EFFECTS OF TIMING AND RATE ON EFFICACY OF THIMET 20G FOR POSTEMERGENCE CONTROL OF SUGARBEET ROOT MAGGOT

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Introduction:

Postemergence applications of granular insecticides have been used for decades by many sugarbeet producers in the Red River Valley (RRV) to manage the sugarbeet root maggot (SBRM), *Tetanops myopaeformis* (Röder). Poncho Beta, a recently registered seed treatment insecticide, has been shown in previous research at North Dakota State University to provide moderate levels of SBRM control. Results of previous research have also indicated that supplemental insecticide protection will be needed under the moderately high to high SBRM infestations that commonly infest sugarbeet in certain portions of the RRV. Therefore, postemergence control tools such as Thimet 20G are likely to become increasingly important in areas affected by this insect. The objective of this experiment was to determine the optimal timing and application rate of Thimet 20G as a postemergence rescue insecticide for SBRM control in the Red River Valley growing area.

Materials and Methods:

This study was planted on 19 May at a field site near St. Thomas, ND. Plots were planted using a 6-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. Plots were 6 rows (22-inch spacing) wide with the 4 centermost rows treated. The outer row on each side 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. Counter 15G was used as planting time insecticide for all treatments, and was applied at either the standard (10 lb product/ac) or the highest (11.9 lb) labeled rate. All planting-time treatments were applied as 5-inch over-the-row bands by using Gandy™ row banders.

Postemergence Thimet 20G granules were applied at either eight days before anticipated peak fly activity (i.e., June 16) or five days before peak (19 June). Thimet 20G was applied at either 4.9 or 7 lb product/ac. Granular output was regulated by using Noble metering units, and placement of insecticide in 4-inch bands was achieved by using Kinze row banders attached to a tractor-mounted tool bar. Granules were incorporated using two pairs of rotary tines that straddled each row. A paired set of tines was positioned ahead of each bander, and a second pair was mounted behind the granular drop zone. This system effectively stirred the soil around sugarbeet seedlings and incorporated the granules.

For comparative purposes, a treatment of Lorsban 4E, at 1 pt product/ac in a 7-inch band, was also included in this experiment. The Lorsban treatment was applied on 20 June, which was 4 days before peak fly activity. To avoid confounding effects from neighboring treatments that did not receive a treatment capable of killing SBRM flies, plots treated with Lorsban 4E were three tractor passes wide rather than the standard single pass. However, all treatment evaluations were carried out within the inner four rows of the center tractor pass to conform with assessments in standard-sized plots.

Root injury ratings: Root maggot feeding injury was assessed on 5 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). Treatment performance was also compared on the basis of sugarbeet yield parameters.

Harvest: On 16 September, all foliage was removed from plots immediately before harvest by using a commercial-grade mechanical defoliator. Shortly thereafter, 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 12-18

beets was collected from each plot and sent to the American Crystal Sugar Company Tare Laboratory (East Grand Forks, MN) for analysis of sugar content and quality.

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, 1999), and treatment means were separated using Fisher's protected least significant difference (LSD) test at a 0.05 level of significance.

Results and Discussion:

Results from assessments of sugarbeet root maggot feeding injury are presented in Table 1. The untreated checks in this study incurred moderately low levels of SBRM feeding injury (average of 3.55 on 0 to 9 scale). All insecticide programs in the experiment resulted in significantly less SBRM feeding injury than that observed in the untreated check plots. Application timing did not significantly affect (positive or negative) the performance of Thimet 20G at protecting roots from SBRM larval feeding injury. Also, there was no significant effect of application rate on performance of Thimet 20G. Interestingly, when plots were initially treated with an at-plant application of Counter 15G at 10 lb product/ac, applying a postemergence application of Thimet 20G at five days before peak SBRM fly activity resulted in the plots having significantly less feeding injury than plots treated with a stand-alone application of Counter 15G at 10 lb product/ac. Applying the Thimet earlier (i.e., 8 days pre-peak) did not provide a significant improvement in root protection over that of the single at-plant application of Counter 15G at its moderate rate of 10 lb product/ac. There were no additional impacts of timing or application rate with respect to SBRM feeding injury.

Table 1. *Larval feeding injury* in evaluation of the impacts of application timing and rate on performance of Thimet 20G for postemergence control of sugarbeet root maggot, St. Thomas, ND, 2008

Treatment/form.	Placement[a]	Rate (product/ac)	Rate (lb ai/ac)	Root injury (0-9)
Counter 15G + Thimet 20G	B 5 d pre-peak B	11.9 lb 7 lb	1.8 1.4	1.33 c
Counter 15G + Thimet 20G	B 5 d pre-peak B	10 lb 4.9 lb	1.5 1.0	1.48 c
Counter 15G + Thimet 20G	B 5 d pre-peak B	10 lb 7 lb	1.5 1.4	1.60 bc
Counter 15G	B	11.9 lb	1.8	1.75 bc
Counter 15G + Thimet 20G	B 8 d pre-peak B	11.9 lb 7 lb	1.8 1.4	1.85 bc
Counter 15G + Thimet 20G	B 8 d pre-peak B	10 lb 4.9 lb	1.5 1.0	1.93 bc
Counter 15G + Thimet 20G	B 8 d pre-peak B	10 lb 7 lb	1.5 1.4	2.00 bc
Counter 15G + Lorsban 4E	B 4 d pre-peak 7" Post B	10 lb 1 pt	1.5 0.5	2.15 bc
Counter 15G	B	10 lb	1.5	2.35 b
Check	-----	----	-----	3.55 a
LSD (0.05)				0.85

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

[a]B = band; Post B = postemergence band

Comparisons of yield results are presented in Table 2. There were no statistically significant differences in recoverable sucrose yield among treatments in this experiment. All insecticide-treated plots produced greater root yields than the untreated check plots; however, there were no significant impacts on Thimet performance in relation to application rate or timing. The results of this experiment support the findings from our research in previous years. Specifically, application timing does not appear to be a major driving force in the performance of Thimet 20G when the material is applied postemergence. The general lack of rate impacts in this experiment, although encouraging,

should be interpreted with a degree of caution because the root maggot infestation at this site in 2008 was atypically low.

Table 2. *Yield parameters* from evaluation of the impacts of application timing and rate on performance of Thimet 20G for postemergence control of sugarbeet root maggot, St. Thomas, ND, 2008

Treatment/form.	Placement[a]	Rate (product/ac)	Rate (lb ai/ac)	Sucrose yield (lb/ac)	Root yield (T/ac)	Sucrose (%)	Gross return ($/ac)
Counter 15G + Thimet 20G	B 5 d pre-peak B	11.9 lb 7 lb	1.8 1.4	6131 a	22.3 a	15.20 a	690
Counter 15G	B	11.9 lb	1.8	6119 a	22.0 ab	15.40 a	700
Counter 15G + Thimet 20G	B 5 d pre-peak B	10 lb 7 lb	1.5 1.4	6071 a	21.3 ab	15.68 a	715
Counter 15G + Lorsban 4E	B 4 d pre-peak 7" Post B	10 lb 1 pt	1.5 0.5	5900 a	21.0 b	15.73 a	695
Counter 15G + Thimet 20G	B 8 d pre-peak B	10 lb 7 lb	1.5 1.4	5886 a	21.3 ab	15.30 a	668
Counter 15G + Thimet 20G	B 8 d pre-peak B	10 lb 4.9 lb	1.5 1.0	5848 a	21.1 ab	15.38 a	668
Counter 15G + Thimet 20G	B 5 d pre-peak B	10 lb 4.9 lb	1.5 1.0	5812 a	21.6 ab	14.98 a	637
Counter 15G + Thimet 20G	B 8 d pre-peak B	11.9 lb 7 lb	1.8 1.4	5717 a	21.1 ab	15.05 a	633
Counter 15G	B	10 lb	1.5	5672 a	21.0 ab	15.03 a	628
Check	-----	----	-----	5378 a	19.0 c	15.65 a	632
LSD (0.05)				NS	1.6	NS	

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

[a]S = spoon; Post B = postemergence band; Seed = insecticidal seed treatment

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