TURNING POINT® SURVEY OF SUGARBEET INSECT PEST PROBLEMS AND MANAGEMENT PRACTICES IN MINNESOTA AND EASTERN NORTH DAKOTA IN 2022

Mark A. Boetel[1], Professor
Mohamed F.R. Khan[2], Professor
Thomas J. Peters[2], Associate Professor
Peter C. Hakk[3], Research Specialist

[1]Department of Entomology, North Dakota State University, Fargo, ND
[2]North Dakota State University & University of Minnesota, Fargo, ND
[3]Plant Pathology Department, North Dakota State University, Fargo, ND

Attendees of the 2023 Winter Sugarbeet Grower Seminars held at Fargo, Grafton, Grand Forks, and Wahpeton, ND were asked about their 2022 insect pest issues and associated management practices in a live polling session by using a Turning Point® interactive personal response system. Missing data from the Wahpeton seminar resulted from question exclusion by site hosts, thus precluding presentation of that data in this report.

Initial questioning included identifying the county in which grower respondents produced the majority of their sugarbeet crop in 2022. Those results are presented in Tables 1-4). The majority (73%) of Fargo seminar attendees indicated that the majority of their sugarbeet crop was grown in Clay, Norman, or Mahnomen counties of Minnesota, with the remaining 27% of respondents having produced most of their crop in either Cass or Traill County, ND (Table 1).

Table 1. 2023 Fargo Grower Seminar – county in which sugarbeet was grown in 2022

County	Number of responses	Percent of responses
Cass	3	10
Clay	11	38
Norman/Mahnomen	10	35
Traill	5	17
Totals	29	100

The majority (66%) of attendees at the Grafton grower seminar reported that most of their sugarbeet production acreage was located in either Pembina or Walsh County, ND (Table 2). Kittson and Marshall counties of Minnesota accounted for an additional 12% each of the attendees of the Grafton seminar, and Grand Forks County, ND was represented by an additional 8% of Grafton respondents.

Table 2. 2023 Grafton Grower Seminar – county in which sugarbeet was grown in 2022

County	Number of responses	Percent of responses
Grand Forks	4	8
Kittson	6	12
Marshall	6	12
Pembina	14	28
Walsh	19	38
Other	1	2
Totals	50	100

At the Grand Forks winter sugarbeet grower seminar, the largest proportion (47%) of attendees indicated that the majority of their sugarbeet production occurred in Polk County, MN (Table 3). An additional 25% of grower attendees at Grand Forks responded that most of their sugarbeet was grown in Grand Forks County, ND. Other counties represented by grower attendees at Grand Forks included Marshall and Nelson counties of Minnesota, and Traill and Walsh counties of North Dakota.

Table 3. 2023 Grand Forks Grower Seminar – county in which sugarbeet was grown in 2022

County	Number of responses	Percent of responses
Grand Forks	15	25
Marshall	4	7
Nelson	2	3
Polk	29	47
Traill	3	5
Walsh	3	5
Other	5	8
Totals	61	100

Responses to this question at the Wahpeton winter sugarbeet grower seminar indicated that 48% of the attending producers grew the majority of their sugarbeet crop in Wilkin County, MN, with another 26% of the respondents reporting that most of their crop was produced in Richland County, ND (Table 4). An additional 10% of grower attendees at the Wahpeton seminar indicated that most of their sugarbeet production occurred in Grant County, MN, with Clay and Traverse counties of Minnesota each being where 7% of the Wahpeton attendees grew most of their sugarbeet in 2022.

Table 4. 2023 Wahpeton Grower Seminar – county in which sugarbeet was grown in 2022

County	Number of responses	Percent of responses
Cass	1	2
Clay	3	7
Grant	4	10
Richland	11	26
Traverse	3	7
Wilkin	20	48
Totals	42	100

This report is based on production activities on an estimated 126,300 acres of sugarbeet grown in 2022 by 172 grower respondents that attended the 2023 Fargo, Grafton, Grand Forks, and Wahpeton Winter Sugarbeet Grower seminars (Table 5). The majority (34%) of respondents reported growing sugarbeet on between 300 and 599 acres during the 2022 production season. An additional 28% of producers grew sugarbeet on between 600 and 999 acres, whereas 10% produced sugarbeet on less than 200 acres. Similar to previous years, 9% of respondents reported growing sugarbeet on 1,500 acres or more in 2022.

Table 5. Ranges of sugarbeet acreage operated by respondents in 2022

		Acres of sugarbeet									
Location	Number of responses	<99	100-199	200-299	300-399	400-599	600-799	800-999	1000-1499	1500-1999	2000+
		% of responses									
Fargo	23	0	0	4	22	26	17	4	13	4	9
Grafton	46	2	11	7	15	17	11	9	15	9	4
Grand Forks	63	3	10	6	8	29	16	16	13	0	0
Wahpeton	40	3	8	5	10	13	20	13	15	13	3
Totals	172	2	8	6	12	22	16	12	14	6	3

From a combined total of 178 respondents at the Fargo, Grafton, Grand Forks, and Wahpeton seminars, 36% identified the sugarbeet root maggot (SBRM) as their worst insect pest problem in 2022, and 32% viewed grasshoppers as their worst insect pest problem (Table 6). Springtails were rated as the worst pest by 9% of all seminar respondents. Other insect groups identified as causing problems in 2022 included white grubs, wireworms, and cutworms (3, 3, and 1%, of all seminar respondents, respectively) as averaged across the four seminar locations.

The majority of respondents at Grafton (52%) and Grand Forks (49%) identified the SBRM as their worst insect pest problem, whereas, grasshoppers were reported as the worst insect problem for 52, 28, 15, and 50% of producer respondents at Fargo, Grafton, Grand Forks, and Wahpeton, respectively. Springtails were identified as the worst insect pest problem by 8, 15, and 10% of respondents at Fargo, Grand Forks, and Wahpeton, respectively.

Table 6. Worst insect pest problem in sugarbeet in 2022

Location	Number of responses	Springtails	Cutworms	Lygus bugs	Wireworms	Root maggot	White grubs	Grass-hoppers	None
		% of responses							
Fargo	25	8	0	0	4	24	0	52	12
Grafton	46	0	2	0	2	52	0	28	15
Grand Forks	65	15	0	0	2	49	2	15	17
Wahpeton	42	10	2	0	7	5	10	50	17
Totals	178	9	1	0	3	36	3	32	16

A combined total of 89% of all grower respondents at across all winter grower seminars indicated that they used some form of insecticide to manage insect pests in 2022, with the majority (37%) reporting that they planted seed treated with Poncho Beta insecticidal seed treatment (Table 7). An additional 23% reported using Counter 20G for at-plant protection from insect pests. The remaining producers indicated that they used either Mustang (i.e., Mustang or Mustang Maxx; 10%), Midac (6%), Cruiser (3%), or NipsIt Inside (3%). The majority of planting-time insecticide use in 2022 was carried out by growers that attended the Fargo, Grafton, and Grand Forks seminars, at which 93, 92, and 94% of respondents, respectively, reported using insecticidal protection at planting. Conversely, only 41% of Wahpeton seminar respondents responded as having used an insecticide at planting.

At the Fargo seminar, 37% of producers reported using insecticide-treated seed, with the majority (34%) of those individuals using Poncho Beta-treated seed and the remaining 3% planting their fields with Cruiser-treated seed. An additional 28% of Fargo attendees applied Counter 20G for at-plant protection from insect pests. A considerable segment (27%) of Fargo attendees applied a liquid insecticide at planting in 2022, with the majority of those applications being either Midac (14%) or Mustang (10% Mustang Maxx; 3% Mustang).

The majority (51%) of Grafton attendees reported planting Poncho Beta insecticide-treated seed. Cruiser- and NipsIt Inside-treated seed were each used by an additional 4% of Grafton attendees. A surprisingly low proportion (19%) of Grafton seminar attendees reported using Counter 20G for planting-time insect pest management. An additional 15% of growers at Grafton indicated that they used a sprayable liquid insecticide, which involved applications of Midac, Mustang, and Mustang Maxx (9, 4, and 2% of respondents, respectively).

Poncho Beta-treated seed was used by 42% of the attendees of the Grand Forks seminar location, and an additional 6 and 5% of respondents at that location reported using NipsIt Inside- and Cruiser-treated seed, respectively. Counter 20G was reported as being used at planting by 29% of grower respondents at Grand Forks, whereas, 8% of attendees at that location reported using Mustang Maxx and an additional 5% responded as using Midac as their planting-time insecticide.

At the Wahpeton seminar location, 17% of respondents indicated that they applied Mustang Maxx for planting-time protection from insect pests in 2022. Similarly, 15% of Wahpeton attendees reported using Counter 20G, and an additional 10% indicated that they used Poncho Beta-treated seed for insect pest management. No other insecticides were reported as being used during the 2022 growing season by Wahpeton seminar attendees.

Table 7. *Planting-time* insecticide use for sugarbeet insect pest management in 2022

Location	Number of responses	Counter	Midac	Mustang Maxx	Mustang	Poncho Beta	Cruiser	NipsIt Inside	Other	None
		% of responses								
Fargo	29	28	14	10	3	34	3	0	0	7
Grafton	53	19	9	2	4	51	4	4	0	8
Grand Forks	66	29	5	8	0	42	5	6	0	6
Wahpeton	41	15	0	17	0	10	0	0	0	59
Totals	189	23	6	8	2	37	3	3	0	18

Averaged across the Fargo, Grafton, and Grand Forks seminar locations, the moderate and high (7.5 and 8.9 lb product/ac) rates of Counter 20G were the most commonly used (16 and 15%, respectively) granular insecticide treatments for insect management in 2022 (Table 8). The majority of Fargo (55%), Grafton (60%), and Grand Forks (67%) respondents reported no use of a granular insecticide in 2022. However, 70% of the Fargo respondents that did use a granular insecticide applied Counter 20G at the 7.5-lb rate and 10% used the 5.25-lb rate,

but no one at the Fargo seminar location reported applying it at the high (8.9 lb product/ac) label rate.

At the Grafton seminar location, 40% of producers reported applying a granular insecticide in 2022. Fifty percent of those respondents applied Counter at the high (8.9 lb) rate, and 33% used it at the moderate rate of 7.5 lb product per acre. Similarly, 33% of Grand Forks respondents reported using a granular insecticide in 2022. Fifty percent of the Grand Forks attendees that used a granular insecticide in 2022 indicated that they applied Counter 20G at the high labeled rate, and an additional 35% applied it at 7.5 lb product per acre.

Averaged across the Fargo, Grafton, and Grand Forks seminar locations, Thimet 20G was used by 2% of grower respondents, and all reported use of Thimet was at its lower rate of 4.5 lb product per acre. The survey question relating to granular insecticide use in 2022 was errantly excluded at the Wahpeton seminar in 2023.

Table 8. Application rates of *granular* insecticides used for sugarbeet insect pest management in 2022

	Number of	Counter 20G			Thimet 20G			
Location	responses	8.9 lb	7.5 lb	5.25 lb	7 lb	4.5 lb	Other	None
		% of responses						
Fargo	22	0	32	5	0	0	9	55
Grafton	45	20	13	2	0	2	2	60
Grand Forks	60	17	12	2	0	2	2	67
Totals	127	15	16	2	0	2	3	62

Averaged across the Fargo, Grafton, and Grand Forks survey locations, 46% of respondents reported using a postemergence insecticide to manage the sugarbeet root maggot (SBRM) (Table 9). At the Fargo seminar site, 33% of respondents applied Mustang Maxx for postemergence root maggot control in 2022, which was 70% of all insecticide use reported for that purpose by Fargo grower respondents. Additionally, 14% of all producer respondents at Fargo reported using Thimet 20G to manage the root maggot, which accounted for 30% of all reported postemergence insecticide use for root maggot control by Fargo attendees.

At the Grafton seminar location, 66% of grower respondents indicated that they used some form of postemergence insecticide for SBRM control in 2022. The majority (41%) of Grafton attendees applied Mustang Maxx for postemergence root maggot management, which was 62% of all respondents who used a postemergence insecticide for root maggot control in 2022.

A total of 30% of Grand Forks seminar attendees reported using a postemergence insecticide for root maggot management in 2022. Two-thirds of the producer respondents that did apply an insecticide for SBRM control indicated that they used Mustang Maxx, whereas, only 11% of them used Asana XL, and 22% relied on Thimet 20G for protection against the pest.

Table 9. *Postemergence* insecticide use for *sugarbeet root maggot* management in 2022

	Number of				Mustang				
Location	responses	Asana XL	Lannate	Movento	Maxx	Mustang	Thimet	Other	None
		% of responses							
Fargo	21	0	0	0	33	0	14	0	53
Grafton	44	7	0	0	41	9	9	0	34
Grand Forks	60	3	2	0	20	0	5	0	70
Totals	125	4	1	0	3	3	8	0	54

Averaged across the Fargo, Grafton, and Grand Forks seminar locations, 63% of grower respondents rated their satisfaction with the insecticide applications they made for root maggot control in 2022 as good to excellent (Table 10). Conversely, an average of 22% of growers that attended the three seminars rated the SBRM control performance of their insecticide program as being fair, and an additional 4% rated it as poor.

Individually, grower satisfaction with insecticide performance for root maggot control in 2022 was rated as good to excellent by 75, 55, 67% of Fargo, Grafton, and Grand Forks respondents, respectively. Satisfaction with insecticide performance for SBRM control was rated as fair by 8, 30, and 19% of respective respondents at the Fargo, Grafton, and Grand Forks seminar locations, which was similar to results those locations in previous years.

At the Fargo seminar location, 17% of respondents that used an insecticide for sugarbeet root maggot

control viewed the control provided by the insecticide as poor. However, it should be noted that only 12 grower attendees provided a response to this question, so the poor performance rating involved an even smaller number of respondents.

At the Grafton seminar location, just 3% of grower respondents who used an insecticide for root maggot control rated the insecticide performance as poor; no respondents at the Grand Forks seminar gave a poor rating of performance for their root maggot control treatments. Although the percentages of respondents that rated their root maggot control tool performance as poor may be viewed as low, the incidence of these views was higher during this series of grower seminar surveys than in recent years.

Table 10. *Satisfaction* with insecticide treatments for sugarbeet root maggot management in 2022

Location	Number of responses	Excellent	Good	Fair	Poor	Unsure
		% of responses				
Fargo	12	33	42	8	17	0
Grafton	33	3	52	30	3	12
Grand Forks	36	25	42	19	0	14
Totals	81	17	46	22	4	11

As presented in Table 11, a combined average of 72% of grower respondents at the Fargo, Grafton, and Grand Forks grower seminar locations used an insecticide for planting-time protection against springtails. That is a substantial increase when compared to the usage reported from the past few years, in which the use of insecticides for springtails hovered around 50% of growers surveyed. The majority (37%) of respondents that did use an insecticide for this purpose in 2022 relied on Poncho Beta seed treatment insecticide. An additional 19% applied Counter 20G for springtail control. Other notable uses reported included overall averages of 8 and 5% of respondents that used Midac and Mustang Maxx for springtail control. About 28% of all growers surveyed at the three seminar locations reported not using any insecticide for springtail control, which was significantly lower than had been recorded in recent years.

At the Fargo seminar, Counter 20G and Poncho Beta were each used by 21% of respondents, and 17% reported applying Midac for springtail control in 2022. Mustang Maxx was reported as being used by just 4% of Fargo respondents.

The majority (44% of respondents) of insecticide use for springtail management by Grafton seminar attendees involved planting seed treated with Poncho Beta. Cruiser seed treatment insecticide and Counter 20G were each used for springtail control by 7% of the Grafton seminar respondents. The remaining use of insecticides for springtail control, as reported by attendees of the Grafton seminar, included Mustang Maxx (5% of respondents) and Midac (2% of respondents). Thirty-five percent of Grafton attendees indicated that they did not use an insecticide for protection from springtail injury.

Similar to the results from Fargo and Grafton, the majority (38%) of grower respondents at the Grand Forks seminar location indicated that Poncho Beta insecticidal seed treatment was their choice for springtail management during the 2022 growing season. A relatively large number (27%) of Grand Forks respondents also reported that they used Counter 20G at planting for springtail control. Other insecticide use reported by Grand Forks attendees included Midac (8% of respondents), Mustang Maxx (5% of respondents), and NipsIt Inside seed treatment (3% of respondents). This question was excluded at the Wahpeton grower seminar by the site hosts, so no data were collected on springtail management for that growing area.

Table 11. Insecticide use for *springtail* management in 2022

Location	Number of responses	Cruiser	NipsIt Inside	Poncho Beta	Mustang Maxx	Counter 20G	Midac	Other	None
		% of responses							
Fargo	24	0	0	21	4	21	17	0	38
Grafton	43	7	0	44	5	7	2	0	35
Grand Forks	60	0	3	38	5	27	8	0	18
Totals	127	2	2	37	5	19	8	0	28

As presented in Table 12, an overall average of 83% of grower respondents surveyed at the Fargo, Grafton, and Grand Forks seminar locations rated their insecticide performance for springtail management as good to excellent, and only 2% of respondents across all locations viewed their insecticide performance as poor. It should be noted, however, that the combined total of 10% of respondents rating the performance of their springtail control program as being either fair or poor differed markedly from the previous survey (2021 crop year), in which no respondents gave fair or poor ratings for their springtail control.

Satisfaction among Fargo attendees, with regard to insecticide performance for springtail control, was fairly strong, with 71% rating their insecticide performance as either good or excellent. However, the Fargo seminar attendees also had the highest incidence (7%) of respondents that rated their springtail control as poor.

Among grower respondents at the Grafton location, most (63%) viewed their springtail control as being either good or excellent. Only 7% rated the performance of their springtail control program as being fair, and no respondents rated it as poor. Interestingly, 30% of respondents at the Grafton seminar were unsure of the performance of springtail control in their fields.

Grower respondents at the Grand Forks seminar had the highest incidence (79% of respondents) of good to excellent ratings of their springtail control programs. However, 10% of Grafton respondents rated their springtail control as being fair to poor.

Table 12. *Satisfaction* with insecticide treatments for springtail management in 2022

Location	Number of responses	Excellent	Good	Fair	Poor	Unsure
		----------% of responses----------				
Fargo	14	50	21	0	7	21
Grafton	30	53	10	7	0	30
Grand Forks	48	44	35	8	2	10
Totals	92	48	35	8	2	10

Lygus bugs were not a major production problem for Red River Valley producers in 2022. This was demonstrated by the combined average of 88% of survey respondents at the Fargo, Grafton, and Grand Forks winter grower seminars reporting that they did not use an insecticide in 2022 for *Lygus* bug control (Table 13).

Fargo seminar attendees reported the highest incidence of insecticide use (26% of respondents) for *Lygus* bug management during the 2022 growing season. A total of 16% of Fargo respondents indicated that they applied Mustang (i.e., Mustang or Mustang Maxx) for *Lygus* bug control, which was the majority of reported insecticide use for this purpose by Fargo seminar respondents in 2022.

Only 8% of Grafton respondents reported using an insecticide for *Lygus* bug management in 2022, with 3% of respondents indicating that they used Asana XL. An additional 5% of total respondents reported that they used an insecticide that was not included as a choice in the survey.

Attendees of the Grand Forks grower seminar also reported low levels of insecticide use for *Lygus* bug control. A total of 10% of Grand Forks respondents indicated that they sprayed for *Lygus* bugs in 2022, with the majority (5% of attendees) reporting that they chose Mustang Maxx for this use. Asana XL and Lannate were each reported as being applied for *Lygus* bug control by 2% of Grand Forks respondents, and an additional 2% indicated that they used an insecticide that was not included as a choice in the survey.

Table 13. Insecticide use for *Lygus bug* management in 2022

Location	Number of responses	Asana XL	Lannate	Movento	Mustang Maxx	Mustang	Other	None
		----------% of responses----------						
Fargo	19	0	0	0	11	5	11	74
Grafton	38	3	0	0	0	0	5	92
Grand Forks	58	2	2	0	5	0	2	90
Totals	115	2	1	0	4	1	4	88

Survey results on satisfaction with insecticide performance for *Lygus* bug control are presented in Table 14. Those results should be interpreted with discretion because the relative infrequency of insecticide use for that purpose resulted in a very small sample size. Overall, the results suggest that 48% of respondents that used an insecticide for *Lygus* bug management in 2022 viewed its performance as good to excellent, and a similar proportion (47%) of respondents were unsure.

Table 14. *Satisfaction* with insecticide treatments for *Lygus bug* management in 2022

Location	Number of responses	Excellent	Good	Fair	Poor	Unsure
		----------% of responses----------				
Fargo	6	33	17	0	0	50
Grafton	5	40	0	0	0	60
Grand Forks	6	0	50	17	0	33
Totals	17	24	24	6	0	47

Grasshoppers were problematic for many North Dakota and Minnesota producers in 2022; however, outbreaks were not as widespread as they had been during the 2021 growing season. About 39% of all grower respondents that attended the Fargo, Grafton, and Grand Forks grower seminars indicated that they used a foliar postemergence insecticide for grasshopper control in 2022 (Table 15). Mustang (i.e., Mustang or Mustang Maxx) was chosen for grasshopper control in 2022 by 21% of all respondents at the three aforementioned 2023 winter grower seminars, which was 56% of all growers who actually used an insecticide for this purpose. An additional 6% of all survey respondents across all grower seminar locations indicated that they had used Asana XL for grasshopper control, which was 16% of all who used an insecticide to manage grasshoppers in 2022.

Grower attendees of the Fargo seminar reported the highest use (72% of all respondents) of foliar rescue insecticides for grasshopper control in 2022. The majority (46% overall; 63% of growers that sprayed for grasshoppers) indicated that they chose Mustang (i.e., Mustang or Mustang Maxx) for this use, whereas 18% of all Fargo respondents (25% of those who used an insecticide for grasshopper control) applied Asana XL.

At the Grafton winter grower seminar, 43% of respondents indicated that they had used a foliar insecticide for grasshopper management in 2022. Of those producers that used an insecticide for this purpose, 55% applied either Mustang or Mustang Maxx, and 15% reported that they used Asana XL for grasshopper control in 2022.

The Grand Forks seminar survey indicated that 23% of respondents used an insecticide to control grasshoppers in 2022; 50% of those attendees who used an insecticide applied either Mustang or Mustang Maxx, and an additional 7% used Asana XL to manage grasshopper infestations in their sugarbeet fields in 2022. This question was excluded from the survey by site hosts at the Wahpeton seminar location.

Table 15. Insecticide use for *grasshopper* management in 2022

Location	Number of responses	Asana XL	Lannate	Movento	Mustang Maxx	Mustang	Other	None
		----------% of responses----------						
Fargo	22	18	0	0	32	14	9	27
Grafton	46	7	0	2	20	4	11	57
Grand Forks	60	2	0	2	8	3	8	77
Totals	128	6	0	2	16	5	9	61

Good to excellent grasshopper control was reported by 65% of all respondents that attended the three winter grower seminar locations where this question was asked (Table 16); however, 27% of all grower seminar respondents viewed their grasshopper control tool performance as being fair to poor.

At the Fargo winter grower seminar, 63% of respondents rated their insecticide as having provided good to excellent grasshopper control in 2022. Thirty-one percent of Fargo seminar respondents that used an insecticide for grasshopper control in 2022 rated its performance as only fair, but no Fargo respondents rated it as poor.

Grafton seminar respondents that applied an insecticide for grasshopper control in 2022 mostly (67% of those that used an insecticide for that purpose) viewed its performance as either good or excellent. Survey respondents at the Grafton seminar location also had the lowest (19%) incidence of growers that rated their insecticide performance for grasshopper management as fair.

Survey results from the Grand Forks grower seminar were similar to those at the other two locations. Sixty-four percent of Grand Forks respondents rated their insecticide performance in managing grasshopper infestations as being good to excellent, whereas 27% rated their grasshopper control as fair to poor.

Table 16. *Satisfaction* with insecticide treatments for *grasshopper* management in 2022

Location	Number of responses	Excellent	Good	Fair	Poor	Unsure
		----------% of responses----------				
Fargo	16	13	50	31	0	6
Grafton	21	24	43	19	5	10
Grand Forks	11	9	55	27	0	9
Totals	48	17	48	25	2	8

Survey responses to the question about postemergence insecticide spray output volume used in 2022 are presented in Table 17. When averaged across all three grower seminar locations where attendees were asked about the finished spray output volume they used for postemergence insecticide applications, 68% of grower respondents reported that they applied their insecticide in the range of six to 10 gallons per acre (GPA). An additional 26% of all seminar respondents reported making postemergence insecticide applications in an output volume of between 11 and 15 GPA, and the remaining 6% used a finished spray volume of 16 to 20 GPA.

At the Fargo seminar location, the majority (88%) of respondents that used a postemergence insecticide in 2022 indicated that they applied it in a total spray output volume of between six and 10 GPA. The remaining 12% of respondents reported applying their postemergence insecticide in an output volume of between 11 and 15 GPA.

Most (68%) of the Grafton grower seminar attendees reported that they applied postemergence liquid insecticides in an output volume that ranged between six and 10 gallons per acre (GPA) in 2022. Another 29% of respondents at Grafton indicated that they delivered their postemergence sprays in output volumes ranging between 11 and 15 GPA, and 3% reported using an output volume of between 16 and 20 gallons per acre.

The majority (57%) of Grand Forks seminar attendees that applied a postemergence sprayable insecticide in 2022 indicated that they delivered it in an output volume that ranged between six and 10 GPA. Twenty-nine percent of Grand Forks attendees reported applying their postemergence insecticide sprays by using an output volume of between 11 and 15 GPA, and an additional 14% of Grand Forks respondents indicated that they applied the material in a spray volume that ranged between 16 and 20 GPA.

Table 17. Spray volume output used for ground-applied postemergence insecticide applications in 2022

Location	Number of responses	1–5 GPA	6–10 GPA	11–15 GPA	16–20 GPA	> 20 GPA
		----------% of responses----------				
Fargo	16	0	88	12	0	0
Grafton	34	0	68	29	3	0
Grand Forks	28	0	57	29	14	0
Totals	78	0	68	26	6	0

Attendees of all four 2023 winter sugarbeet grower seminars were asked about how their insecticide use for insect pest management compared to previous years. Overall, 60% of all respondents (Fargo, Grafton, Grand Forks, and Wahpeton locations combined) reported that their insecticide use in 2022 did not differ from the previous five years (Table 18). The most significant insecticide use change observed with this question was that 50% of Fargo seminar attendees reported an increase in insecticide use in 2022 when compared to previous years. Similarly, 30% and 27% of respondents at the Grafton and Wahpeton seminars, respectively, also reported that their insecticide usage in 2022 was greater than it had been during the previous five years. Increases in insecticide use by grower attendees of the Fargo and Grafton seminars could have been a product of increasing intensity and geographic spread of sugarbeet root maggot populations, combined with several outbreaks of grasshoppers in 2022. The increased insecticide usage reported by Wahpeton seminar attendees were more likely a result of several outbreaks of sugarbeet webworm, beet armyworm, and grasshoppers during the 2022 growing season.

Table 18. Insecticide use in sugarbeet during 2022 compared to the previous 5 years

Location	Number of responses	Increased	Decreased	No Change	No Insecticide Use
		% of responses			
Fargo	24	50	4	46	0
Grafton	40	30	8	58	5
Grand Forks	57	14	12	70	4
Wahpeton	37	27	5	57	11
Totals	158	27	8	60	5

Grower seminar attendees were also asked about their use of various information sources for making sugarbeet insect pest management decisions. Averaged across all four grower seminar locations, 49% of respondents indicated that they used a publicly available decision-making tool or information source for sugarbeet insect management decision making during the 2022 growing season (Table 19). About 50% of attendees indicated that they used alternative sources for making insect management decisions, and just 1% of respondents reported that they did not rely on any of them. The most commonly used decision-making tools and information sources used by attendees for insect pest management in 2022, as averaged across locations, included the NDSU Crop & Pest Report (23% of respondents), sugar cooperative-generated cellular text alerts (15% of respondents), and the Sugarbeet Production Guide (11% of respondents). Pest management information source usage was mostly consistent among surveyed locations, with the exception that no attendees of the Fargo seminar reported using the Sugarbeet Production Guide in 2022.

Table 19. Use of information sources for sugarbeet insect pest management decision making in 2022

Location	Number of Responses	Cellular text alerts	NDSU Crop & Pest Report	Sugarbeet Production Guide	Other	None
		% of responses				
Fargo	26	19	31	0	50	0
Grafton	58	16	24	12	48	0
Grand Forks	81	14	21	14	51	1
Totals	165	15	23	11	50	1

Acknowledgement:

The authors greatly appreciate the valued and essential contributions of responses to this survey by the sugarbeet producers that attended the winter sugarbeet grower seminars.