ASSESSMENT OF CRUISER 5FS, NIPSIT INSIDE, AND PONCHO BETA INSECTICIDAL SEED TREATMENTS FOR SUGARBEET ROOT MAGGOT CONTROL

Mark A. Boetel, Associate Professor
Robert J. Dregseth and Allen J. Schroeder, Research Specialists

Department of Entomology, North Dakota State University, Fargo, ND

Introduction:

In recent years, three insecticidal seed treatment materials have been registered to protect sugarbeet against insect pests. Most testing of these products for efficacy at controlling the sugarbeet root maggot (SBRM), *Tetanops myopaeformis* (Röder), has been conducted under high infestations of this pest. However, the performance of these materials has not been thoroughly tested under more moderate SBRM infestations that commonly occur in much of the Red River Valley (RRV). The main objective of this experiment was to compare the relative efficacy of Cruiser 5FS, NipsIt Inside, and Poncho Beta insecticidal seed treatments under moderate sugarbeet root maggot infestations. A secondary objective was to test the impact of application rate on performance of the new 20G formulation of Counter insecticide under moderate SBRM pressure.

Materials and Methods:

This experiment was carried out on a field site near Minto (Walsh County), ND that was expected to have a moderate SBRM infestation during the 2010 growing season. Seed treatment insecticides were applied to seed by a custom seed-coating company (Germains Seed Technology, Fargo, ND). Plots were established on 20 May, 2010 using a 6-row John Deere 71 Flex planter adjusted to plant at a depth of 1¼ inch and a rate of one seed every 4 ¾ inches of row. Betaseed 87RR38, a glyphosate-resistant seed variety, was used for all treatment plots. Each plot was 6 rows (22-inch spacing) wide with the 4 centermost rows treated. The outer "guard" row to each side of the plot served as an untreated buffer. Each plot was 35 feet long, and 25-foot tilled alleys were maintained between replicates. The experiment was arranged in a randomized complete block design with four replications of the treatments. To avoid cross-contamination of seed between treatment applications, planter seed hoppers were completely disassembled, cleaned, and re-assembled after each seed treatment was applied.

Counter 20G served as a planting-time granular insecticide standard in all three seed treatment experiments. Granules were applied by using band (B) placement. Banded applications consisted of 5-inch swaths of granules that were achieved by using Gandy™ row banders. Granular output rates used in these experiments were controlled by using planter-mounted Noble metering units.

Root injury ratings: Assessments of root maggot feeding injury were carried out on 11 August by randomly collecting ten beet roots per plot (five from each of the outer two treated rows), hand-washing them, and scoring them in accordance with the 0 to 9 root injury rating scale (0 = no scarring, and 9 = over ¾ of the root surface blackened by scarring or dead beet) of Campbell et al. (2000).

Harvest: Treatment performance was also compared on the basis of sugarbeet yield parameters. On 6 October, the foliage was removed from all treatment plots by using a commercial-grade mechanical defoliator. Immediately after defoliation, all beets from the center 2 rows of each plot were lifted using a mechanical harvester and weighed in the field using a digital scale. A representative subsample of 12-16 beets was collected from each plot and sent to the American Crystal Sugar Company Tare Laboratory (East Grand Forks, MN) for sucrose content and quality analysis.

Data analysis: All data from root injury ratings and harvest samples 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:

Sugarbeet root maggot feeding injury data for this trial are presented in Table 1. Root injury ratings from the untreated check plots in this experiment averaged 6.1 on the 0 to 9 scale of Campbell et al. (2000). This suggested that a moderate SBRM infestation was present to conduct this trial. Significant reductions in SBRM feeding injury resulted from the following treatments: 1) Counter 20G, banded at 8.9 lb product/ac; 2) Counter 20G, banded at 7.5 lb/ac; 3) NipsIt Inside seed treatment; and 4) Poncho Beta seed treatment. A slight reduction in SBRM feeding injury was also observed with Cruiser 5FS seed treatment, although this entry did not differ significantly from the untreated check with respect to root injury ratings.

Table 1. ***Larval feeding injury*** **in comparison of registered seed treatments for sugarbeet root maggot control, Minto, ND, 2010**

Treatment/form.	Placement[a]	Rate (product/ac)	Rate (lb a.i./ac)	Root injury (0-9)
Counter 20G	B	8.9 lb	1.8	3.43 c
Counter 20G	B	7.5 lb	1.5	3.73 c
NipsIt Inside	Seed		60 g a.i./ unit seed	3.83 c
Poncho Beta	Seed		68 g a.i./ unit seed	4.50 bc
Cruiser 5FS	Seed		60 g a.i./ unit seed	5.23 ab
Check	---	----	---	6.10 a
LSD (0.05)				1.21

Means within a column sharing a letter are not significantly (P = 0.05) different from each other (Fisher's Protected LSD test).
[a] B = band; Seed = insecticidal seed treatment

Yields in this trial were generally high (Table 2). Although there were no statistically significant differences in recoverable sucrose yields between treatments, the two entries of Counter 20G produced numerically higher amounts of recoverable sucrose than all other treatment in this experiment. Treatments that resulted in significant increases in sugarbeet root yields in this experiment included Counter 20G (7.5 or 8.9 lb product/ac) and Cruiser 5FS seed treatment. Similar to findings from previous years, there were no statistically significant differences in root yield tonnage among seed treatment products, and the seed treatments resulted in root yields that were not outperformed by the moderate rate (7.5 lb product/ac) of Counter 20G. This rate of the new Counter formulation is equivalent to applying the former, 15G formulation of Counter at 10 lb product/ac.

Table 2. ***Yield parameters*** **in comparison of registered seed treatments for sugarbeet root maggot control, Minto, ND, 2010**

Treatment/form.	Placement[a]	Rate (product/ac)	Rate (lb a.i./ac)	Sucrose yield (lb/ac)	Root yield (T/ac)	Sucrose (%)	Gross return ($/ac)
Counter 20G	B	8.9 lb	1.8	10231 a	31.5 a	17.80 a	1640
Counter 20G	B	7.5 lb	1.5	9927 a	30.6 ab	17.68 a	1591
Cruiser 5FS	Seed		60 g a.i./ unit seed	9708 a	29.8 ab	17.75 a	1559
NipsIt Inside	Seed		60 g a.i./ unit seed	9511 a	28.9 bc	17.98 a	1545
Poncho Beta	Seed		68 g a.i./ unit seed	9249 a	28.6 bc	17.65 a	1477
Check	---	----	---	9009 a	27.4 c	17.88 a	1461
LSD (0.05)				NS	2.3	NS	

Means within a column sharing a letter are not significantly (P = 0.05) different from each other (Fisher's Protected LSD test).
[a] B = band; Seed = insecticidal seed treatment

Gross revenue increases from Counter treatments, when compared with the untreated check plots, ranged from $130/ac for the lower (7.5 lb product/ac) rate to $179/ac for the higher (8.9 lb product/ac) rate. Insecticidal seed treatments produced the following respective revenue increases when compared to the untreated check plots: $16/ac for Poncho Beta, $84/ac for NipsIt Inside, and $98/ac for Cruiser 5FS.

Overall, the findings of this experiment suggest that moderate SBRM infestations like that which developed at the Minto site in 2010, can be effectively managed by applying a single, planting-time treatment of Counter 20G at either of the rates tested in this experiment (i.e., 7.5 to 8.9 lb product/ac). The results also suggest that the insecticidal seed treatments evaluated in this experiment can provide comparable control to that of low to moderate rates of Counter 20G. However, it should be noted that, although NipsIt Inside and Poncho Beta treatments provided similar yields to that of Counter 20G at the lower, 7.5-lb rate, neither of these seed treatments resulted in statistically significant improvements in sugarbeet root tonnage over that of the untreated check. The results of this trial suggest that evaluations of these products under moderate SBRM infestation pressure should be continued.

References Cited:

Campbell, L. G., J. D. Eide, L. J. Smith, and G. A. Smith. 2000. Control of the sugarbeet root maggot with the fungus *Metarhizium anisopliae*. J. Sugar Beet Res. 37: 57–69.

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