PERFORMANCE OF COUNTER 20G FOR SUGARBEET ROOT MAGGOT CONTROL

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Introduction:

Counter 15G has been used to control sugarbeet root maggot (SBRM), *Tetanops myopaeformis* (Röder) and other soil insect pests of sugarbeet in the Red River Valley for well over three decades. Recently, a new formulation of Counter, containing 20% active ingredient (i.e., terbufos) has been developed and is currently labeled for use with the Smartbox™ closed handling and application system. This granule, which contains 33% more active ingredient per pound of product than the currently labeled 15G formulation, allows for a reduction in volume of insecticide product needed while maintaining the same amount of active ingredient applied per acre. One obvious benefit of this formulation is that more acres can be planted between stops to reload application units with insecticide. This trial was carried out to achieve the following objectives relating to SBRM control: 1) compare the performance of Counter 20G with that of the standard labeled 15G formulation of Counter; 2) determine the efficacy of combining planting-time applications of Counter 20G with Poncho Beta-treated seed; and 3) assess the performance of Counter 20G as a postemergence rescue treatment in combination with Poncho Beta.

Materials and Methods:

This study was planted on 5 June at a field site near Auburn (Walsh County), ND using BTS 88RR66 (glyphosate-resistant) sugarbeet seed. All planting-time granular applications were applied ahead of the planter's rear press wheels in 5-inch bands that were incorporated with planter-mounted drag chains. Postemergence granules, which were were applied on 22 June, were also banded (Post B). Postemergence bands were achieved by using Kinze row banders, which were attached to a tractor-mounted tool bar and adjusted to a height to deliver insecticides in 4-inch swaths over individual rows. Postemergence granules were incorporated by using rotary tines that straddled each row. One paired set of tines was positioned ahead of the bander, and a second pair was mounted behind the granule 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. The experiment was arranged in a randomized block design with four replications of the treatments. Each plot was 35 feet long by four rows (22-inch spacing) wide, and 25-foot tilled alleys between replicates were maintained weed-free throughout the growing season.

Root injury: Root maggot feeding injury was assessed on 12 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 22 September, all foliage was removed from plots immediately before harvest by using a commercial-grade mechanical defoliator. On the same day, 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.

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:

Root injury rating data from this trial are presented in Table 1. The best root protection in this trial was provided by the combination treatment of Poncho Beta+Counter 20G applied at planting. This entry resulted in significantly lower root maggot feeding injury than the combination treatment of Poncho Beta+Counter 20G applied at postemergence. At-plant-only applications of Counter 20G also provided good root maggot control when higher (i.e., 7.5 and 9 lb product/ac) rates were used. There were no significant differences between application rates of Counter 20G, but numerical decreases in root maggot feeding injury were observed with increasing application rates. The new 20G formulation of Counter appeared to perform just as well as the conventional 15G form. Root maggot feeding injury in Poncho Beta-protected plots was not significantly different from that observed in the untreated check plots; however, adding a postemergence application of Thimet 20G resulted in a significant improvement root protection.

Table 1. *Larval feeding injury* in evaluation of Counter 20G, Thimet 20G, and Poncho Beta insecticides for sugarbeet root maggot control, Auburn, ND, 2009

Treatment/form.	Placement[a]	Rate (product/ac)	Rate (lb a.i./ac)	Root injury (0-9)
Poncho Beta + Counter 20G	Seed B	 5.25 lb	68 g a.i./unit seed 1.05	2.45 d
Counter 20G	B	9 lb	1.8	2.55 cd
Counter 20G	B	7.5 lb	1.5	2.83 bcd
Counter 15G	B	11.9 lb	1.8	2.93 bcd
Counter 20G	B	5.25 lb	1.05	3.15 bcd
Counter 20G + Thimet 20G	B Post B	7.5 lb 7 lb	1.5 1.4	3.33 bc
Poncho Beta + Counter 20G	Seed Post B	 5.25 lb	68 g a.i./unit seed 1.05	3.35 b
Poncho Beta + Thimet 20G	Seed Post B	 7 lb	68 g a.i./unit seed 1.4	3.40 b
Poncho Beta	Seed		68 g a.i./unit seed	4.53 a
Check	---	-----	---	4.53 a
LSD (0.05)				0.78

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; Post B = postemergence band; Seed = insecticidal seed treatment

Yield, quality, and gross economic return comparisons for this experiment are presented in Table 2. Patterns of performance with respect to yield were consistent with the root rating data. Most insecticide treatments in this experiment resulted in significant increases in recoverable sucrose yield and root tonnage. As was observed with root maggot feeding injury data, a pattern of increased performance was apparent with increased application rate of Counter 20G, although no significant differences were detected between rates with respect to recoverable sucrose, root yield, or percent sucrose. Interestingly, the stand-alone application of Counter 20G at its highest (9 lb product/ac) rate produced the greatest level of gross economic return in this experiment. A major factor that impacted this finding was quality, which was evidenced by the fact that the 9-lb rate of Counter 20G had the highest percent sucrose in the study. Other treatments in this experiment that produced some of the highest economic returns included the following (in decending amount of revenue): 1) Poncho Beta + Counter 20G postemergence band (5.25 lb product/ac); 2) Counter 20G at-plant band (7.5 lb product/ac) + Thimet 20G postemergence; and 3) Poncho Beta + Counter 20G banded at planting time (5.25 lb product/ac).

As was observed with root maggot feeding injury ratings, the combination treatment of Poncho Beta+postemergence Counter 20G performed very well. Another finding that corresponded with root injury rating data was that there were no statistical differences in root tonnage or recoverable sucrose yield between the 20G and 15G forms of Counter. However, applying the new 20G formulation resulted in $66 more revenue per acre than when the older 15G product was used.

The only treatments in this experiment that did not produce significant improvements in recoverable sucrose yield and root tonnage were Poncho Beta as a stand-alone entry and the combination entry of Poncho Beta +

postemergence Thimet 20G. This finding underscores the importance of and need for effective postemergence control strategies if growers choose to use Poncho Beta or another seed treatment insecticide in areas likely to produce high root maggot infestations. In general, Thimet 20G applications did not produce major improvements in yield parameters in this experiment. This was also reflected somewhat in the root maggot feeding injury assessments, and could have been impacted by rainfall after the Thimet applications. A rainfall event dropped over two inches of rain on these plots just four days after the applications, and an additional 0.63-inch rain was occurred one day thereafter. These somewhat heavy rains could have washed some of the Thimet granules away from the target zone (i.e., sugarbeet plant bases), and diminished performance. This is a reasonable speculation because Thimet has performed quite well in previous years of screening, especially when applied at the high (7-lb product/ac) labeled rate used in this experiment. It should be noted, however, that postemergence Thimet applications, whether used in combination with Poncho Beta or Counter 20G, resulted in revenue increases of $32 to $58 per acre when compared with stand-alone entries, which would easily justify such applications for postemergence control.

The fact that the 20G formulation of Counter provided equivalent levels of performance to those of the labeled 15G formulation is a very positive finding because a 20 percent granule can be applied at a lower volume of product per acre than a 15G material while maintaining the same rate of active ingredient being applied. Thus, the higher-concentration granule would enable growers to plant more acres before needing to reload insecticide application units.

Table 2. *Yield parameters* from evaluation of Counter 20G, Thimet 20G, and Poncho Beta insecticides for sugarbeet root maggot control, Auburn, ND, 2009

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 + Thimet 20G	B Post B	7.5 lb 7 lb	1.5 1.4	5845 a	24.7 a	13.38 a	479
Counter 20G	B	9 lb	1.8	5701 a	23.0 abc	13.78 a	514
Poncho Beta + Counter 20G	Seed B	5.25 lb	68 g a.i./unit seed 1.05	5572 a	22.4 bc	13.80 a	506
Counter 20G	B	7.5 lb	1.5	5550 a	23.6 ab	13.33 a	447
Counter 15G	B	11.9 lb	1.8	5390 ab	22.6 abc	13.38 a	448
Poncho Beta + Counter 20G	Seed Post B	5.25 lb	68 g a.i./unit seed 1.05	5368 ab	22.1 bc	13.50 a	467
Counter 20G	B	5.25 lb	1.05	5362 ab	23.1 abc	13.15 a	420
Poncho Beta + Thimet 20G	Seed Post B	7 lb	68 g a.i./unit seed 1.4	5124 abc	21.4 cd	13.50 a	431
Poncho Beta	Seed		68 g a.i./unit seed	4648 bc	19.8 d	13.20 a	373
Check	---	----	---	4450 c	19.6 d	12.80 a	330
LSD (0.05)				756	2.1	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; Post B = postemergence band; Seed = insecticidal seed treatment

References Cited:

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