# SUGARBEET ROOT MAGGOT CONTROL USING SEED TREATMENTS, PLANTING-TIME GRANULES, AND POSTEMERGENCE INSECTICIDES

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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). For over three decades, conventional granular insecticides and postemergence materials have been used to control SBRM infestations in the RRV. In 2008, Poncho Beta seed treatment insecticide received federal registration for use in sugarbeet. Although conventional granular insecticides continue to provide good control of the SBRM and several other soil insect pests of sugarbeet, seed treatment technology is a welcome addition to sugarbeet production because it offers the following benefits: 1) no on-farm calibration is needed to achieve the appropriate application rate; 2) no tank mixing is required by grower (reduced likelihood of pesticide exposure); 3) no specialized application equipment is needed on planter; and 4) a significant reduction in insecticide active ingredient needed per acre.

In this investigation, three seed treatment studies were carried out during the 2008 growing season to accomplish the following objectives: 1) compare the efficacy of conventional granular insecticides with registered and experimental seed treatments for sugarbeet root maggot control; and 2) test control programs consisting of seed treatments combined with conventional postemergence liquid insecticides.

## Materials and Methods:

Three experiments were established on a field site near St. Thomas, ND. Seed treatment insecticides were applied to seed by a custom seed-coating company (Germain's Technology Group, Inc., Fargo, ND). The same seed variety and lot were used for all treatments (i.e., seed treatments, conventional insecticide entries, and the untreated check) within each study. Plots were planted 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. Plots were 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. Counter 15G was used as a planting-time granular insecticide standard in all three seed treatment experiments.

<ins>Root injury ratings</ins>: Root maggot feeding injury was assessed in all tests 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).

<ins>Harvest</ins>: Treatment performance was also compared on the basis of sugarbeet yield parameters. Foliage was removed from plots immediately before harvest 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.

<ins>Data analysis</ins>: 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.

**Specific information on materials and methods for the three studies are respectively presented below.**

**Study I:** This experiment was planted on May 20, 2008 at St. Thomas, ND using VDH 46519 seed. Poncho Beta (clothianidin+betacyfluthrin) seed treatment, applied at a rate of 60+8 g a.i./unit (100,000 seeds), was the only seed treatment entry in the study. Counter 15G, applied at planting time at 10 and 11.9 lb product/ac using spoon (S) placement (Boetel et al. 2006), was used as an industry standard for comparative purposes. Spoon placement was achieved by delivering granules down the planter's in-furrow tube, to the end of which a galvanized metal spoon-shaped device was attached. A number 10 bolt was inserted the center of the spoon and fastened with double hex-shaped nuts facing upward on the concave side of the spoon to deflect the majority of the granules to either side of the furrow and, thus, minimize the amount of insecticide placed near the seed.

Two granular insecticides (i.e., Counter 15G or Thimet 20G) were also applied as postemergence control materials in this experiment. Postemergence granular applications (Post B) were made on 16 June. Band placement of postemergence granules was achieved by using Kinze row banders, which were attached to a tractor-mounted tool bar and adjusted to a height needed to deliver the insecticides in 4-inch bands. Granules were incorporated using two pairs of rotary tines that straddled each row. A paired set of tines was positioned ahead of the bander and a second pair was mounted behind the granular drop zone. This system effectively stirred soil around the bases of sugarbeet seedlings and incorporated granules as the unit passed through each plot. Granular output rates for both planting-time and postemergence treatments in these experiments were regulated by using Noble metering units.

Postemergence applications of liquid insecticides (i.e., Lorsban 4E and Vydate C-LV 3.77SL) were made on 20 June using a tractor-mounted $CO_2$ spray system equipped with TeeJet 8001EVS nozzle. The system was calibrated to deliver a finished spray volume of 10 GPA and the nozzles were positioned at a height to achieve 7-inch bands. As with the planting-time treatments, the postemergence liquids were also applied to the inner four rows of each tractor pass; however, 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 colonizing a neighboring plot. All evaluations in these plots were made within the central four-row tractor pass of each three-pass plot. Root maggot feeding injury was assessed in this study on 6 August, and plots were harvested on 16 September.

**Study II:** This experiment was established on 20 May, 2008 using VDH 46519 seed. It was carried out to compare the efficacy of the following seed treatment insecticides for sugarbeet root maggot control: Poncho Beta (68 g a.i./unit seed), V-10170-13, V-10170-29, and Cruiser 5FS (all at 60 g a.i./seed unit). Counter 15G was applied at 5.9, 10, and 11.9 lb product/ac by using band placement. Ratings of root maggot feeding injury were conducted on 6 August, and the plots were harvested on 17 September.

**Study III:** This experiment was planted using Hilleshog 3036Rz seed on May 30. It was designed to evaluate the performance of Cruiser 5FS seed treatment insecticide at three application rates and in combination with other companion insecticidal seed treatments. Cruiser 5FS rates included 60, 75, and 90 g a.i./unit. Cruiser 70WS was applied at 60 g a.i./unit. Seed treatment combinations evaluated in the experiment included Cruiser+NOA (60 g+0.5 mg a.i./unit), Cruiser+Tefluthrin (60+8 g a.i./unit), and Cruiser 70WS+Tefluthrin (60+8 g a.i./unit). Poncho 600 and Cruiser 5FS were also included in this experiment on a fully pelleted seed at 60 g a.i./unit. Counter 15G, applied at 10 and 11.9 lb product/ac by using band placement, was included in the experiment as an industry standard. Root maggot feeding injury assessments for this study were conducted on 6 August, and plots were harvested on 16 September.

**Results and Discussion:**

**Study I:** Results from root injury rating assessments for Study I are presented in Table 1. All insecticide treatments provided significant reductions in root maggot feeding injury when compared to the untreated check. Counter 15G, as a stand-alone application at both moderate (10 lb product/ac) and high (11.9 lb) rates, provided greater root protection from root maggot feeding injury than Poncho Beta. Although supplemental applications of postemergence insecticides tended to reduce root maggot injury, the improvements were never statistically significant. Additionally, there were no statistical differences in root protection among the postemergence insecticides or rates in this trial.

| **Table 1.** ***Larval feeding injury*** **in evaluation of seed treatments, conventional granular insecticides, and postemergence materials for sugarbeet root maggot control, St. Thomas, ND, 2008** | | | | |
|---|---|---|---|---|
| **Treatment/form.** | **Placement[a]** | **Rate (product/ac)** | **Rate (lb a.i./ac)** | **Root injury (0-9)** |
| Counter 15G +<br>Thimet 20G | S<br>8 d pre-peak Post B | 10 lb<br>7 lb | 1.5<br>1.4 | 1.50 e |
| Counter 15G | S | 11.9 lb | 1.8 | 1.57 de |
| Counter 15G | S | 10 lb | 1.5 | 1.87 cde |
| Counter 15G +<br>Thimet 20G | S<br>8 d pre-peak Post B | 10 lb<br>4.9 lb | 1.5<br>1.0 | 2.00 cde |
| Counter 15G +<br>Lorsban 4E | S<br>4 d pre-peak Post B | 10 lb<br>1 pt | 1.5<br>0.5 | 2.03 cde |
| Poncho Beta +<br>Counter 15G | Seed<br>8 d pre-peak Post B | <br>7 lb | 68 g a.i./ unit seed<br>1.05 | 2.13 b-e |
| Poncho Beta +<br>Vydate C-LV | Seed<br>4 d pre-peak Post B | <br>34 fl oz | 68 g a.i./ unit seed<br>1.0 | 2.25 b-e |
| Poncho Beta +<br>Lorsban 4E | Seed<br>4 d pre-peak Post B | <br>2 pt | 68 g a.i./ unit seed<br>1.0 | 2.25 b-e |
| Poncho Beta +<br>Counter 15G | Seed<br>8 d pre-peak Post B | <br>10 lb | 68 g a.i./ unit seed<br>1.5 | 2.28 bcd |
| Poncho Beta +<br>Lorsban 4E | Seed<br>4 d pre-peak Post B | <br>1 pt | 68 g a.i./ unit seed<br>0.5 | 2.60 bc |
| Poncho Beta | Seed | | 68 g a.i./ unit seed | 2.88 b |
| Check | --- | ---- | --- | 4.38 a |
| LSD (0.05) | | | | 0.76 |

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

Yield data from Seed Treatment Study I are presented in Table 2. All insecticide entries, including the experimental seed treatments, produced significant increases in recoverable sucrose and sugarbeet root yields when compared to the untreated check. Correspondingly, major increases in revenue per acre were achieved with all insecticide treatments. The best treatment in this experiment in relation to recoverable sucrose per acre and sugarbeet root yield was the stand-alone application of Counter 15G applied at the high (11.9 lb product/ac) rate using spoon placement. Gross return from this treatment was $743, which was an increase of $179/ac in gross revenue over that of the untreated control plots. Another conventional program comprised of at-plant Counter 15G (10 lb/ac) followed by postemergence Thimet 20G also resulted in excellent recoverable sucrose and root yields and grossed $721/ac. Dual insecticide entries in this study that included Poncho Beta plus a postemergence insecticide also resulted in good yield improvements. The only combination involving a seed treatment that produced a significant improvement in both sucrose and root yield was Poncho Beta followed by postemergence Counter 15G. This entry produced the largest gross economic return in the experiment ($760/ac), which was a $196 increase in revenue over the untreated check.

The findings observed in this experiment were similar to those of other studies this year. The subtle, nonsignificant differences in control between stand-alone entries (seed treatments or planting-time granular insecticides) and dual treatment combinations that included a postemergence insecticide could have resulted from a couple of factors. First, the root maggot infestation in this trial was moderate and much lower than observed in previous years. Second, the cool spring and early summer weather delayed root maggot fly emergence and activity. As a result, plants were well-established by the time larvae began feeding, and roots were more able to withstand root maggot feeding injury.

| **Table 2. *Yield parameters* from evaluation of seed treatments, conventional granular insecticides, and postemergence materials for sugarbeet root maggot control, Study I, St. Thomas, ND, 2008** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **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 15G | S | 11.9 lb | 1.8 | 6502 a | 23.4 a | 15.33 a | 743 |
| Counter 15G +<br>Thimet 20G | S<br>8 d pre-peak B | 10 lb<br>7 lb | 1.5<br>1.4 | 6384 a | 23.2 ab | 15.30 a | 721 |
| Counter 15G | S | 10 lb | 1.5 | 6357 ab | 23.1 ab | 15.20 a | 717 |
| Poncho Beta +<br>Counter 15G | Seed<br>8 d pre-peak B | <br>10 lb | 68 g a.i./ unit seed<br>1.5 | 6338 ab | 21.8 abc | 15.80 a | 760 |
| Counter 15G +<br>Thimet 20G | S<br>8 d pre-peak B | 10 lb<br>4.9 lb | 1.5<br>1.0 | 6147 abc | 22.1 abc | 15.33 a | 704 |
| Poncho Beta +<br>Lorsban 4E | Seed<br>4 d pre-peak Post B | <br>2 pt | 68 g a.i./ unit seed<br>1.0 | 6043 abc | 21.7 abc | 15.33 a | 691 |
| Poncho Beta +<br>Counter 15G | Seed<br>8 d pre-peak B | <br>7 lb | 68 g a.i./ unit seed<br>1.05 | 5961 abc | 21.6 abc | 15.18 a | 676 |
| Counter 15G +<br>Lorsban 4E | S<br>4 d pre-peak Post B | 10 lb<br>1 pt | 1.5<br>0.5 | 5942 abc | 22.5 ab | 14.68 a | 635 |
| Poncho Beta +<br>Lorsban 4E | Seed<br>4 d pre-peak Post B | <br>1 pt | 68 g a.i./ unit seed<br>0.5 | 5856 abc | 21.4 bc | 15.13 a | 655 |
| Poncho Beta +<br>Vydate C-LV | Seed<br>4 d pre-peak Post B | <br>34 fl oz | 68 g a.i./ unit seed<br>1.0 | 5708 bc | 20.5 cd | 15.43 a | 655 |
| Poncho Beta | Seed | | 68 g a.i./ unit seed | 5588 c | 19.5 d | 15.63 a | 660 |
| Check | --- | ---- | --- | 4903 d | 17.5 e | 15.35 a | 564 |
| LSD (0.05) | | | | 665 | 1.9 | 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

**Study II:** Root injury ratings from Seed Treatment Study II are presented in Table 3. Root maggot feeding pressure in this trial was light. This was evidenced by the average root maggot feeding injury rating of 3.73 on the 0 to 9 scale. All insecticides, including the experimental seed treatments, resulted in significantly lower levels of sugarbeet root maggot feeding injury when compared with the injury that occurred in the untreated check plots. There were no significant differences among insecticidal seed treatments or formulations (i.e., V-10170-1713 versus V-10170-29). All insecticidal seed treatment entries in this experiment provided levels of root protection that were not statistically different from Counter 15G at its lowest labeled application rate (5.9 lb product/ac); however, Counter provided significantly greater root protection than all seed treatment entries when it was applied at moderate to high (10 to 11.9 lb product/ac) labeled rates.

| **Table 3. *Larval feeding injury* in comparison of seed treatments and conventional granular insecticide treatments for sugarbeet root maggot control, Study II, St. Thomas, 2008** | | | | |
|---|---|---|---|---|
| **Treatment/form.** | **Placement[a]** | **Rate (product/ac)** | **Rate (lb a.i./ac)** | **Root injury (0-9)** |
| Counter 15G | B | 11.9 lb | 1.8 | 1.10 c |
| Counter 15G | B | 10 lb | 1.5 | 1.25 c |
| Counter 15G | B | 5.9 lb | 0.9 | 1.60 bc |
| Poncho Beta | Seed | | 68 g a.i./ unit seed | 2.23 b |
| V-10170-1713 | Seed | | 60 g a.i./ unit seed | 2.25 b |
| V-10170-1729 | Seed | | 60 g a.i./ unit seed | 2.43 b |
| Cruiser | Seed | | 60 g a.i./ unit seed | 2.48 b |
| Check | --- | ---- | --- | 3.73 a |
| LSD (0.05) | | | | 0.90 |

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 = insecticidal seed treatment

Yield data from this trial corresponded with the root injury ratings, although there were no significant differences in recoverable sucrose yield among treatments (Table 4). Counter 15G tended to perform better than seed treatments in this experiment. Moderate and high (10 and 11.9 lb product/ac) rates of Counter were the only entries in this test that produced root yields that were significantly greater than the untreated check. Plots treated with a planting-time application of Counter 15G at the high labeled rate (11.9 lb/ac) produced a gross economic return of $777/ac, the highest return from any treatment in this experiment. Root yields in plots treated with V-10170-1729 and V-10170-1713 seed treatments were not significantly different from yields in plots that received 10 lb product/ac of Counter 15G at planting. There were no statistical differences in root yield among any of the seed treatment entries in this experiment.

**Table 4. *Yield parameters* in comparison of seed treatments and conventional granular insecticide treatments for sugarbeet root maggot control, Study II, St. Thomas, ND, 2008**

| 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 15G | B | 11.9 lb | 1.8 | 6788 a | 24.4 a | 15.25 a | 777 |
| Counter 15G | B | 10 lb | 1.5 | 6272 a | 23.1 ab | 14.98 a | 698 |
| V-10170-1729 | Seed | | 60 g a.i./ unit seed | 6173 a | 21.8 bc | 15.45 a | 721 |
| V-10170-1713 | Seed | | 60 g a.i./ unit seed | 6148 a | 21.6 bc | 15.53 a | 723 |
| Counter 15G | B | 5.9 lb | 0.9 | 6006 a | 21.7 bc | 15.23 a | 683 |
| Cruiser | Seed | | 60 g a.i./ unit seed | 5902 a | 20.2 c | 15.83 a | 714 |
| Poncho Beta | Seed | | 68 g a.i./ unit seed | 5806 a | 20.5 c | 15.45 a | 679 |
| Check | --- | ---- | --- | 5747 a | 20.5 c | 15.30 a | 665 |
| LSD (0.05) | | | | NS | 2.4 | NS | |

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 = insecticidal seed treatment

**<u>Study III</u>:** A light infestation of sugarbeet root maggot larvae occurred in this experiment. This was indicated by the average root injury rating of 3.53 (0 to 9 scale) being recorded for the untreated check plots (Table 5). Counter 15G, banded at either 10 or 11.9 lb product/acre, provided excellent levels of root protection from maggot feeding injury. Insecticide treatments that provided statistically equivalent levels of root protection to that of Counter at its moderate (10 lb product/ac) rate included the following seed treatment entries: Cruiser 5FS (90 g a.i./100,000 seed unit), Cruiser 5FS (60 g/unit, pelleted), Cruiser 5FS + NOA 4210126 (60 g a.i./unit + 0.5 mg/seed), Poncho 600 (60 g, pelleted), Cruiser 5FS + Tefluthrin (60+8g), and Cruiser 70WS + Tefluthrin (60+8 g). Entries that did not result in significant reductions in root maggot feeding injury when compared to the untreated check plots included Cruiser 5FS (60 and 75 g rates), Cruiser 70WS + Tefluthrin (60+8 g), and Cruiser 70WS (60 g).

**Table 5. *Larval feeding injury* in evaluation of experimental seed treatment insecticides for sugarbeet root maggot control, Study III, St. Thomas, ND, 2008**

| Treatment/form. | Placement[a] | Rate (product/ac) | Rate (lb ai/ac) | Root injury (0-9) |
|---|---|---|---|---|
| Counter 15G | B | 11.9 lb | 1.8 | 1.20 d |
| Counter 15G | B | 10 lb | 1.5 | 1.33 cd |
| Cruiser 5FS | Seed | | 90 g ai/ unit seed | 1.85 bcd |
| Cruiser 5FS (pellet) | Seed | | 60 g ai/ unit seed | 2.00 bcd |
| Cruiser 5FS + NOA 4210126 | Seed | | 60 g ai/ unit seed + 0.5 mg/seed | 2.03 bcd |
| Poncho 600 (pellet) | Seed | | 60 g ai/ unit seed | 2.05 bcd |
| Cruiser 5FS + Tefluthrin | Seed | | 60+8 g ai/ unit seed | 2.20 bcd |
| Cruiser 5FS | Seed | | 60 g ai/ unit seed | 2.30 a-d |
| Cruiser 5FS | Seed | | 75 g ai/ unit seed | 2.43 a-d |
| Cruiser 70WS + Tefluthrin | Seed | | 60+8 g ai/ unit seed | 2.55 abc |
| Cruiser 70WS | Seed | | 60 g ai/ unit seed | 2.90 ab |
| Check | --- | ---- | ---- | 3.53 a |
| LSD (0.05) | | | | 1.25 |

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 = insecticidal seed treatment

Yields in this trial were somewhat low compared to those of other trials conducted at the St. Thomas location. The generally low yields, irrespective of treatments, resulted from this trial being planted relatively late because of a delay in availability of insecticide treated seed. Although results of yield and quality analyses were somewhat reflective of differences observed in root maggot feeding injury comparisons in this experiment, there were no significant differences among treatments in relation to recoverable sucrose yield, root yield, or percent sucrose content (Table 6). This was probably due, in large part, to the light feeding injury that occurred in this experiment. One positive finding in this experiment was that, unlike our observations in previous years, there was no apparent negative impact on yield or quality from the highest (90 g) rate of Cruiser 5FS seed treatment.

**Table 6. *Yield parameters* from evaluation of seed treatment insecticides for sugarbeet root maggot control, Study III, St. Thomas, ND, 2008**

| 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 15G | B | 11.9 lb | 1.8 | 4957 a | 18.9 a | 14.78 a | 527 |
| Counter 15G | B | 10 lb | 1.5 | 4944 a | 18.8 a | 14.75 a | 527 |
| Poncho 600 (pellet) | Seed | | 60 g a.i./ unit seed | 4735 a | 18.0 a | 14.83 a | 507 |
| Cruiser 5FS + NOA 4210126 | Seed | | 60 g a.i./ unit seed + 0.5 mg/seed | 4693 a | 17.2 a | 15.23 a | 525 |
| Cruiser 5FS | Seed | | 90 g a.i./ unit seed | 4650 a | 17.9 a | 14.65 a | 486 |
| Cruiser 5FS + Tefluthrin | Seed | | 60+8 g a.i./ unit seed | 4630 a | 17.5 a | 14.93 a | 497 |
| Cruiser 5FS | Seed | | 60 g a.i./ unit seed | 4589 a | 17.2 a | 14.93 a | 499 |
| Cruiser 70WS + Tefluthrin | Seed | | 60+8 g a.i./ unit seed | 4589 a | 17.1 a | 14.90 a | 504 |
| Cruiser 5FS (pellet) | Seed | | 60 g a.i./ unit seed | 4577 a | 17.3 a | 14.80 a | 491 |
| Cruiser 70WS | Seed | | 60 g a.i./ unit seed | 4547 a | 17.1 a | 14.90 a | 493 |
| Cruiser 5FS | Seed | | 75 g a.i./ unit seed | 4457 a | 17.5 a | 14.43 a | 454 |
| Check | --- | ---- | ---- | 4380 a | 16.5 a | 15.03 a | 473 |
| LSD (0.05) | | | | NS | NS | NS | |

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 = insecticidal seed treatment

Overall findings of these trials indicate that seed treatment insecticides can provide moderate levels of sugarbeet root maggot control. Seed treatments should be excellent tools for protection under low to moderate root maggot pressure; however, they should not be considered as stand-alone treatments to combat the high maggot populations that commonly develop in parts of the Red River Valley. Failure to adequately control SBRM infestations in one growing season sets the stage for increased problems in an area during the following year. Combining additive postemergence insecticides, in the form of postemergence liquid or granular materials, typically augments control, and will probably be a necessity for adequate control of moderate to high SBRM infestations. Use of seed treatment insecticide technology in areas at high risk of sugarbeet root maggot damage will require careful monitoring of fly populations to allow for the application of postemergence insecticides. Finally, the results of these trials and those of previous years underscore the importance for growers to pay close attention to NDSU's fly activity forecast and additional updates regarding fly activity each year.

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