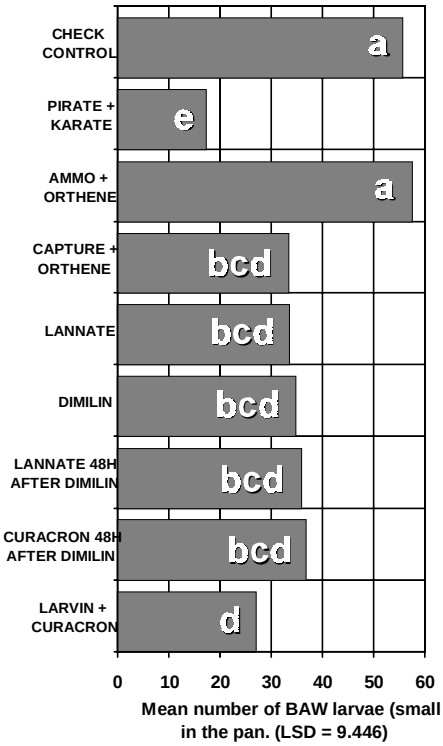

Figure 1: Mean number of BAW larvae (small) per pan, San Angelo, Texas, 1995. Bars showing the same letter are not significantly different from each other at P≤ 0.05 as judged by ANOVA and RANGE tests.

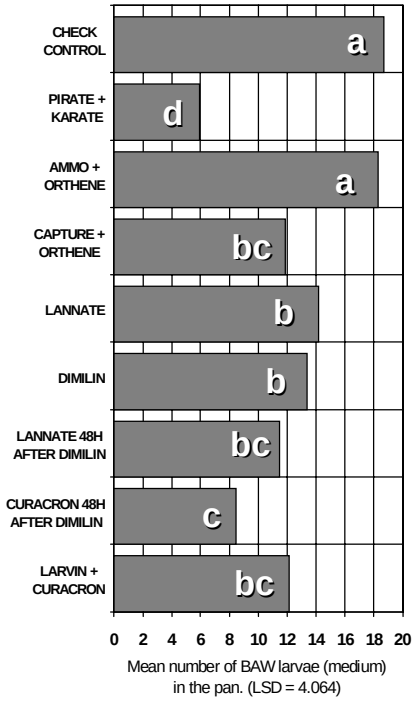

Figure 2: Mean number of BAW larvae (medium) per pan, San Angelo, Texas, 1995. Bars showing the same letter are not significantly different from each other at P≤ 0.05 as judged by ANOVA and RANGE tests.

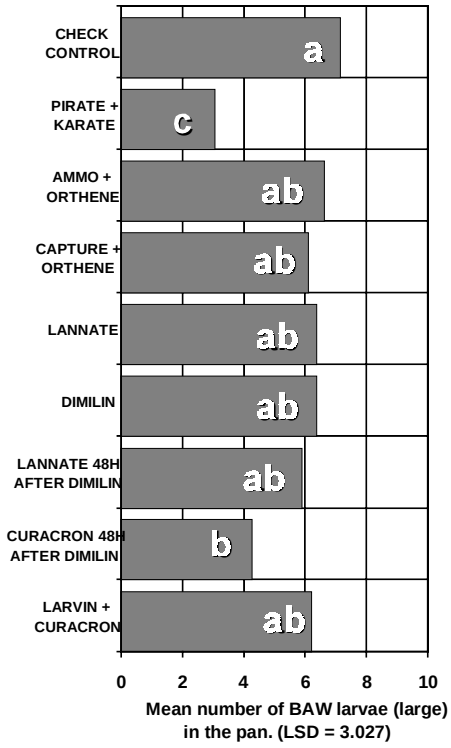

Figure 3: Mean number of BAW larvae (large) per pan, San Angelo, Texas, 1995. Bars showing the same letter are not significantly different from each other at P≤ 0.05 as judged by ANOVA and RANGE tests.

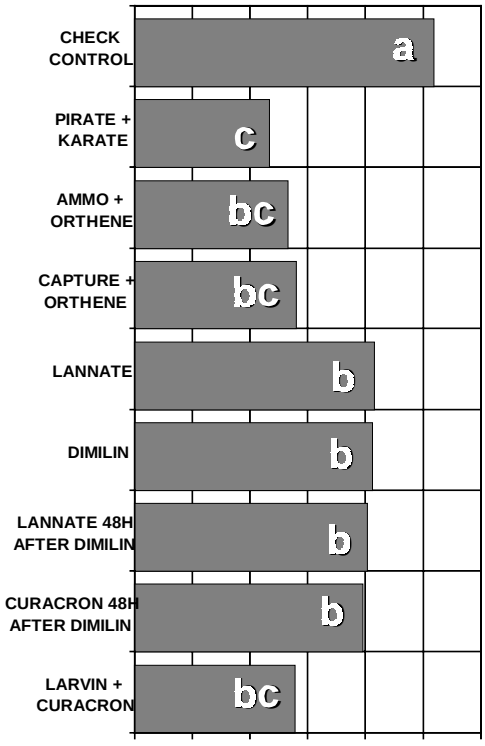

Figure 4: Mean number of Cabbage Looper larvae per pan, San Angelo, Texas, 1995. Bars showing the same letter are not significantly different from each other at P≤ 0.05 as judged by ANOVA and RANGE tests.

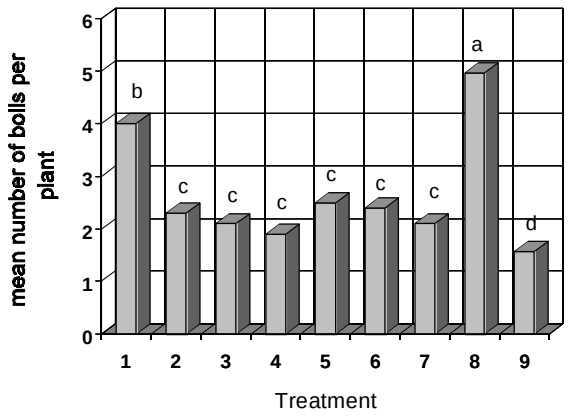

Figure 5: Mean number of cotton bolls per plant, San Angelo, Texas, 1995.Treatments: (1) Larvin + Curacron, (2) Curacron 48h after Dimilin, (3) Lannate 48h after Dimilin, (4) Dimilin, (5) Lannate, (6) Capture + Orthene, (7) Ammo + Orthene, (8) Pirate + Karate, (9) Untreated Check. Bars showing the same letter are not significantly different from each other at $P \leq 0.05$ as judged by ANOVA and RANGE tests.