INSECTICIDAL SEED TREATMENTS AND SPRAYABLE LIQUID INSECTICIDES FOR BLACK CUTWORM CONTROL IN SUGARBEET: A GREENHOUSE ASSESSMENT

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Introduction:

Cutworms are frequent pest problems for sugarbeet growers in the Red River Valley, and several species are capable of damaging the crop. Fields can be infested with cutworms at nearly any part of the typical growing season, but their impacts on sugarbeet yield are most problematic during the early stages of plant development. Heavy infestations can cause substantial plant stand reductions and major yield losses if not detected in time for curative rescue insecticide applications.

Historically, rescue insecticide treatments used for cutworm control in sugarbeet have entailed broadcast or banded liquid insecticide sprays, or banded insecticide granules over sugarbeet rows. Anecdotal evidence suggests that, while Lorsban 15G and generic formulations of chlorpyrifos (i.e., both liquid and granular) are believed to be effective against the cutworm pest group, Counter 15G is not likely to provide acceptable levels of cutworm control.

In recent years, multiple insecticidal seed treatments have been registered for use in sugarbeet, and they have been widely adopted for insect control by sugarbeet producers; however, little was known regarding their efficacy against cutworm larvae. This experiment was carried out to achieve the following objectives: 1) evaluate the efficacy provided by Poncho Beta, NipsIt Inside, and Cruiser insecticidal seed treatments for cutworm control; and 2) determine the relative effectiveness of Lorsban Advanced and the non-registered compounds, Coragen and Cyazypyr, as sprayable liquid insecticides to control cutworms in sugarbeet.

Materials and Methods:

This research was conducted in greenhouse facilities on the NDSU campus. The experiment was arranged in a randomized complete block design containing 10 replications of the treatments. Pots for maintaining plants in this experiment were constructed from 10-inch long sections of PVC tubing (4-inch diam.), and four small holes (ca. 1/8 inch diam.) were drilled into the bottom of each pot to allow for drainage. Each pot was filled with Metro Mix 360 potting soil to within about ½ inch from its rim. The sugarbeet seed variety used for all treatments in this experiment was Betaseed BTS86RR66. All insecticidal seed treatments were applied to seed by the same commercial, third-party seed treatment application facility.

To establish sugarbeet seedling plants for subsequent screening, two seeds were planted near the center of each pot at a depth of 1.25 inch on November 17, 2009. Plants were thinned to one per pot for the experiment. On December 8, liquid insecticide spray applications were carried out in an enclosed walk-in spray chamber using a CO_2-propelled backpack sprayer equipped with a single TeeJet 4001E nozzle. The system was calibrated to deliver 10 GPA of finished spray volume during the applications. After all treatments were established, pots were transported to the greenhouse and a 6-inch tall cylinder of aluminum flashing was placed inside each pot to prevent cutworms from crawling out of pots during the experiment.

Infestation consisted of introducing one healthy black cutworm, *Agrotis ipsilon* (Hufnagel) larva into each pot on December 9. Sugarbeet plants were in the 4-leaf stage of development at the time of infestation, and the cutworm larvae were all about 0.5-inch in length. To quantify treatment performance, the number of surviving plants was counted on January 7, 2010. Surviving plant count data was were subjected to analysis of variance (ANOVA) using the general linear models (GLM) procedure (SAS Institute, 2008), and treatment means were separated using Fisher's protected least significant difference (LSD) test at a 0.05 level of significance.

Results and Discussion:

The results from this trial, presented as the average number of surviving plants per pot, appear in Table 1. All of the liquid insecticide spray treatments, including the registered standard (Lorsban Advanced) and the experimental insecticides (Cyazypyr and Coragen) provided significant levels of plant protection from cutworm injury when compared to the untreated check. Additionally, all liquid sprays performed significantly better than any of the insecticidal seed treatment entries. There were no significant differences between any of the liquid insecticide materials tested, and there also was no difference in performance between rates of the experimental material, Cyazypyr. Trends suggested that Cruiser and Poncho Beta may have had very slight activity against black cutworm larvae in this experiment, but none of the seed treatment materials tested provided significant levels of control when compared to the untreated check.

Table 1. ***Number of surviving plants per pot*** **from evaluation of liquid insecticides and insecticidal seed treatments for cutworm control in the greenhouse, 2009-2010**

Treatment/form.	Placement[a]	Rate (product/ac)	Rate (lb ai/ac)	Surviving plants/pot
Cyazypyr	B	6.75 oz		1.00 a
Lorsban Advanced	B	2 pt	1.0	1.00 a
Cyazypyr	B	13.5 oz		0.90 a
Coragen	B	5.0 oz		0.80 a
Cruiser 5FS	Seed		60 g a.i./ unit seed	0.40 b
Poncho Beta	Seed		68 g a.i./ unit seed	0.40 b
Check	---	----	---	0.20 b
NipsIt Inside	Seed		60 g a.i./ unit seed	0.10 b
LSD (0.05)				0.32

Means within a column sharing a letter are not significantly ($P = 0.05$) different from each other (Fisher's Protected LSD).

[a]B = band; Seed = seed treatment;

Overall, the results of this study suggest that rescue treatments involving foliar liquid insecticide sprays are superior to insecticidal seed treatment materials for management of black cutworms in sugarbeet. Growers should not rely on seed treatment insecticides for protection of sugarbeet from cutworm injury. Rather, they should continue to give due diligence to field scouting for cutworm infestations, and use a registered sprayable liquid insecticide such as Lorsban Advanced to manage them. It should be noted that neither Cyazypyr nor Coragen were registered for use in sugarbeet at the time this research was conducted; however, the comparable performance of these materials to that of Lorsban Advanced in this experiment suggests that they could be good options for cutworm management in sugarbeet in the future should they receive registration for use in the crop. It also should be pointed out that, in addition to black cutworms, several different cutworm species are capable of infesting and causing economic damage to sugarbeet. Although the black cutworm larvae used in this experiment were effectively managed by the liquid insecticides tested, it cannot be assumed that all other cutworm species will respond the same to these treatments. This experiment should be repeated to determine the consistency of treatment performance observed in this first screening of these materials.

Reference Cited:

SAS Institute. 2008. The SAS System for Windows. Version 9.2. SAS Institute Inc., 2002-2008. Cary, NC.