# EFFICACY OF REGISTERED AND EXPERIMENTAL INSECTICIDES AGAINST BEET ARMYWORM

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## Abstract

Field trials were conducted to evaluate the activity of selected insecticides against beet armyworm larvae at two locations in Northeast Louisiana. Confirm 2F, Pirate 3F, Spinosad 4F and Lorsban 4EC were effective in controlling beet armyworms. Larvin 3.2F and Spod-X provided erratic and inadequate control of this pest under the conditions experienced during these trials.

## Introduction

The beet armyworm [*Spodoptera exigua* (Hübner)], a sporadic pest in the Southeast since the 1920's (Wilson 1934), attacks a broad range of hosts including agronomic crops, vegetables and weeds (Cobb & Bass 1975, Sullivan et al. 1991, Chandler & Ruberson 1994). Although this pest historically has been perceived as an occasional late season pest of cotton, population outbreaks experienced in the 1980's and early 1990's in Alabama, Georgia, Louisiana, Mississippi (Douce & McPherson 1991, Burris et al. 1994, Layton 1994, Smith 1994) and more recently in Texas (Arrillago 1995) have demonstrated the potential damage that this pest may cause. During the outbreak of 1993, 60% of the total cotton acreage in the mid-south and southeastern states was infested by beet armyworms, and ca. 35% of this acreage had infestations well above an economic level (Smith 1994).

The overall economic impact of beet armyworm infestations to producers vary from region to region and include both the direct yield loss caused by insect injury and the high production costs associated with frequent and expensive insecticide usage. The average number of insecticide applications per acre targeted at the beet armyworm in the U.S. during 1993 was 0.3 at an average cost of $12.30 per application (Williams 1994). However, these figures represent national averages and in some states, such as Alabama and Mississippi, large cotton acreages were abandoned after the cost of controlling this pest exceeded $100-150 per acre (Layton 1994, Smith 1994).

## Materials and Methods

Field tests were conducted to evaluate the effectiveness of currently registered and experimental insecticides against natural populations of beet armyworm in Northeast Louisiana. Tests were conducted at the Northeast Research Station (Test 1) near St. Joseph, LA and at the Macon Ridge location of the Northeast Research Station (Test 2) near Winnsboro, LA during the summer of 1995.

Each test was arranged in a randomized complete block design with 4 replications. The plot size for both studies was 4 rows (40-inch centers) by 50 ft. Test 1 was planted to `Stoneville LA 887' cotton on 16 May and Test 2 was planted to `DPL 5690' cotton on 20 June. Treatments included in this study were Confirm® 2F (tebufenozide, Rohm & Haas Co.), Larvin ® 3.2F(thiodicarb, Rhone-Poulenc Ag. Co.), Lorsban® 4EC (chlorpyrifos, DowElanco), Pirate® 3F (American Cyanamid Co.), Spinosad ® 4F (DowElanco) and Spod-X® virus (Crop Genetics International).

Pre-treatment densities of larvae were estimated by taking 6-10 drop cloth (3 ft X 3 ft) samples in each block. Treatments for Test 1 and 2 were applied on 15 and 30 August, respectively, with a high clearance sprayer. In Test 1, the sprayer was calibrated to deliver 10.0 gal total spray volume/acre through Teejet X-12 hollow cone nozzles (2/row) at 52 psi. In Test 2, the sprayer was calibrated to deliver 11.3 gal total spray volume/acre through Teejet X-8 hollow cone nozzles (2/row)at 44 psi.

Treatment effect was measured by taking 2 drop cloth samples in each plot and counting the number of live larvae. At each sampling period [2, 5, 7 and 10 days after treatment (DAT)], one row of each plot was sampled, so that row 1, 2, 3 and 4 were sampled at 2, 5, 7 and 10 DAT, respectively. This sampling pattern was used to avoid sampling an individual `hit'(recently hatched egg mass) which may have been disturbed during an earlier sampling period. Recently deposited egg masses were avoided during the last two sampling dates, because these `hits' represented infestations which would not have received the full treatment effect. Total number of live larvae/ft of row was used in the data analysis. Data were analyzed by ANOVA and means were separated according to Fischer's protected LSD (SAS Institute 1988).

## Results

The average number of beet armyworm larvae/ft of row in Test 1 and 2 prior to application of the various treatments was 5.1 and 12.5, respectively. In Test 1, numbers of beet armyworm larvae were significantly less than that of the untreated control for all treatments at 3 and 5 DAT, except for Spod-X (Table 1). Similar results were observed at 7 DAT, when all treated plots except for Spod-X and Larvin had fewer live larvae than the control plots. At the final observation (10 DAT), all treatments had significantly

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reduced the number of beet armyworm larvae relative to the untreated control (Table 1).

In Test 2, no significant differences among treatments were observed at 3 DAT (Table 2). At 5 DAT, only the Pirate and Spinosad treatments significantly reduced the number of beet armyworm larvae compared with the untreated control. All treated plots, except for Larvin and Spod-X, had significantly fewer larvae than the untreated control at 7 DAT. By 10 DAT, significantly fewer larvae were observed in all treatments, except for Larvin, relative to the untreated control (Table 2).

## Discussion

In both tests, Pirate and Spinosad provided excellent beet armyworm control. These insecticides performed as well as or better than the standard, Lorsban. The fast action of these two compounds make them very attractive for future use in beet armyworm control. Confirm also provided satisfactory control of beet armyworm, particularly after 5 days in Test 1 and after 7 days in Test 2. Although this product has a slightly slower mode of action than Pirate and Spinosad, it appears to be well suited for integration into an overall pest management program. Larvin's performance in these tests was erratic. It provided satisfactory control at times in Test 1, but was ineffective in Test 2. In both tests, Spod-X was effective only at 10 DAT, which suggests very slow activity against beet armyworm under the conditions of these studies. Lorsban seems to remain an effective tool in the control of beet armyworm in Northeast Louisiana.

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Table 1. Efficacy of selected insecticides against beet armyworm in Test 1, Northeast Research Station, St. Joseph, LA.

| | | No. beet armyworm larvae/row ft | | | |
|---|---|---|---|---|---|
| Treatment [a] | Rate | 3 DAT [b] | 5 DAT | 7 DAT | 10 DAT |
| A | 0.125 | 2.1 b | 0.6 c | 1.1 b | 0.5 b |
| B | 0.6 | 1.7 b | 2.7 b | 1.9 ab | 0.9 b |
| C | 1.0 | 0.9 b | 0.5 c | 1.2 b | 0.5 b |
| D | 0.2 | 0.5 b | 0.3 c | 0.6 b | 0.3 b |
| E | 0.067 | 0.7 b | 0.2 c | 0.4 b | 0.2 b |
| F | 2.54 [c] | 6.1 a | 3.7 ab | 4.0 a | 1.1 b |
| Untreated | ---- | 5.1 a | 5.1 a | 3.9 a | 2.4 a |
| $P > F$ | | 0.01 | 0.01 | 0.01 | 0.01 |

Means within a column not followed by a common letter are significantly different ($P = 0.05$; LSD).
[a] A = Confirm 2F, B = Larvin 3.2F, C = Lorsban 4EC, D = Pirate 3F, E = Spinosad 4F, F = Spod-X
[b] Days after treatment
[c] oz form/acre.

Table 2. Efficacy of selected insecticides against beet armyworm in Test 2, Macon Ridge Location of the Northeast Research Station, Winnsboro, LA.

| | | No. beet armyworm larvae/row ft | | | |
|---|---|---|---|---|---|
| Treatment [a] | Rate | 3 DAT [b] | 5 DAT | 7 DAT | 10 DAT |
| A | 0.125 | 14.5 a | 1.4 bc | 0.4 b | 0.7 bc |
| B | 0.6 | 12.6 a | 4.4 ab | 5.2 a | 1.4 ab |
| C | 1.0 | 4.7 a | 3.6 bc | 1.2 b | 0.3 c |
| D | 0.2 | 2.8 a | 0.6 c | 1.1 b | 0.4 c |
| E | 0.067 | 5.8 a | 0.7 c | 1.3 b | 0.4 c |
| F | 2.54 [c] | 10.7 a | 7.9 a | 3.4 ab | 0.7 bc |
| Untreated | ---- | 9.2 a | 4.4 ab | 5.4 a | 1.8 a |
| *P > F* | | 0.41 | 0.02 | 0.04 | 0.05 |

Means within a column not followed by a common letter are significantly different ($P = 0.05$; LSD).

[a] A = Confirm 2F, B = Larvin 3.2F, C = Lorsban 4EC, D = Pirate 3F, E = Spinosad 4F, F = Spod-X

[b] Days after treatment

[c] oz form/acre.