A Three-Year Assessment of Seed Treatment Insecticides and Postemergence Rescue Sprays for Sugarbeet Root Maggot Control

Results:

Study 1: ***Stand-alone Seed Treatments vs. At-plant Counter 15G***

SBRM Feeding Injury. The sugarbeet root maggot (SBRM) injury recorded in the untreated check plots (5.3 on the 0 to 9 scale of Campbell et al., 2000) indicated that moderate infestations were present during the three-year duration of this study (Table 1).

Counter 15G provided the best root protection from SBRM feeding injury, irrespective of whether the moderate (10 lb product/ac) or high labeled rate (12 lb/ac) of the at-plant granule was used. Both rates of Counter were statistically superior to all insecticidal seed treatments in this study and there was no significant difference between the two rates of Counter.

All seed treatments provided significant reductions in SBRM feeding injury when compared with that sustained in the untreated checks. There were no statistical differences in root protection among seed treatments.

Table 1. Three-year combined analysis of *root feeding injury* in plots treated with seed treatment insecticides or Counter 15G at planting for sugarbeet root maggot control, St. Thomas, ND, 2007–2009

Treatment/form.	Placement[a]/ timing	Rate (product/ac)	Rate (a.i./ac)	Root injury (0-9)
Counter 15G	B	12 lb	1.8 lb	2.9 c
Counter 15G	B	10 lb	1.5 lb	3.0 c
Poncho Beta	SEED	---	68 g a.i./unit seed	3.8 b
NipsIt Inside	SEED	---	60 g a.i./unit seed	4.1 b
Cruiser 5FS	SEED	---	60 g a.i./unit seed	4.1 b
Check	---	---	---	5.3 a
LSD (0.05)				0.64

[a]B = Band; Seed = insecticidal seed treatment

Yield and Economic Return. Yield data corresponded well with findings from root injury ratings. For example, both rates of Counter 15G were statistically superior to all seed treatment entries with respect to recoverable sucrose yield, root tonnage, and gross economic return (Table 2). Revenue benefits from using Counter 15G for SBRM control, compared with returns from check plots, ranged from $229 to $271 per acre, depending on Counter application rate.

Also similar to root injury results was that all seed treatments provided significant increases in recoverable sucrose, root yield, percent sucrose, and there were no differences between seed treatment entries with respect to sucrose yield, root yield, or revenue. Economic benefits from using seed treatment insecticides to manage SBRM ranged between $89 and $116 per acre when compared with revenue from harvest of the untreated check plots.

Table 2. Three-year combined analysis of *Yield parameters* in plots treated with seed treatment insecticides or Counter 15G for sugarbeet root maggot control, St. Thomas, ND, 2007–2009

Treatment/form.	Placement[a]/ timing	Rate (product/ac)	Rate (a.i./ac)	Recoverable sucrose (lb/ac)	Root yield (T/ac)	Sucrose (%)	Gross return ($/ac)
Counter 15G	B	12 lb	1.8 lb	6087.4 a	23.8 a	14.2 a	643 a
Counter 15G	B	10 lb	1.5 lb	5837.3 a	23.3 a	14.0 ab	601 a
Poncho Beta	SEED	---	68 g a.i./unit seed	4903.3 b	20.0 b	13.6 bc	488 b
Cruiser 5FS	SEED	---	60 g a.i./unit seed	4709.1 b	19.1 b	13.6 bc	474 b
NipsIt Inside	SEED	---	60 g a.i./unit seed	4581.6 b	18.6 b	13.6 c	461 b
Check				3931.2 c	16.6 c	13.1 d	372 c
LSD (0.05)				495.51	1.76	0.43	67.4

[a]B = Band; Seed = insecticidal seed treatment

Conclusions: Under this moderate level of root maggot pressure, all seed treatment entries clearly would generate sufficient amounts of revenue to pay for added input costs for this technology and provide additional profit. However, seed treatments are not as efficacious for SBRM control and provide significantly lower yield, quality, and revenue than the conventional at-plant granular insecticide Counter 15G. Growers will need to decide whether the savings in purchase and upkeep of granular insecticide equipment, combined with the convenience of seed treatment technology is worth the reduction in gross revenue that is likely to occur if one of these seed treatments is used for SBRM management in moderately to heavily infested portions of the Red River Valley production area.

Study 2: ***Combining Postemergence Lorsban 4E Sprays with Poncho Beta or Counter 15G***

SBRM Feeding Injury. Root maggot infestations in this three-year trial ranged from light to moderately high, which was reflected by the moderate level of SBRM feeding injury (average of 4.9 on the 0 to 9 rating scale) recorded in the untreated check plots across years (Table 1).

All insecticide entries in this trial, including stand-alone use of Poncho Beta and both at-plant treatments of Counter 15G, provided significant reductions in SBRM feeding injury when compared to that observed in the untreated check plots.

The high rate (12 lb product/ac) of Counter resulted in the lowest level of SBRM feeding injury in this study. Good control was also achieved by using Counter at the moderate (10 lb/ac) labeled rate, and a slight, nonsignificant improvement in root protection from SBRM feeding injury was observed in plots treated with the 10-lb rate when it was combined with a postemergence application of Lorsban 4E.

Both stand-alone applications of Counter 15G were statistically superior in SBRM control to that of the stand-alone Poncho Beta treatment. Similarly, Counter, combined with postemergence Lorsban 4E, was significantly more efficacious at preventing SBRM feeding injury than the combined treatment of Poncho Beta plus the postemergence spray of Lorsban 4E.

Table 3. Three-year combined analysis of *root feeding injury* in plots treated with seed treatment insecticides or Counter 15G and postemergence Lorsban 4E for sugarbeet root maggot control, Baker, MN (2007) and St. Thomas, ND (2007–2009)

Treatment/form.	Placement[a]/ timing	Rate (product/ac)	Rate (a.i./ac)	Root injury (0-9)
Counter 15G	B	12 lb	1.8 lb	2.5 d
Counter 15G + Lorsban 4E	B 7” Post B	10 lb 1 pt	1.5 lb 0.5 lb	2.6 d
Counter 15G	B	10 lb	1.5 lb	2.8 cd
Poncho Beta + Lorsban 4E	SEED 7” Post B	1 pt	68 g a.i./unit seed 0.5 lb	3.2 bc
Poncho Beta	SEED	---	68 g a.i./unit seed	3.6 b
Check	---	---	---	4.9 a
LSD (0.05)				0.59

[a]B = Band; Seed = insecticidal seed treatment

Yield and Economic Return. All insecticide treatments in this study resulted in significant improvements in yield over that of the untreated check. The top-yielding entry was the combination treatment of Counter 15G at 10 lb product per acre, combined with a postemergence application of Lorsban 4E at 1 pt/ac. Although the yield parameters and revenue benefits for this entry were not significantly higher than the stand-alone application of Counter 15G at 10 lb/ac, the combination treatment with Lorsban 4E produced the highest recoverable sucrose and root yields, and a gross revenue improvement of $15 per acre over 10 lb of Counter alone.

Stand-alone applications of Counter 15G were superior to stand-alone Poncho Beta at increasing recoverable sucrose, root tonnage, and revenue, irrespective of which rate of Counter was used. Counter treatments resulted in yield advantages of 1169 to 1202 lb/ac of recoverable sucrose and 3.8 to 4.4 tons of sugarbeet root yield over that of Poncho Beta, and the revenue advantages of stand-alone Counter ranged from $135 to $148/ac.

Similarly, the combination treatment of Counter 15G at 10 lb/ac plus Lorsban 4E produced 541 lb more recoverable sucrose and 2 tons more root yield than Poncho Beta plus Lorsban 4E. The revenue advantage of using Counter, rather than Poncho Beta, in combination with Lorsban 4E was $60/ac. Although not statistically significant, the stand-alone Poncho Beta treatment resulted in a revenue increase of $40 per acre when compared to revenue from the untreated check.

Table 4. Three-year combined analysis of *Yield parameters* in plots treated with seed treatment insecticides or Counter 15G and postemergence Lorsban 4E for sugarbeet root maggot control, Baker, MN (2007) and St. Thomas, ND (2007–2009)							
Treatment/form.	**Placement[a]/ timing**	**Rate (product/ac)**	**Rate (a.i./ac)**	**Recoverable sucrose (lb/ac)**	**Root yield (T/ac)**	**Sucrose (%)**	**Gross return ($/ac)**
Counter 15G + Lorsban 4E	B 7" Post B	10 lb 1 pt	1.5 lb 0.5 lb	6199.1 a	25.6 a	13.6 abc	608 a
Counter 15G	B	10 lb	1.5 lb	6087.3 ab	25.2 a	13.6 ab	593 a
Counter 15G	B	12 lb	1.8 lb	6054.4 ab	24.6 ab	13.8 a	606 a
Poncho Beta + Lorsban 4E	SEED 7" Post B	1 pt	68 g a.i./unit seed 0.5 lb	5658.3 b	23.6 b	13.5 abc	548 a
Poncho Beta	SEED	---	68 g a.i./unit seed	4885.7 c	20.8 c	13.3 c	458 b
Check	---	---	---	4356.6 d	18.2 d	13.4 bc	418 b
LSD (0.05)				453.1	1.64	0.32	61.9

[a]B = Band; Seed = insecticidal seed treatment

Overall Conclusions:

Seed treatment technology provides growers with a simple and accurate means of deploying insecticides for crop protection. A major benefit of seed treatments is that no specialized equipment (e.g., granular applicators) is needed for their application to the target zone. Also, the prescribed application rate is applied professionally to seed before it is sold. Thus, no equipment calibration or product mixing is necessary for growers to achieve an accurate application rate. Additional benefits of seed treatments include reduced risk of exposure to applicators because the only loading procedure involved with field application is when seed is added to planter hoppers. Another benefit is that substantial (i.e., up to 95%) reductions in active ingredient are applied per acre when compared with using conventional insecticides.

Drawbacks of insecticidal seed treatments include higher product cost per planted acre and lower efficacy and gross revenue than that achieved by using conventional granular insecticides. Growers will need to decide whether the savings in purchase/maintenance of granular insecticide equipment, combined with the convenience of seed treatment technology outweigh seed treatment costs and reduced revenue associated with using insecticidal seed treatments for SBRM management in moderately to heavily infested portions of the Red River Valley production area.

Performance rating of insecticides for control of various sugarbeet insect pests in NDSU trials in the Red River Valley, 2006–2008			
Insecticide	**Performance rating***		
	Root maggot	**Springtails**	**Wireworms**
Counter 15G	Excellent	Excellent	Good
Cruiser 5FS	Fair	Good	Good
NipsIt Inside	Fair	Good	Good
Poncho Beta	Fair	Good	Good
MustangMax	Poor	Fair	Good

*Performance ratings are based on three years of control trials on sugarbeet root maggot and springtail control, but only two small trials on wireworms.

References:

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