SURVEY OF WEED CONTROL AND PRODUCTION PRACTICES ON SUGARBEET IN MINNESOTA AND EASTERN NORTH DAKOTA IN 2014

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The forty-sixth annual weed control and production practices questionnaire was conducted electronically in 2014. The survey was linked to the websites of American Crystal Sugar Company, Minn-Dak Farmers Cooperative, and Southern Minnesota Beet Sugar Cooperative (SMBSC) from October to early December, 2014. Growers were asked to evaluate weed control and sugarbeet injury from specific herbicides, and to list the most important weed and production problems related to sugarbeet grown in 2014. In addition, growers were asked to indicate insecticide use, fungicide use, sugarbeet acreage, acres of hand-weeded sugarbeet, pesticide application methods, cost of hand weeding sugarbeet and other questions relating to their 2014 sugarbeet crop. Insecticide use and fungicide use portions of the survey can be found in the Entomology and Plant Pathology sections of this book.

Sugarbeet growers planted 642,896 acres of sugarbeet in the Minnesota and eastern North Dakota in 2014. One-hundred eighty-eight growers responded to the survey, representing 105,950 acres or 16% of the total acres planted. Of the acres reported, 1% was conventional and 99% were Roundup Ready® (RR) sugarbeet. This compared to 99% of reported acres being RR in 2013, 97% in 2012, 82% in 2011, 93% in 2010, 88% in 2009, and 49% in 2008. Grand Forks, Norman, Pembina, and Polk Counties each had 1 respondent who grew conventional sugarbeet while respondents from all other counties grew only RR sugarbeet. 2014 marked the third year the survey was conducted exclusively online.

A summary of herbicide use, weed control, and crop injury averaged across all counties is presented in Table 1. The number of responses for an herbicide treatment is listed and the acres treated are expressed as a percentage of the total acreage reported. Multiple herbicide treatments are tabulated for each grower; therefore the number of responses for herbicide treatments exceeds the total number of survey respondents. Also, multiple herbicide treatments on the same acreage are listed separately in the tables, thus acres treated exceeds 100%. Weed control and sugarbeet injury are presented as the percentage of growers evaluating weed control or sugarbeet injury according to the categories listed. Table 2 and 3 provides a summary of herbicide use and performance in conventional sugarbeet and RR sugarbeet, respectively.

The herbicide trade names listed in the tables are original trade names. The original trade names also represent the generic formulations of the same active ingredient. Thus Nortron also represents Ethofumesate SC, Ethofumesate 4SC, and Ethotron; Betamix also represents Phen-Des 8+8 and Sugarbeet Mix; Progress also represents BnB Plus; Stinger also represents Clopyr Ag, Garrison, and Spur; Dual Magnum as a lay-by herbicide also represents Brawl, Cinch, and Charger Basic; Outlook also represents Commit, Establish, Propel, or Slider; and Grass Herbicide represents Assure II, Select, Select Max, Arrow, Clethodim 2EC, Intensity, Intensity One, Prism, Section, Shadow, Trigger, Volunteer, and Targa.

Total sugarbeet acreage treated with herbicides in 2014 was 236% (Tables 1 and 4) compared to 232% in 2013, 208% in 2012, 287% in 2011, 256% in 2010, 230% in 2009, 308% in 2008, 383% in 2007, 386% in 2006, and 378% in 2005. The acres treated do not include “other weed control methods” which were non-herbicidal methods. Respondents planting conventional sugarbeet in 2014 applied herbicides to 310% of their acreage (Tables 2 and 4), compared to 480% in 2013, 378% in 2012, 403% in 2011, 385% in 2010, 299% in 2009, and 407% in 2008. Respondents who planted RR sugarbeet in 2014 applied herbicides to 236% of their acreage (Tables 3 and 4) compared to 229% in 2103, 202% in 2012, 262% in 2011, 245% in 2010, 225% in 2009, and 225% in 2008.

Nortron, Dual Magnum, and tank-mixes of Nortron+Dual were the soil-applied herbicides reported by respondents in 2014. Soil-applied herbicide use for all sugarbeet acreage was 4% in 2014(Table 1), 3% in 2013, 2% in 2012, 6% in 2011, 2% in 2010, 5% in 2009, 20% in 2008, 25% in 2007, 23% in 2006, 24% in 2005, and 47% in 1989. When asked if they planned to use a soil-applied herbicide in the spring of 2015, 16% said yes, 58% said no, 23% were unsure, and 3% did not answer the question. Of those who said ‘yes’ and plan to use a soil herbicide next season 93% were from

Moorhead, Minn-Dak, or SMBSC factory districts. This is probably due to the increasing presence of waterhemp in these areas.

Postemergence (POST) herbicide use averaged across all sugarbeet was 232% in 2014 (Table 1) compared to 221% in 2013, 201% in 2012, 276% in 2011, 253% in 2010, 224% in 2009, 279% in 2008, 340% in 2007, 335% in 2006, and 336% in 2005. In 2014, based upon a change in question formatting, POST herbicide usage also includes all POST lay-by applications that were reported as an herbicide tank-mixed with Outlook, Dual Magnum, or Warrant.

The most common herbicide treatment reported by all respondents since 2009 has been glyphosate applied POST. Glyphosate, when combined across all rates and combinations, was applied POST to 227% of all (conventional + RR) sugarbeet acreage reported in 2014 (Table 1), compared to 215% in 2013, 192 % in 2012, 198% in 2011, 224% in 2010, 190% in 2009 and 105% in 2008. Glyphosate, when combined across all rates and combinations, was applied to 230% of RR sugarbeet acreage reported in 2014 (Table 3), compared to 218% in 2013, 198% in 2012, 244% in 2011, 242% in 2010, 224% in 2009 and 223% in 2008. Glyphosate plus Stinger at 34% and glyphosate plus Grass Herbicide at 10% of acres treated were the most frequently reported herbicide combinations by respondents planting RR sugarbeet in 2014 (Table 3). Stinger may be added to glyphosate to help control weeds such as common ragweed or volunteer RR soybean, while Select may be added to help control volunteer RR corn.

The average cumulative rate of glyphosate applied POST per acre in RR sugarbeets in 2014 was 2.32 pounds acid equivalent per acre (lb ae/A), compared to 2.11 in 2013, 2.32 in 2012, 2.21 in 2011, 2.09 in 2010, 1.85 in 2009 and 1.95 lb ae/A in 2008. Since 2012 the average total rate of glyphosate applied per acre has been calculated using actual product names and use rates provided by the respondents who grew RR sugarbeet (data available upon request). In 2008 through 2011 the average total rate of glyphosate applied per acre was calculated by multiplying a glyphosate rate listed in Table 1 by the total percentage (in decimal form) of acres treated for that particular glyphosate rate listed in Table 1 and by the total acres reported in Table 1. The procedure was repeated for each glyphosate rate listed, the results were added, and then divided by the total RR sugarbeet acreage listed in Table 4. The average glyphosate rate per acre per application in 2014 was 0.94 lb ae/A compared to 0.91 lb ae/A in 2013. In 2014, Roundup PowerMax was applied by 76% of responses reporting the use of glyphosate formulations (Table 5).

The use of postemergence grass herbicides alone or in combination was 24% of all sugarbeet acres in 2014 (Table 1) as compared to 23% in 2013, 30% in 2012, 56% in 2011, 32% in 2010, 29% in 2009, 104% in 2008, 189% in 2007, 215% in 2006, and 203% in 2005. The rapid decline in postemergence grass herbicide usage after 2007 is due to the rapid adoption of RR sugarbeet and the use of glyphosate to control grass weeds. In RR sugarbeet, grass herbicides are most commonly used to control volunteer RR corn.

The RR sugarbeet system continues to provide the most effective POST weed control reported by growers in the history of this survey. Fifty-six percent of RR sugarbeet respondents (Table 3) reported excellent POST weed control compared to 36% of respondents who grew conventional sugarbeet (Table 2). From 1974 to 2010, an average of 25% of conventional sugarbeet growers reported excellent weed control. Of growers who reported weed control from glyphosate applied alone (excludes those who did not respond), 63% reported excellent weed control in 2014 compared to 75% in 2013, 77% in 2012, 80% in 2011, 81% in 2010, 87% in 2009, and 92% in 2008. This declining trend of excellent weed control by respondents with RR sugarbeet should be noted as it is likely an indicator of increasing levels of glyphosate-resistant weeds.

Lay-by herbicides Outlook, Warrant, and Sequence were applied to 15% of reported acres in 2014 (Table 1). All applications but one were made as tank-mixes with glyphosate and/or other herbicides. Outlook was the most commonly applied lay-by product being applied to nearly 13% of reported acres.

The rotary hoe was used on only 0.5% of all acres in 2014 (Table 1) compared to 0.1% in 2013, 0.7% in 2012, 0.9% in 2011, 2.8% in 2010, 2.4% in 2009, 15% in 2008, 25% in 2007, 41% in 2006, and 56% in 2005. The rotary hoe and harrow have nearly vanished as tools to control weeds in sugarbeet compared to historical use due to the introduction of RR sugarbeet. One respondent indicated flailing/swathing/mowing <1% of all reported acres in 2014.

Sugarbeet acreage operated by survey respondents in 2014 varied from less than 50 acres to greater than 2,000 acres (Table 6) with the median sugarbeet acreage being 473 acres and the average being 564 acres. The most common range

in acres of sugarbeet was 400 to 599 acres with 23% of the respondents. Thirteen percent of respondents reported producing 1,000 or more acres of sugarbeet in 2014.

Waterhemp was reported most frequently as the "worst weed" problem by 37% of respondents planting RR sugarbeet in 2014 (Table 7). Each year from 2008 to 2013, 'none' had been chosen most often as "worst weed" by RR sugarbeet growers. With waterhemp now being chosen more often than 'none' as "worst weed", along with a declining trend in satisfaction from glyphosate applied alone, growers ought to closely monitor their farms for waterhemp escapes and create management strategies that do not rely upon glyphosate alone. 'None' (26%), common lambsquarters (10%), ragweed (9%), and pigweed (7%) were the next most reported "worst weed" problems by survey respondents planting RR sugarbeet in 2014 (Table 7). Bolters, volunteer RR crops, smartweed, and common mallow were write-in responses on the survey (Table 8).

Rhizoctonia/Aphanomyces was selected most often as the "most serious production problem" by survey respondents for the sixth year in a row with 33% of respondents (Table 9). From 1999 to 2008, weeds were the primary problem for respondents, but in 2014 only 7% of respondents selected weeds as their most serious production problem. This reduction in emphasis on weeds is primarily due to the adoption of RR sugarbeet. 2014 was a very wet spring which delayed field work. Thirty-one percent of respondents wrote-in "weather" related issues as their worst production problem (Table 10).

Averaged across all counties, respondents reported hand-weeding on 5% of sugarbeet acres (Table 11) in 2014. Survey respondents from Renville, Trail, Richland, and Chippewa counties each reported greater than 10% hand-weeded acreage in 2014. Eighty-eight percent, 86%, and 62% of Renville, Chippewa, and Richland county respondents, respectively, also reported waterhemp as their "worst weed." Waterhemp may likely be the cause for above average reports of hand-weeding in these counties.

The cost of hand weeding ranged from zero to $50/A in 2014 (Table 11). The most common cost in 2014 was zero dollars as reported by 87% of survey respondents. Zero cost responses were 57% in 2005, 45% in 2006, 48% in 2007, 62% in 2008, 89% in 2009, 98% in 2010, 92% in 2011, 85% in 2012, and 91% in 2013. When averaged over all survey respondents, the average cost of hand weeding as calculated from Table 16 was $2.97/A in 2014 as compared to $1.91 in 2013, $3.25/A in 2012, $2.23/A in 2011, $0.63/A in 2010, $4.78/A in 2009, $ 11.32/A in 2008, $15.50/A in 2007, $14.37/A in 2006, $10.78/A in 2005, and $34/A in 1995. The effectiveness of glyphosate and the percentage of acreage planted to RR sugarbeet have likely caused the reduction in the average cost of hand weeding averaged over all respondents. When averaged across growers who actually reported hand-weeded acres, the average cost of hand weeding in 2014 was $17.11/A compared to $10.03 in 2013, $21.76 in 2012, $20.90/A in 2011, $29.06/A in 2010, $27.58/A in 2009, $27.41/A in 2008, and $29.40/A in 2007.

Survey respondents planting conventional sugarbeets reported 143% of acreage as row crop cultivated in 2014 (Table 12), compared to 155% in 2013, 119% in 2012, 97% in 2011, 74% in 2010, 100% in 2009, 95% in 2008 and 99% in 2007. Nineteen percent of RR sugarbeet acreage was reportedly row crop cultivated in 2014 compared to12% in 2013, 14% in 2012, 10% in 2011, 11% in 2010, 28% in 2009, and 32% in 2008. RR sugarbeet has reduced row crop cultivation for weed control compared to conventional sugarbeet.

The percentage of respondents compared to the percentage of acres reported were very similar among factory districts (Table 13). Minn-Dak growers represented 26% of all respondents and 30% of reported acres, while Hillsboro growers represented 7% of respondents and 8% of reported acres. Within a county, growers represented 1 to 3 factory districts.

Respondents indicated seeding cover crops in 44% of sugarbeet acres in 2014 (Table 14). Barley was the most commonly reported cover crop specie on 18% of reported acres. Respondents from Chippewa County reported the most sugarbeet acres seeded with cover crop at 88%.

Wheat was the most common crop to precede sugarbeet in 2014 on 54% of reported acres (Table 15). Corn preceded sugarbeet on 22% of acres reported and soybean on 10% of reported acres. Chippewa and Renville counties were the only two counties that did not report any sugarbeet to have been preceded by wheat.

Band sprayers were used in sugarbeet in 2014 by 28% of respondents (Table 16). Forty percent of respondents reportedly stopped using their band sprayer in sugarbeet between 2006 and 2013. Only 5% responded that they had never used a band sprayer in sugarbeet.

A GPS-based guidance system was used in sugarbeet production in 2014 by 98% of respondents (Table 17). GPS-based guidance systems are a standard component of a Red River Valley sugarbeet grower's equipment.

The majority of respondents (57%) to this year's survey indicated electronic applications or 'apps' are their preferred method of receiving technical information pertaining to sugarbeet production (Table 17). Twenty-two percent of respondents preferred paper copies of this information and 19% were undecided between electronic or paper copies. Of those respondents who are currently using apps as a tool in their farm management decision making, the NDSU pest management app was used by 46% and the Crystal Sugar Company Agronomy app was used by 37%. Other apps reportedly being used were Ag Phd, MinnDak, Weed ID, Agrian, Land Scout, and Measure Your Land. Respondents used these apps for purposes such as the Cercospora Degree-Day Model (26% of responses), Weed Management (19%), Disease Management (15%), and Root Maggot Degree-Day Model (11%). Seed spacing, soil fertility, and 'other' responses were also listed as purposes for using apps.

Respondents reported their age on the survey for the first time in over 20 years. Nine percent of respondents were age 18 to 30 while 21% of respondents were 56 to 60 years old (Table 18). Only 1 respondent indicated being 66 years of age or older. Growers from the Drayton district were youngest on average at 40.6 years old while growers from the Hillsboro district were oldest on average at 51.1 years old. Respondents age 56 to 60 grew 25% of reported acres while respondents age 18 to 30 grew 5% of reported acres (Table 19).

Table 1.Summary of all herbicides used in sugarbeet reported in 2014. 188 growers reported on 105,950 acres.

Treatment	No. of Responses	Acres Treated	Acres Treated % of Total	% of Responses Reporting Weed Control					% of Responses Reporting Crop Injury				
				NR*	Exc	Gd	Fr	Pr	NR	None	Slt	Mod	Sev
A. SOIL APPLIED HERBICIDES													
Dual+Nortron PRE	6	3,560	3.4	0	67	33	0	0	0	33	33	33	0
Nortron PRE	4	443	0.4	0	25	75	0	0	0	50	25	25	0
Other PRE	2	300	0.3	0	0	0	100	0	0	50	50	0	0
Nortron PPI	2	131	0.1	0	50	50	0	0	0	100	0	0	0
Dual PRE	1	40	0.0	0	0	100	0	0	0	100	0	0	0
Total-PPI & PRE	**15**	**4,474**	**4.2**	**0**	**40**	**47**	**13**	**0**	**0**	**53**	**27**	**20**	**0**
B. POSTEMERGENCE HERBICIDES													
Glyphosate	303	160,047	151.1	7	59	29	4	1	7	91	2	0	0
Glyp+Stinger	52	35,180	33.2	0	60	35	2	4	0	81	19	0	0
Glyp+Grass	19	10,379	9.8	5	42	42	11	0	0	100	0	0	0
Glyp+Stinger+Grass**	9	5,897	5.6	0	44	44	0	11	0	78	11	0	11
Glyp+Betamix	5	2,635	2.5	0	0	40	40	20	0	60	40	0	0
Glyp+Stinger+Bmix	3	2,535	2.4	0	67	33	0	0	0	0	100	0	0
Glyp+Nortron	3	1,856	1.8	0	0	67	33	0	0	100	0	0	0
Betamix	5	1,730	1.6	0	40	40	20	0	0	60	40	0	0
Glyp+UpBeet+Grass**	1	1,462	1.4	0	100	0	0	0	0	100	0	0	0
Glyp+Stinger+Bmix+Grass**	3	1,160	1.1	0	33	67	0	0	0	67	33	0	0
Bmix+Nort+UpB+Sting+Grass**	4	1,055	1.0	0	0	100	0	0	0	75	25	0	0
Glyp+Stinger+Nort	1	1,050	1.0	0	0	100	0	0	0	100	0	0	0
Glyp+Stinger+UpB+Grass**	2	1,000	0.9	0	0	100	0	0	0	0	100	0	0
Bmix+Nort+UpB+Sting	2	798	0.8	0	50	50	0	0	0	100	0	0	0
Bmix+Nort+UpB	1	752	0.7	0	100	0	0	0	0	100	0	0	0
Glyp+Bmix+Grass**	2	690	0.7	0	0	100	0	0	0	50	50	0	0
Glyp+Nortron+Grass**	1	520	0.5	0	100	0	0	0	0	100	0	0	0
Glyp+Stinger+Bmix+UpB	1	500	0.5	0	100	0	0	0	0	0	100	0	0
Bmix+Nort	1	400	0.4	0	0	0	100	0	0	0	100	0	0
Nortron	1	250	0.2	0	0	100	0	0	0	100	0	0	0
Bnex+Nort+UpB+Grass**	1	140	0.1	0	100	0	0	0	0	100	0	0	0
Glyp+UpBeet	1	80	0.1	0	100	0	0	0	0	100	0	0	0
Glyp+Betanex	1	40	0.0	0	100	0	0	0	0	100	0	0	0
Glyp+Bmix+UpBeet	1	6	0.0	0	0	0	0	100	0	0	100	0	0
Total-POST	**423**	**230,162**	**217.2**	**5**	**56**	**33**	**4**	**2**	**5**	**87**	**7**	**0**	**<1**
C. LAY-BY HERBICIDES													
Outlook+Glyp	13	7,152	6.8	0	54	38	8	0	0	100	0	0	0
Outlook+Glyp+Stinger	4	2,751	2.6	0	50	50	0	0	0	100	0	0	0
Outlook+Glyp+Grass**	4	2,062	1.9	0	50	25	25	0	0	77	23	0	0
Outlook+Glyp+Bmix	4	1,107	1.0	0	25	25	50	0	0	50	50	0	0
Warrant+Glyp	6	1,028	1.0	0	33	50	17	0	0	75	25	0	0
Warrant+Glyp+Grass**	1	700	0.7	0	0	100	0	0	0	100	0	0	0
Warrant+Glyp+Sting+Grass**	1	450	0.4	0	100	0	0	0	0	100	0	0	0
Outlook	1	300	0.3	0	0	100	0	0	0	100	0	0	0
Otlk+Bmx+Nrt+UpB+Stg+Grass**	1	140	0.1	0	100	0	0	0	0	100	0	0	0
Warrant+Glyp+Stinger	1	100	0.1	0	0	100	0	0	0	100	0	0	0
Sequence	1	75	0.1	0	0	100	0	0	0	0	100	0	0
Outlook+Glyp+Sting+Grass**	1	27	0.0	0	0	100	0	0	0	100	0	0	0
Total-Lay-by	**38**	**15,892**	**15.0**	**0**	**42**	**45**	**13**	**0**	**0**	**82**	**18**	**0**	**0**
D. OTHER WEED CONTROL METHODS													
Cultivations	63	21,924	20.7	17	11	25	38	8	2	65	30	3	0
Rotary Hoe	3	578	0.5	100	0	0	0	0	100	0	0	0	0
Harrow	1	150	0.1	100	0	0	0	0	100	0	0	0	0
Flail/Swath/Mow	1	60	0.0	100	0	0	0	0	100	0	0	0	0
Total-Other Methods	**68**	**22,712**	**21.4**	**24**	**10**	**24**	**35**	**7**	**9**	**60**	**28**	**3**	**0**
TOTAL ALL TREATMENTS	**544**	**273,240**	**257.9**	**7**	**49**	**33**	**9**	**2**	**5**	**82**	**11**	**1**	**<1**

*NR=No Response;Exc=Excellent;Gd=Good;Fr=Fair;Pr=Poor;Slt=Slight;Mod=Moderate;Sev=Severe

**Grass=Grass Herbicide

Table 2. Summary of herbicides used in conventional sugarbeet in 2014. 4 growers reported on 1,365 acres.

Treatment	No. of Responses	Acres Treated	Acres Treated % of Total	% of Responses Reporting Weed Control					% of Responses Reporting Crop Injury				
				NR*	Exc	Gd	Fr	Pr	NR	None	Slt	Mod	Sev
B. POSTEMERGENCE HERBICIDES													
Betamix	3	1,350	98.9	0	1	1	1	0	0	3	0	0	0
Bmix+Nort+UpB+Sting+Grass**	4	1,055	77.3	0	0	4	0	0	0	1	0	0	0
Bmix+Nort+UpB+Sting	2	798	58.5	0	1	1	0	0	0	2	0	0	0
Bmix+Nort+UpB	1	752	55.1	0	1	0	0	0	0	3	1	0	0
Bnex+Nort+UpB+Grass	1	140	10.3	0	1	0	0	0	0	1	0	0	0
Total-POST	**11**	**4,095**	**300.0**	**0**	**36**	**55**	**9**	**0**	**0**	**91**	**9**	**0**	**0**
C. PREEMERGE & LAY-BY HERBICIDES													
Otlk+Bmx+Nrt+UpB+Stg+Grass**	1	140	10.3	0	100	0	0	0	0	100	0	0	0
Total-PRE&Lay-by	**1**	**140**	**10.3**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**
D. OTHER WEED CONTROL METHODS													
Cultivations	4	1,957	143.3	0	50	50	0	0	0	100	0	0	0
Total-Other Methods	**4**	**1,957**	**143.3**	**0**	**50**	**50**	**0**	**0**	**0**	**100**	**0**	**0**	**0**
TOTAL ALL TREATMENTS	**16**	**6,192**	**453.6**	**0**	**44**	**50**	**6**	**0**	**0**	**94**	**6**	**0**	**0**

*NR=No Response;Exc=Excellent;Gd=Good;Fr=Fair;Pr=Poor;Slt=Slight;Mod=Moderate;Sev=Severe

**Grass=Grass Herbicide

Table 3. Summary of herbicides use in Roundup Ready Sugarbeet in 2014. 188 growers reported on 104,585 acres.

Treatment	No. of Responses	Acres Treated	Acres Treated % of Total	% of Responses Reporting Weed Control					% of Responses Reporting Weed Control				
				NR*	Exc	Gd	Fr	Pr	NR	None	Slt	Mod	Sev
A. SOIL APPLIED HERBICIDES													
Dual+Nortron PRE	6	3,560	3.4	0	67	33	0	0	0	33	33	33	0
Nortron PRE	4	443	0.4	0	25	75	0	0	0	50	25	25	0
Other PRE	2	300	0.3	0	0	0	100	0	0	50	50	0	0
Nortron PPI	2	131	0.1	0	50	50	0	0	0	100	0	0	0
Dual PRE	1	40	0.0	0	0	100	0	0	0	100	0	0	0
Total-PPI & PRE	**15**	**4,474**	**4.3**	**0**	**40**	**47**	**13**	**0**	**0**	**53**	**27**	**20**	**0**
B. POSTEMERGENCE HERBICIDES													
Glyphosate	303	160,047	153.0	7	59	29	4	1	7	91	2	0	0
Glyp+Stinger	52	35,180	33.6	0	60	35	2	4	0	81	19	0	0
Glyp+Grass**	19	10,379	9.9	5	42	42	11	0	0	100	0	0	0
Glyp+Stinger+Grass**	9	5,897	5.6	0	44	44	0	11	0	78	11	0	11
Glyp+Betamix	5	2,635	2.5	0	0	40	40	20	0	60	40	0	0
Glyp+Stinger+Bmix	3	2,535	2.4	0	67	33	0	0	0	0	100	0	0
Glyp+Nortron	3	1,856	1.8	0	0	67	33	0	0	100	0	0	0
Glyp+UpBeet+Grass**	1	1,462	1.4	0	100	0	0	0	0	100	0	0	0
Glyp+Stinger+Bmix+Grass**	3	1,160	1.1	0	33	67	0	0	0	67	33	0	0
Glyp+Stinger+Nort	1	1,050	1.0	0	0	100	0	0	0	100	0	0	0
Glyp+Stinger+UpB+Grass**	2	1,000	1.0	0	0	100	0	0	0	0	100	0	0
Glyp+Bmix+Grass**	2	690	0.7	0	0	100	0	0	0	50	50	0	0
Glyp+Nortron+Grass**	1	520	0.5	0	100	0	0	0	0	100	0	0	0
Glyp+Stinger+Bmix+UpB	1	500	0.5	0	100	0	0	0	0	0	100	0	0
Bmix+Nort	1	400	0.4	0	0	0	100	0	0	0	100	0	0
Betamix	2	380	0.4	0	50	50	0	0	0	0	100	0	0
Nortron	1	250	0.2	0	0	100	0	0	0	100	0	0	0
Glyp+UpBeet	1	80	0.1	0	100	0	0	0	0	100	0	0	0
Glyp+Betanex	1	40	0.0	0	100	0	0	0	0	100	0	0	0
Glyp+Bmix+UpBeet	1	6	0.0	0	0	0	0	100	0	0	100	0	0
Total-POST	**412**	**226,067**	**216.2**	**5**	**56**	**32**	**4**	**2**	**5**	**87**	**7**	**0**	**<1**
C. PREEMERGE & LAY-BY HERBICIDES													
Outlook+Glyp	13	7,152	6.8	0	54	38	8	0	0	100	0	0	0
Outlook+Glyp+Stinger	4	2,751	2.6	0	50	50	0	0	0	100	0	0	0
Outlook+Glyp+Grass**	4	2,062	1.9	0	50	25	25	0	0	77	23	0	0
Outlook+Glyp+Bmix	4	1,107	1.0	0	25	25	50	0	0	50	50	0	0
Warrant+Glyp	6	1,028	1.0	0	33	50	17	0	0	75	25	0	0
Warrant+Glyp+Grass**	1	700	0.7	0	0	100	0	0	0	100	0	0	0
Warrant+Glyp+Sting+Grass**	1	450	0.4	0	100	0	0	0	0	100	0	0	0
Outlook	1	300	0.3	0	0	100	0	0	0	100	0	0	0
Warrant+Glyp+Stinger	1	100	0.1	0	0	100	0	0	0	100	0	0	0
Sequence	1	75	0.1	0	0	100	0	0	0	0	100	0	0
Outlook+Glyp+Sting+Grass**	1	27	0.0	0	0	100	0	0	0	100	0	0	0
Total-PRE&Lay-by	**37**	**15,752**	**15.1**	**0**	**41**	**46**	**14**	**0**	**0**	**81**	**19**	**0**	**0**
D. OTHER WEED CONTROL METHODS													
Cultivations	59	19,967	19.1	19	8	24	41	8	2	63	32	3	0
Rotary Hoe	3	578	0.5	100	0	0	0	0	100	0	0	0	0
Harrow	1	150	0.1	100	0	0	0	0	100	0	0	0	0
Flail/Swath/Mow	1	60	0.0	100	0	0	0	0	100	0	0	0	0
Total-Other Methods	**64**	**20,755**	**19.8**	**25**	**8**	**22**	**38**	**8**	**9**	**58**	**30**	**3**	**0**
TOTAL ALL TREATMENTS	**528**	**267,048**	**255.3**	**8**	**49**	**31**	**9**	**2**	**5**	**82**	**11**	**1**	**<1**

*NR=No Response;Exc=Excellent;Gd=Good;Fr=Fair;Pr=Poor;Slt=Slight;Mod=Moderate;Sev=Severe

**Grass=Grass Herbicide

Table 4. Acres of sugarbeet and percent of sugarbeet acres treated with herbicide by grower groups in 2014.

	Respondents[1]	Acres	% of Acres treated with herbicide
RR Sugarbeet	188	104,585	236
Conventional Sugarbeet	4	1,365	310
All Sugarbeet	188	105,950	236

[1]Respondents = All 4 'conventional sugarbeet' respondents grew both conventional and RR beets.

Table 5. Glyphosate product and use rates per acre in sugarbeet by county in 2014.

		lb ae/A				Glyphosate Product Used											
County	Responses	<0.7	0.7 to 0.84	0.85 to1.0	>1.0	P.Max[9]	W.Max	O.Max	Durango	Buc-aneer	Sequ-ence	Corner-stone	Gly Star Plus	Makaze	Dura-max	T-down Total	Other
		----------% of responses----------															
Cass	17	12	12	47	29	100	-	-	-	-	-	-	-	-	-	-	-
Chippewa[1]	42	12	33	26	29	57	24	-	7	12	-	-	-	-	-	-	-
Clay[2]	28	-	36	39	25	75	-	-	18	-	-	-	4	-	4	-	-
Grand Forks	20	5	30	30	35	100	-	-	-	-	-	-	-	-	-	-	-
Kittson	7	-	29	57	14	86	-	-	-	14	-	-	-	-	-	-	-
Marshall	22	-	27	41	32	73	-	-	-	5	-	-	-	23	-	-	-
Norman[3]	14	-	21	29	50	100	-	-	-	-	-	-	-	-	-	-	-
Pembina	17	-	76	12	12	82	-	-	-	-	-	12	-	6	-	-	-
Polk[4]	62	2	27	34	37	84	-	2	-	3	-	8	-	3	-	-	-
Renville[5]	58	9	40	22	29	72	2	-	9	16	2	-	-	-	-	-	-
Richland[6]	31	3	32	39	26	87	-	-	10	-	-	3	-	-	-	-	-
Traill	4	-	75	25	-	50	-	-	-	-	-	-	-	50	-	-	-
Traverse[7]	30	-	20	27	53	50	40	-	10	-	-	-	-	-	-	-	-
Walsh	17	-	18	35	47	100	-	-	-	-	-	-	-	-	-	-	-
Wilkin[8]	47	17	13	40	30	66	13	-	11	2	-	-	6	2	-	-	-
Total	416	6	30	32	32	76	7	<1	6	5	<1	2	1	3	<1	0	0

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County
[9]P.Max=Roundup PowerMax; W.Max=Roundup WeatherMax; Bucaneer=Bucaneer 5, Bucaneer Plus; Mad Dog=Mad Dog, Mad Dog Plus; Cornerstone=Cornerstone, Cornerstone 5 Plus, Cornerstone Plus; Makaze=Makaze, Makaze Yield Pro; T-down Total=Touchdown Total

Table 6. Total sugarbeet acreage operated by survey respondents in 2014.

		Acres of sugarbeet										
County	Respondents	<50	50-99	100-199	200-299	300-399	400-599	600-799	800-999	1000-1499	1500-1999	2000+
		----------% of respondents----------										
Cass	7	-	-	-	-	29	29	14	14	14	-	-
Chippewa[1]	14	7	-	14	-	21	29	14	-	7	7	-
Clay[2]	13	-	-	8	15	23	23	8	8	8	-	8
Grand Forks	9	-	11	-	11	-	33	11	-	33	-	-
Kittson	3	-	33	-	-	33	33	-	-	-	-	-
Marshall	9	-	-	11	-	-	44	11	22	-	11	-
Norman[3]	7	14	-	-	-	14	29	14	14	-	-	14
Pembina	8	-	-	13	-	25	-	25	25	13	-	-
Polk[4]	32	3	6	9	9	6	25	34	-	6	-	-
Renville[5]	24	-	13	25	25	8	8	4	4	4	4	4
Richland[6]	13	-	-	8	8	15	23	15	8	15	8	-
Traill	3	-	33	-	67	-	-	-	-	-	-	-
Traverse[7]	13	-	-	8	15	8	23	15	8	23	-	-
Walsh	10	-	10	10	-	30	30	10	10	-	-	-
Wilkin[8]	26	-	-	12	12	15	23	4	27	8	-	-
Total	191	2	5	10	10	14	23	14	9	9	2	2

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County

Table 7. A summary of the worst weed problem responses in RR sugarbeet for the past 7 years.

Year	Response	None	COCB[1]	KOCZ	COLQ	FXTL	PIWE	RAWE	SMWE	VELF	WIBW	WIOA	WAHE	RR Crops	Other
		% of responses													
2008	57	54	0	7	7	0	16	-	0	0	5	4	2	5	-
2009	178	39	2	3	30	0	12	2	1	1	2	2	3	2	-
2010	246	30	2	4	23	1	17	2	2	1	5	2	5	2	-
2011	205	29	1	4	16	2	20	7	1	0	3	2	11	3	-
2012	109	28	0	4	19	1	20	6	0	1	0	0	13	3	-
2013	180	36	<1	2	18	1	16	4	<1	0	2	2	13	3	-
2014	187	26	1	1	10	0	7	9	1	0	2	1	37	4	3

[1]COCB=common cocklebur; KOCZ=kochia; COLQ=common lambsquarters; FXTL=foxtail species; PIWE=pigweed species; RAWE=ragweed, common or giant; SMWE=smartweed; VELF=velvetleaf; WIBW=wild buckwheat; WIOA=wild oat; WAHE=waterhemp; RR Crops=Roundup Ready crops.

Table 8. Worst weed problem in sugarbeet by county in 2014.

County	Responses	None	KOCZ[9]	RR Soy	COLQ	PIWE	GIRA	CORA	VEMA	bolters	WIBW	RR Can	WAHE	Other[10]
		% of responses												
Cass	7	43	-	-	-	-	-	29	-	-	-	-	29	-
Chippewa[1]	14	7	-	-	-	-	-	-	-	-	-	-	86	7
Clay[2]	13	23	-	-	-	8	-	-	-	-	-	15	54	-
Grand Forks	9	11	-	-	44	-	-	22	-	11	11	-	-	-
Kittson	3	0	-	-	-	33	-	-	33	-	33	-	-	-
Marshall	9	33	-	-	22	11	-	-	11	-	11	-	-	11
Norman[3]	7	43	-	-	-	14	-	43	-	-	-	-	-	-
Pembina	8	50	-	13	-	25	-	-	-	13	-	-	-	-
Polk[4]	32	38	3	3	19	13	3	13	-	-	3	3	-	3
Renville[5]	24	0	-	-	-	4	-	4	-	-	-	-	88	4
Richland[6]	13	8	-	-	15	8	-	-	-	-	-	-	62	8
Traill	3	33	-	-	67	-	-	-	-	-	-	-	-	-
Traverse[7]	13	15	-	-	-	8	-	-	-	-	-	-	77	-
Walsh	10	60	-	-	20	-	-	10	-	-	-	-	-	10
Wilkin[8]	26	31	4	-	8	8	-	12	-	-	-	4	35	-
Total	191	25	1	1	10	8	1	8	1	1	2	2	36	3

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County
[9] KOCZ=kochia; RR Soy=Roundup Ready soybean; COLQ=common lambsquarters; PIWE=pigweed species; GIRA=giant ragweed; CORA= common ragweed; VEMA=venice mallow; WIBW=wild buckwheat; RR can=Roundup Ready canola; WAHE=waterhemp.
[10] Other= smartweed; wild oat; wild mustard; RR corn; common cocklebur; common mallow

Table 9. A summary of the most serious production problem responses for the past 25 years.

	Production problem indicated as worst in sugarbeet									
Year	No Problem	Weeds	Weather	Emergence/ Stand	Labor mgmt.	Root maggot	Cercospora leaf spot	Rhizoctonia/ Aphanomyces	Rhizomania	Herbicide Injury
	---% of responses---									
1990	5	42	20	10	2	8	4	-	-	-
1991	3	26	4	18	1	26	7	8	-	-
1992	11	45	9	15	5	9	1	3	-	-
1993	3	40	21	16	4	1	2	12	-	-
1994	3	56	12	13	4	1	3	8	-	-
1995	2	51	6	2	3	<1	24	11	-	-
1996	6	53	12	11	6	2	3	6	-	-
1997	15	34	13	12	3	1	5	14	2	-
1998	3	25	9	4	1	1	36	17	3	-
1999	14	39	14	12	2	1	6	9	2	-
2000	8	48	9	10	1	<1	3	18	2	-
2001	6	52	13	5	2	1	1	16	3	-
2002	4	53	11	19	1	<1	<1	9	3	-
2003	7	61	9	4	1	<1	1	11	2	4
2004	6	47	10	21	2	1	0	8	1	1
2005	3	36	22	3	3	0	0	22	11	0
2006	9	57	5	9	1	0	<1	13	3	1
2007	4	46	7	18	<1	<1	<1	18	2	1
2008	12	30	4	21	3	0	<1	24	2	1
2009	14	7	12	21	2	1	1	30	5	1
2010	14	6	8	5	2	1	3	53	5	1
2011	7	5	15	7	<1	1	1	54	3	<1
2012	11	11	7	8	3	0	7	43	1	0
2013	18	5	16	9	8	1	<1	30	1	<1
2014	7	7	31	13	4	2	0	33	1	1

Table 10. Most serious production problem in sugarbeet by county in 2014.

County	Responses	No Prob.	Emerg/ Stand	Rhizo- mania	Aphan- omyces	Rhizoc- tonia	CLS[9]	Root Maggot	Weeds	Herbicide Injury	Labor Mangmt	Weather	Other[10]
		---% of responses---											
Cass	7	14	14	-	14	29	-	-	-	-	14	14	-
Chippewa[1]	14	-	14	-	-	29	-	-	14	-	7	36	-
Clay[2]	13	-	23	-	15	23	-	-	8	-	-	31	-
Grand Forks	9	-	11	11	22	11	-	11	-	-	-	33	-
Kittson	3	-	-	-	33	33	-	-	-	-	-	33	-
Marshall	9	-	-	-	44	33	-	-	-	-	-	22	-
Norman[3]	7	14	-	-	14	43	-	-	-	-	-	14	14
Pembina	8	13	-	-	13	38	-	13	-	-	13	13	-
Polk[4]	32	19	13	-	6	22	-	-	6	-	6	28	-
Renville[5]	24	-	21	-	-	21	-	-	17	4	-	33	4
Richland[6]	13	23	8	8	8	15	-	-	15	-	8	15	-
Traill	3	-	-	-	33	33	-	33	-	-	-	-	-
Traverse[7]	13	-	23	-	8	8	-	-	8	-	-	54	-
Walsh	10	-	10	-	-	40	-	10	-	-	10	30	-
Wilkin[8]	26	8	12	-	12	15	-	-	4	-	-	46	4
Total	191	7	13	1	10	23	0	2	7	1	4	31	2

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County
[9]CLS=Cercospora leaf spot
[10]Other= huskie complete carryover; coop personnel; small beets

Table 11. Hand-weeded acres and cost of hand-weeding in sugarbeet by county in 2014.

County	RR acres planted	Conv. acres planted	Hand-weeded	Responses	Dollars per acre									
					0	1-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50
			% of acres planted		% of respondents									
Cass	4,393	0	0	7	100	-	-	-	-	-	-	-	-	-
Chippewa[1]	7,611	0	12	14	71	-	7	7	-	7	-	7	-	-
Clay[2]	7,543	0	2	12	100	-	-	-	-	-	-	-	-	-
Grand Forks	5,257	752	2	9	100	-	-	-	-	-	-	-	-	-
Kittson	920	0	0	3	100	-	-	-	-	-	-	-	-	-
Marshall	6,359	0	2	9	89	-	-	-	-	11	-	-	-	-
Norman[3]	5,255	23	<1	7	86	-	-	-	14	-	-	-	-	-
Pembina	4,682	450	0	8	100	-	-	-	-	-	-	-	-	-
Polk[4]	15,161	140	1	32	97	-	3	-	-	-	-	-	-	-
Renville[5]	11,019	0	14	23	57	4	4	9	13	9	-	4	-	-
Richland[6]	9,101	0	13	12	67	17	17	-	-	-	-	-	-	-
Traill	573	0	14	3	100	-	-	-	-	-	-	-	-	-
Traverse[7]	8,160	0	7	13	92	-	-	-	-	-	-	-	-	8
Walsh	4,382	0	0	10	100	-	-	-	-	-	-	-	-	-
Wilkin[8]	14,168	0	6	26	92	4	-	-	4	-	-	-	-	-
Total	104,585	1,365	5	188	87	2	3	2	3	2	-	1	-	1

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County

Table 12. Percent of acres planted that were cultivated to control weeds by county in 2014.

County	Roundup Ready Sugarbeet				Conventional Sugarbeet			
	Number of Respondents	Acres Planted	Acres Cultivated	Acres Cultivated	Number of Respondents	Acres Planted	Acres Cultivated	Acres Cultivated
				% of acres planted				% of acres planted
Cass	7	4,393	0	0	0	0	0	0
Chippewa[1]	14	7,611	4,940	65	0	0	0	0
Clay[2]	12	7,543	616	8	0	0	0	0
Grand Forks	9	5,257	306	6	1	752	752	100
Kittson	3	920	20	2	0	0	0	0
Marshall	9	6,359	450	7	0	0	0	0
Norman[3]	7	5,255	8	<1	1	23	25	109
Pembina	8	4,682	1,420	30	1	450	900	200
Polk[4]	32	15,161	2,545	17	1	140	280	200
Renville[5]	23	11,019	5,541	50	0	0	0	0
Richland[6]	12	9,101	1,075	12	0	0	0	0
Traill	3	573	0	0	0	0	0	0
Traverse[7]	13	8,160	1,790	22	0	0	0	0
Walsh	10	4,382	405	9	0	0	0	0
Wilkin[8]	26	14,168	851	6	0	0	0	0
Total	188	104,585	19,967	19	4	1,365	1,957	143

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County

Table 13. Breakdown of survey respondents and acres by factory district and county in 2014.

County	No. of Resp.	No. of Acres	Factory District													
			Drayton		E. Grand Forks		Crookston		Hillsboro		Moorhead		Minn-Dak		SMBSC	
			% of respondents / % of acres													
Cass	7	4,393	-	-	-	-	-	-	43	29	43	51	14	20	-	-
Chippewa[1]	14	7,611	-	-	-	-	-	-	-	-	-	-	-	-	100	100
Clay[2]	12	7,544	-	-	-	-	-	-	-	-	92	93	8	7	-	-
Grand Forks	9	6,009	-	-	67	60	11	7	22	32	-	-	-	-	-	-
Kittson	3	920	100	100	-	-	-	-	-	-	-	-	-	-	-	-
Marshall	9	6,359	67	47	33	53	-	-	-	-	-	-	-	-	-	-
Norman[3]	7	5,278	-	-	-	-	-	-	71	81	29	19	-	-	-	-
Pembina	8	5,132	100	100	-	-	-	-	-	-	-	-	-	-	-	-
Polk[4]	32	15,301	-	-	28	26	72	74	-	-	-	-	-	-	-	-
Renville[5]	23	11,019	-	-	-	-	-	-	-	-	-	-	-	-	100	100
Richland[6]	12	9,101	-	-	-	-	-	-	-	-	8	3	92	97	-	-
Traill	3	573	-	-	-	-	-	-	100	100	-	-	-	-	-	-
Traverse[7]	13	8,160	-	-	-	-	-	-	-	-	-	-	85	94	15	6
Walsh	10	4,382	50	62	50	38	-	-	-	-	-	-	-	-	-	-
Wilkin[8]	26	14,168	-	-	-	-	-	-	-	-	4	1	96	99	-	-
Total	188	105,950	12	11	12	12	13	11	7	8	10	10	26	30	21	18

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County

Table 14. Percent of sugarbeet acres seeded with various cover crops in 2014 by county.

County	No. of responses	Acres planted	Barley	Oat	Wheat	Rye	Other	No Response
			% of acres planted					
Cass	7	4,393	23	-	-	-	-	77
Chippewa[1]	14	7,611	-	43	45	-	-	12
Clay[2]	12	7,544	10	10	-	-	-	80
Grand Forks	9	6,009	21	-	-	-	-	79
Kittson	3	920	-	-	-	-	-	100
Marshall	9	6,359	8	-	15	-	-	77
Norman[3]	7	5,278	54	-	6	-	-	41
Pembina	8	5,132	18	12	15	-	-	55
Polk[4]	32	15,301	27	-	4	9	<1	60
Renville[5]	23	11,019	-	59	13	-	-	28
Richland[6]	12	9,101	40	-	35	-	-	25
Traill	3	573	35	-	-	-	-	65
Traverse[7]	13	8,160	13	3	18	-	3	63
Walsh	10	4,382	2	7	30	-	5	56
Wilkin[8]	26	14,168	20	-	3	-	1	76
Total	188	105,950	18	11	13	1	1	56

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County

Table 15. Percent of sugarbeet acres seeded in 2014 into various crop residues by county.

County	No. of responses	Sugarbeet Acres planted	Crop Preceding Sugarbeet					
			Corn	Dry Bean	Soybean	Wheat	Fallow	Other
			% of acres planted					
Cass	6	3,711	31	0	12	34	23	0
Chippewa[1]	14	7,611	85	0	12	0	0	4
Clay[2]	11	5,244	19	0	33	45	3	0
Grand Forks	8	5,428	2	11	0	86	0	1
Kittson	3	920	0	0	8	84	0	9
Marshall	9	6,359	0	2	0	83	0	14
Norman[3]	6	5,237	0	12	7	73	7	0
Pembina	8	5,132	0	7	5	56	4	28
Polk[4]	27	13,032	1	0	0	95	0	4
Renville[5]	20	8,939	43	0	3	0	0	54
Richland[6]	10	8,301	20	0	22	57	0	0
Traill	2	492	0	0	0	41	0	59
Traverse[7]	11	7,370	58	0	17	25	0	0
Walsh	7	3,052	0	13	2	78	1	6
Wilkin[8]	20	10,021	17	0	17	66	0	0
Total	162	90,849	22	2	10	54	2	9

[1]Includes Kandiyohi and Swift Counties
[2]Includes Becker County
[3]Includes Mahnomen County
[4]Includes Pennington and Red Lake Counties
[5]Includes Lac Qui Parle, McLeod, Redwood, Stearns, and Yellow Medicine Counties
[6]Includes Roberts (SD) County
[7]Includes Grant and Stevens Counties
[8]Includes Otter Tail County

Table 16. Most recent year of using a band sprayer in sugarbeet as of 2014 by factory district.

Factory District	Acres Planted	Number of Responses	I currently use a band sprayer	2011-2013	2006-2010	2001-2005	1996-2000	1991-1995	It's been so long I can't remember	I have never used a band sprayer	No Response
			% of responses								
Drayton	11,324	21	19	29	29	5	0	5	10	5	0
East Grand Forks	10,656	19	63	16	5	0	16	0	0	0	0
Crookston	10,007	20	55	25	0	0	5	5	0	5	5
Hillsboro	7,915	11	36	27	36	0	0	0	0	0	0
Moorhead	7,772	16	31	19	31	0	0	6	6	6	0
Minn-Dak	26,110	39	8	23	31	23	3	3	10	0	0
SMBSC	17,065	36	19	11	14	11	8	6	17	14	0
Total	90,849	162	28	20	20	9	5	4	8	5	1

Table 17. Use of GPS-based guidance systems in sugarbeet production and preferred distribution method of technical information relating to sugarbeet production by factory district in 2014.

Factory District	Number of Responses	Used GPS-based guidance in 2014		Prefered distribution method of technical information				
		Yes	No	Electronic Applications (Apps)	Prefer apps but do not currently use any	Paper Copies	Undecided	Both Paper and Apps
		% of responses						
Drayton	21	95	5	38	19	24	19	0
East Grand Forks	19	100	0	37	26	16	21	0
Crookston	20	95	5	30	20	30	20	0
Hillsboro	11	100	0	18	18	36	18	9
Moorhead	16	100	0	38	25	6	31	0
Minn-Dak	39	97	3	46	21	18	10	5
SMBSC	36	100	0	25	25	25	22	3
Total	162	98	2	35	22	22	19	2

Table 18. Percent of responses by respondent age range and factory district in 2014.

Factory District	Responses	Acres Planted	Respondents Age									
			18 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 - 70	No Response
			----------% of responses----------									
Drayton	21	11,324	10	19	10	24	14	10	10	0	0	5
East Grand Forks	19	10,656	21	11	16	5	0	21	11	11	0	5
Crookston	20	10,007	10	0	10	5	0	15	30	15	0	15
Hillsboro	11	7,915	0	18	0	0	18	9	45	9	0	0
Moorhead	16	7,772	0	13	19	6	31	6	19	6	0	0
Minn-Dak	39	26,110	8	8	8	13	15	8	26	5	3	8
SMBSC	36	17,065	8	3	8	11	19	19	17	11	0	3
Total	162	90,849	9	9	10	10	14	13	21	8	1	6

Table 19. Percent of acres planted by respondent age range and factory district in 2014.

Factory District	Responses	Acres Planted	Respondents Age									
			18 - 30	31 - 35	36 - 40	41 - 45	46 - 50	51 - 55	56 - 60	61 - 65	66 - 70	No Response
			----------% of acres planted----------									
Drayton	21	11,324	6	25	11	24	9	10	13	0	0	3
East Grand Forks	19	10,656	16	3	31	5	0	21	12	6	0	6
Crookston	20	10,007	3	0	7	3	0	14	46	14	0	13
Hillsboro	11	7,915	0	21	0	0	14	4	57	4	0	0
Moorhead	16	7,772	0	18	26	5	28	4	12	8	0	0
Minn-Dak	39	26,110	4	6	5	9	24	12	27	1	3	8
SMBSC	36	17,065	2	2	6	9	22	10	15	18	0	17
Total	162	90,849	5	9	11	8	16	11	25	7	1	8