COMBINING COUNTER 20G OR PONCHO BETA WITH LORSBAN ADVANCED TO CONTROL MODERATE INFESTATIONS OF SUGARBEET ROOT MAGGOT

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Introduction:

The sugarbeet root maggot (SBRM), *Tetanops myopaeformis* (Röder), continues to be the most serious insect pest of sugarbeet in the Red River Valley (RRV) growing area. Although granular insecticides have been effectively used to control this pest for several years, insecticidal seed treatment insecticides have recently received much attention for use in sugarbeet. Most testing on insecticides for SBRM control in the RRV has been carried out under high to severe infestation levels; however, little is known about the value of insecticide use under more moderate SBRM infestations that can impact sugarbeet in many parts of the Valley. Moreover, the impacts of additive postemergence insecticides on SBRM control and resulting yield and revenue is not well understood.

This experiment was carried out to compare the relative efficacy of Poncho Beta insecticidal seed treatment and the new, 20G formulation of Counter insecticide, and to determine the value of adding postemergence applications of Lorsban Advanced liquid insecticide for SBRM control under moderate infestations of this pest.

Materials and Methods:

This experiment was established on a field site near Minto (Walsh County), ND. Seed treatment insecticides were applied to seed by a custom seed-coating company (Germains Seed Technology, Fargo, ND). The same lot of Betaseed 87RR38 (glyphosate-resistant) seed was used for all treatments (i.e., seed treatments, conventional insecticide entries, and the untreated check) within each study. Plots were planted 20 May, 2010 using a six-row John Deere 71 Flex planter set to plant at a depth of 1¼ inch and a rate of one seed every 4¾ inches of row. Each plot was six rows (22-inch spacing) wide with the four 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 the application of each seed treatment.

Poncho Beta, a dual-insecticide seed treatment product applied at a rate of 60 and 8 g of clothianidin and betacyfluthrin per unit (100,000 seeds), respectively, was the only seed treatment entry in the study. Counter 20G, was applied at planting time at moderate rates (i.e., 6 and 7.5 lb product/ac) using band (B) placement (Boetel et al. 2006), Banded applications consisted of 5-inch swaths of granules delivered through Gandy™ row banders. Granular application rates were regulated by using planter-mounted Noble™ metering units. Mustang Max 0.8EC was applied at its full labeled rate of 4 fl oz/ac in a 3” T-band over the row using a tractor mounted CO_2 spray unit. The unit was calibrated to deliver a finished spray volume of 5 GPA using TeeJet 6501 E nozzles.

Lorsban Advanced was applied as a postemergence additive treatment at 1 pt product/ac on 15 June using a tractor-mounted CO_2 spray system equipped with TeeJet 11002VS nozzles. The system was calibrated to deliver a finished spray volume of 10 GPA as a broadcast application. Three passes were made per plot for the liquid treatments. This design was used to reduce the likelihood of flies exposed to a foliar liquid insecticide treatment in one plot moving into and colonizing a neighboring plot.

<u>Root injury ratings</u>: Root maggot feeding injury was assessed in all plots 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. Plots for this experiment were harvested on 6 October. Immediately before harvest, all foliage was removed from the plots by using a commercial-grade mechanical defoliator. 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:

Root injury ratings from the untreated check plots averaged 5.38 on the 0 to 9 scale of Campbell et al. (2000), which indicated that a moderate SBRM infestation was present in this experiment. Significant improvements in root protection were achieved by all chemical insecticide programs in this experiment except the stand-alone planting-time application of Mustang Max at its full labeled rate of 4 fl oz/ac in a T-band. The following entries provided the best protection from SBRM feeding injury, and these entries were not significantly different from each other: 1) Counter 20G, planting-time band at 7.5 lb product/ac + Lorsban Advanced, 10 days postemergence broadcast at 1 pt product/ac; 2) Counter 20G, planting-time band at 7.5 lb product/ac; 3) Counter 20G, planting-time band at 5.9 lb product/ac; and 4) Poncho Beta seed treatment at 68 g a.i./seed unit. There was very little improvement in root protection from applying a delayed (10 days post-peak) application of Lorsban Advanced, irrespective of whether it followed at-plant protection by Counter 20G or Poncho Beta. Applying Lorsban Advanced to plots initially treated with the at-plant application of Mustang Max provided a slight reduction in SBRM feeding injury.

Table 1. *Larval feeding injury* in evaluation of planting-time granules, liquids, seed treatments and postemergence liquid insecticides 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 + Lorsban Advanced	B 10 d post-peak Broadcast	7.5 lb 1 pt	1.5 0.5	2.48 e
Counter 20G	B	7.5 lb	1.5	2.53 e
Counter 20G	B	5.9 lb	1.2	3.15 de
Poncho Beta	Seed		68 g a.i./ unit seed	3.15 de
Poncho Beta + Lorsban Advanced	Seed 10 d post-peak Broadcast	1 pt	68 g a.i./ unit seed 0.5	3.58 cd
Mustang Max 0.8EC + Lorsban Advanced	3" TB 10 d post-peak Broadcast	4 fl oz 1 pt	0.025 0.5	4.28 bc
Mustang Max 0.8EC	3" TB	4 fl oz	0.025	4.65 ab
Check	---	----	---	5.38 a
LSD (0.05)				1.01

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; TB = T-band over open seed furrow

Yield data from this trial corresponded closely with root maggot feeding injury data. Although root injury ratings indicated the presence of a moderate SBRM infestation, most chemical insecticide regimes in this experiment resulted in significant increased root tonnage and recoverable sucrose yield (Table 2). Excellent yields were achieved with either single- or dual-application insecticide entries that included Poncho Beta or Counter 20G as the at-plant material; however, no significant benefit was achieved by adding a late (i.e., 10 days after peak fly activity) application of Lorsban Advanced to either of those insecticides. This suggests that applications of any postemergence liquid insecticide should be made earlier, preferably 2-3 days before peak SBRM fly activity, which is the current recommendation by NDSU Extension.

Table 2. *Yield parameters* from evaluation of planting-time granules, liquids, seed treatments and postemergence liquid insecticides 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	5.9 lb	1.2	10006 a	31.0 a	17.73 a	1595
Poncho Beta	Seed		68 g a.i./ unit seed	9783 a	29.9 a	17.80 a	1577
Poncho Beta + Lorsban Advanced	Seed 10 d post-peak Broadcast	 1 pt	68 g a.i./ unit seed 0.5	9570 a	29.2 a	17.88 a	1550
Counter 20G + Lorsban Advanced	B 10 d post-peak Broadcast	7.5 lb 1 pt	1.5 0.5	9556 a	30.3 a	17.48 a	1489
Counter 20G	B	7.5 lb	1.5	9320 a	29.3 a	17.58 a	1465
Mustang Max 0.8EC + Lorsban Advanced	3” TB 10 d post-peak Broadcast	4 fl oz 1 pt	0.025 0.5	8930 ab	29.3 a	17.00 a	1341
Check	---	----	---	8151 bc	25.7 b	17.53 a	1278
Mustang Max 0.8EC	3” TB	4 fl oz	0.025	7597 c	24.3 b	17.15 a	1171
LSD (0.05)				1162	2.9	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; TB = T-band over open seed furrow

Interestingly, the top-yielding entry in this study was the stand-alone planting-time application of Counter 20G at a relatively low (i.e., 5.9 lb product/ac) application rate, which produced 1.7 tons more root yield and $130/ac more revenue than when the insecticide was applied at a slightly higher rate (7.5 lb product/ac). This rate of Counter 20G appears to provide good control of moderate SBRM infestations. The slight trends toward reduced yield and revenue in plots treated with the higher (7.5 lb product/ac) rate of Counter 20G are of some concern; however the differences were not statistically significant. These trends could have been associated with the frequent and often heavy rainfall events that occurred during the experiment. The resultant prolonged periods of high soil moisture during the growing season could have led to unusually high releases of insecticide active ingredient from Counter 20G granules, which may have caused some plant stress and possibly slight yield reductions.

Another trend in this experiment was that relatively low efficacy was achieved by using Mustang Max as a planting-time insecticide to control SBRM larvae. This corresponds with our findings from previous years on using Mustang Max for SBRM control. Interestingly, significant increases in both recoverable sucrose yield and root tonnage occurred when plots initially treated with an at-plant application of Mustang Max were treated with a postemergence application of Lorsban Advanced. This was probably due, in large part, to the relatively low SBRM control provided by initial planting-time application of Mustang Max.

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