# EVALUATION OF SELECTED INSECTICIDES FOR CONTROL OF BOLLWORM (BW) AND TOBACCO BUDWORM (TBW) ON NON BT COTTON AT THE SOUTHEASTERN BRANCH RESEARCH AND EDUCATION CENTER, MIDVILLE

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## Introduction

We have conducted full season efficacy trials of new and recommended (University of Georgia, Cooperative Extension Service) insecticides on non-Bt cotton at the Southeastern Branch Research and Education Center (SEBRS), Midville, for over 30 years as a way to track chemical performance in eastern cotton growing areas of the state, which typically has high percent bollworm, Helicoverpa zea (Boddie), (BW) compared to tobacco budworm, Heliothis virescens (Fabricius), (TBW) populations in heliothine infestations. The SEBRS generally experiences moderate to high heliothine infestations in non-Bt cotton, so insecticide testing gives a fair indication of chemical performance in both Bt and non-Bt cotton situations requiring heliothine control. The recent report of Bt resistant populations of H. zea in more than a dozen crop fields in Mississippi and Arkansas between 2003 and 2006 (http://www.erekalert.org/pub/2008-02/uoa-fdc020508.php) gives credence to the concept of keeping abreast of insecticide performance on non-Bt cotton varieties, as these type cotton varieties may have greater use if Bt resistance becomes widespread.

## Materials and Methods

The test had a RCB design with 4 replications and one untreated check per replication. The plots were 4 rows by 50 ft with an untreated row on each side of a plot. The rows were planted with DPL494RR cotton on beds spaced 38 inches apart using a 4-row Max Emerge II John Deere planter. Temik® 15G at 3.0 lbs/acre was placed in-furrow at planting for early season thrips control. Treatment applications began on 7/19 when square damage was approaching threshold. Treatments were applied with a $CO_2$ spraying system mounted on a high cycle sprayer traveling at 3 mph. Treatments were applied at a spray volume of 10 gpa, at 50 psi, with 3 nozzles per row. TX-3 hollow cone nozzles were used. Treatments were applied on 7/19, 7/26, 8/02, and 8/08. Efficacy surveys were done by randomly selecting 5 plants from the middle two rows of each plot and counting all squares on the upper half of each plant. All counted squares, flowering squares, and small bolls were checked for feeding damage and the presence of larvae. A Hardstack moth trap baited with either *H. zea* or *H. virescens* sex pheromone was placed adjacent to the test area. The efficacy surveys and trap counts were conducted on 7/03, 7/12, 7/19, 7/26, 8/02, and 8/08. On 11/6, yield was determined by mechanically harvesting the two middle rows of each plot. Means for percentage and yield were analyzed using ANOVA for RCB with means separation using Tukey's Studentized Range, with $P<0.05$.

## Results and Discussion

The sex pheromone traps had a high ratio of *H. zea* compared to *H. virescens* from mid-July through mid-August, which was the period when larval infestations of cotton were highest (Tables 1 and 2). The untreated check plots had high larval infestations during mid-July through mid-August. All of the insecticide treatments reduced damage significantly more than the untreated checks on 7/26, 8/02, and 8/08. Rynaxypyr (DPX-E2Y45 SC 200g/L) at 0.088 lbs AI/acre had best overall efficacy throughout the test. Karate Z$^{R}$ (lambda-cyhalothrin) at 0.025 lbs AI/acre did not perform as well as expected. Karate Z$^{R}$ has been used for over a decade in tests at the SEBRS at various rates and has produced good control of heliothine infestations in the past. Diamond$^{R}$ 0.83 E (novaluron) used at a rate of 0.83 lbs AI/acre had improved efficacy with each application beginning on 7/19 and ending on 8/8. The combination treatments of Diamond$^{R}$ with Karate Z$^{R}$ had improved efficacy over either product alone. The two Cobalt$^{R}$ (chlorpyrifos 2.5 lbs + gamma-cyhalothrin 0.045 lbs/gal) treatments of 19 and 29 oz/acre produced significant control of larval damage compared to the untreated check, but did not perform as well as other insecticide the treatments. Tracer$^{R}$ (spinosad) produced good control of insect damage at a rate of 0.062 lbs AI/acre. Prolex$^{R}$ (gamma-cyhalothrin) treatments at a rate of 0.0125 lbs AI/acre had >10% infested squares on 7/26 and 8/02, but damage was reduced to 2.3 and 5.0% on 8/08 and 8/15. There were no significant differences in yield in the test, but yield was highest in Prolex$^{R}$, rynoxypyr, and Tracer$^{R}$ treatments, which were all 600 lbs or more greater in seed cotton than the untreated check cotton.

**Table 1. 2007 Pheromone trap counts by date.**

| Species | 7/03 | 7/12 | 7/19 | 7/26 | 8/02 | 8/08 | 8/15 | 8/22 | 8/30 |
|---|---|---|---|---|---|---|---|---|---|
| H. zea | 77 | 249 | 322 | 469 | 477 | 590 | 884 | 647 | 431 |
| H. virescens | 75 | 1 | 0 | 0 | 0 | 1 | 75 | 260 | 91 |

**Table 2. The percent square damage and yield for each treatment on DPL494RR cotton.**

| Treatment/ formulation | Rate lb (AI) acre | % Damaged Squares | | | | Seed Cotton Yield (lb/acre) |
|---|---|---|---|---|---|---|
| | | 7/26 | 8/02 | 8/08 | 8/15 | |
| Diamond 0.83EC | 0.058 | 14.8b | 11.2bcd | 4.8b | 4.6b | 2465a |
| Diamond 0.83EC+ KarateZ 2.09CS | 0.058+ 0.0125 | 10.0b | 11.3bcd | 8.2b | 9.4ab | 2671a |
| Diamond 0.83EC+ KarateZ 2.09CS | 0.039+ 0.0125 | 9.7b | 5.5cd | 4.1b | 5.2ab | 2692a |
| KarateZ 2.09CS | 0.025 | 9.7b | 10.0cd | 11.3b | 2.9b | 2720a |
| Cobalt | 29 oz/A | 18.8b | 26.0b | 11.0b | 6.5ab | 2847a |
| Cobalt | 19 oz/A | 11.3b | 20.7bc | 15.4b | 7.4ab | 2895a |
| Tracer 4SC | 0.062 | 9.4b | 8.4cd | 2.6b | 4.8ab | 3001a |
| Rynaxypyr | 0.088 | 3.2b | 1.9d | 0.0b | 0.0b | 3108a |
| Prolex | 0.0125 | 11.8b | 10.8bcd | 2.3b | 5.0ab | 3184a |
| Untreated | | 45.6a | 51.6a | 47.5a | 20.0a | 2365a |

Means with the same letter within the same column are not significantly different ($P$<0.05).