TURNING POINT SURVEY OF WEED CONTROL AND PRODUCTION PRACTICES IN SUGARBEET IN MINNESOTA AND EASTERN NORTH DAKOTA IN 2016

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The second annual weed control and production practices live polling questionnaire was conducted using Turning Point Technology at the 2017 winter Sugarbeet Grower Seminars. Responses are based on production practices from the 2016 growing season. The survey focuses on responses from growers in attendance at the Fargo, Grafton, Wahpeton, ND, and Willmar, MN, Growers Seminars. Respondents from each seminar indicated the county in which the majority of their sugarbeet were produced (Tables 1, 2, 3, 4). Survey results represents approximately 158,272 acres reported by 235 respondents (Table 5) compared to 183,350 acres represented in 2016. The average sugarbeet acreage per respondent grown in 2016 was calculated from Table 5 at 673 acres, compared to 674 acres in 2015.

Survey participants were asked a series of questions regarding their production practices used in sugarbeet in 2016. Thirty-nine percent of respondents indicated wheat was the crop preceding sugarbeet (Table 6), 39% indicated corn, and 9% indicated soybean. Preceding crop varied dramatically by location with 82% of Fargo growers indicating wheat preceded sugarbeet and 74% of Willmar growers indicated corn as their preceding crop. Seventy-nine percent of growers attending the winter meetings used a nurse or cover crop in 2016 (Table 7), which increased from 72% in 2015. Cover crop species also varied widely by location with oat being used by 58% of growers at the Willmar meeting and no cover crop being used by the majority (38%) of growers at the Grafton meeting.

Growers indicated Cercospora Leaf Spot (CLS) was their most serious production problem in sugarbeet in 2016 (Table 8) with 57% of all respondents naming CLS compared to Rhizoctonia being named most serious by 35% of all participants in 2015. Cercospora was devastating to sugarbeet quality in 2016. Weather was the most serious problem for 23% of growers, mainly those in the northern valley, and weeds were named as most serious by 7% of responses.

Waterhemp was named as the most serious weed problem in sugarbeet in 2016 by 59% of respondents (Table 9) compared to 45% in 2015. Ten percent of respondents indicated common lambsquarters, 9% kochia, and 8% said common ragweed were their most serious weed problem. The increased presence of glyphosate-resistant waterhemp and common ragweed are likely the reason for these weeds being named as the worst weeds. Troublesome weeds varied by location with greater than 80% of Willmar and Wahpeton respondents indicating waterhemp was most problematic while kochia was the worst weed for respondents of the Grafton meeting with 38% of responses.

Respondents to the survey indicated making 0 to 5 glyphosate applications in their 2016 sugarbeet crop (Table 10) with a calculated average of 2.28 applications per acre. The calculated average in 2015 was 2.23 applications per acre.

Glyphosate was most commonly applied with a chloroacetamide herbicide postemergence (lay-by) in 2016 with 36% of responses indicating this herbicide combination was used (Table 11). Fifty-five percent and 42% of Wahpeton and Willmar respondents, respectfully, applied glyphosate with Outlook, S-metolachlor, or Warrant but only 26% and 0% of Fargo and Grafton respondents, respectfully, used this combination. Use of chloroacetamides with glyphosate track to areas where glyhphosate-resistant waterhemp is common. Glyphosate alone was the second most common herbicide used in sugarbeet in 2016 with 31% of responses, followed by glyphosate plus a broadleaf herbicide for 21% of the responses. Satisfaction to weed control from glyphosate applied alone is shown in Table 12

and ranged from 15% of responses indicating excellent control to 6% of responses indicating poor weed control. The majority of responses, 42%, indicated glyphosate was still providing good weed control in sugarbeet in 2016.

Preplant incorporated (PPI) or preemergence (PRE) herbicides were applied by 48% of survey respondents in 2016 (Table 13). Less than 10% of Grafton survey participants applied a PPI or PRE herbicide, while 75% of Wahpeton survey participants did apply a PPI or PRE herbicide in sugarbeet in 2016. Once again, a likely reason for this variation is the increased presence of glyphosate-resistant waterhemp in the southern sugarbeet growing areas of the Red River Valley compared to the north end of the Valley. The most commonly used soil herbicide was S-metolachlor with 22% of all responses followed by ethofumesate with 13% of responses. Of the growers who indicated using a soil-applied herbicide, 77% indicated excellent to good weed control from that herbicide (calculated from Table 14).

The application of soil-residual herbicides applied 'lay-by' was implemented by 71% of those responding about their 2016 sugarbeet crop (Table 15). Outlook was the most commonly applied lay-by herbicide with 33% of responses. The majority of growers responding at the Willmar meeting indicated using Outlook (56% of responses), while S-metolachlor was more commonly applied by growers of the Fargo (40% of responses) and Wahpeton (46% of responses) meetings. Satisfaction of weed control from lay-by applications ranged from excellent to poor (Table 16). Of respondents indicating they applied a lay-by herbicide, 78% indicated excellent or good weed control (calculated from Table 16).

Fifty-four percent of survey responses indicated using some form of mechanical weed control or hand labor in 2016 (Table 17). Of the responses given, 32% indicated at least some hand-weeding, 18% used row-cultivation, and 1% indicated using a rotary hoe for weed control in sugarbeet. Nineteen percent reported row-crop cultivation on less than ten percent of their acres (Table 18). One cultivation pass was reported by 94% of respondents who reported cultivating (calculated from Table 19). Respondents who cultivated generally reported good to fair weed control from the cultivation (Table 20).

Hand-weeding the 2016 sugarbeet crop was reported by 47% of respondents (Table 21). Most respondents who hand-weeded indicated less than 10% of their acres were hand-weeded. Less respondents indicated hand-weeding at the Grafton meeting, while more than half the participants of the Fargo and Wahpeton meetings reported some hand weeding. The cost of hand-weeding on a per acre basis ranged from less than $10 to greater than $40 per acre (Table 22). For growers who reported hand-weeding, 61% reported 'excellent' or 'good' hand-weeding control (Table 23).

Table 1. 2017 Fargo Grower Seminar – Number of survey respondents by county growing sugarbeet in 2016.

County	Number of Responses	Percent of Responses
Barnes	3	9
Cass	7	21
Clay	11	32
Norman[1]	8	24
Richland	1	3
Trail	3	9
Wilkin[2]	1	3
Total	34	100

[1]Includes Mahnomen County
[2]Includes Otter Tail County

Table 2. 2017 Grafton Grower Seminar – Number of survey respondents by county growing sugarbeet in 2016.

County	Number of Responses	Percent of Responses
Grand Forks	1	2
Kittson	4	7
Marshall	5	9
Pembina	19	35
Polk	1	2
Walsh	23	43
Other	1	2
Total	54	100

Table 3. 2017 Wahpeton Grower Seminar – Number of survey respondents by county growing sugarbeet in 2016.

County	Number of Responses	Percent of Responses
Cass	2	4
Clay	3	7
Grant	5	11
Otter Tail	1	2
Richland	7	16
Stevens	1	2
Traverse	5	11
Wilkin	21	47
Total	45	100

Table 4. 2017 Willmar Grower Seminar - Number of survey respondents by county growing sugarbeet in 2016.

County	Number of Responses	Percent of Responses
Chippewa	36	33
Kandiyohi	17	16
Pope	0	0
Redwood	5	5
Renville	31	28
Stearns	3	3
Stevens	1	1
Swift	9	8
Other	7	6
Total	109	100

Table 5. Total sugarbeet acreage operated by respondents in 2016.

Location	Responses	Acres of sugarbeet									
		<99	100-199	200-299	300-399	400-599	600-799	800-999	1000-1499	1500-1999	2000+
		------------------------------------% of responses----------------------------------									
Grafton	54	6	15	11	9	17	9	11	9	2	9
Fargo	33	3	0	15	18	18	6	9	12	6	12
Wahpeton	42	2	7	2	10	33	17	12	10	5	2
Willmar	107	7	15	15	6	22	10	3	14	2	7
Total	235	6	11	12	9	22	11	7	12	3	7

Table 6. Crop grown in 2015 that preceded sugarbeet in 2016.

Location	Responses	Barley	Canola	Corn	Dry Bean	Potato	Soybean	Wheat	Fallow	Other
		\------------------------------------% of responses------------------------------------								
Grafton	53	2	0	0	9	11	2	74	0	2
Fargo	33	6	0	3	0	0	6	82	0	3
Wahpeton	41	0	2	24	0	0	12	61	0	0
Willmar	108	1	0	74	1	0	12	0	0	12
Total	235	2	<1	39	3	3	9	39	0	6

Table 7. Nurse or cover crop used in sugarbeet in 2016.

Location	Responses	Barley	Oat	Rye	Wheat	Other[1]	None
		\-------------------------------% of responses--------------------------					
Grafton	52	21	14	0	27	0	38
Fargo	33	42	3	0	12	0	42
Wahpeton	42	45	2	0	40	0	12
Willmar	106	0	58	1	30	2	10
Total	233	19	30	<1	29	1	21

[1]Includes Mustard and 'Other'

Table 8. Most serious production problem in sugarbeet in 2016.

Location	No. of Responses	CLS[1]	Rhizomania	Aph[2]	Rhizoctonia	Fusarium	Weeds	Root Maggot	Weather	Emergence/ Stand
		\------------------------------------% of responses------------------------------------								
Grafton	56	4	0	14	9	0	0	2	71	0
Fargo	36	44	0	6	8	0	19	0	11	11
Wahpeton	43	84	2	0	5	0	9	0	0	0
Willmar	106	79	2	0	2	0	6	0	10	1
Total	241	57	1	4	5	0	7	<1	23	2

[1]Cercospora Leaf Spot
[2]Aphanomyces

Table 9. Most serious weed problem in sugarbeet in 2016.

Location	Responses	biww[1]	colq	cora	Foxtail spp.	kochia	gira	rrpw	Smartweed	RR Canola	wahe
		\-------------------------------------% of responses-------------------------------------									
Grafton	53	6	27	10	0	38	0	12	0	6	2
Fargo	35	0	6	23	0	3	6	6	3	8	46
Wahpeton	43	0	2	7	0	0	2	5	0	2	81
Willmar	104	0	6	2	0	0	4	3	0	2	84
Total	234	1	10	8	0	9	3	6	<1	4	59

[1]biww=biennial wormwood, colq=common lambsquarters, cora=common ragweed, gira=giant ragweed, rrpw=redroot pigweed, wahe=waterhemp

Table 10. Average number of glyphosate applications per acre in sugarbeet during 2016 season.

Location	Responses	0	1	2	3	4	5
		\-------------------------------% of responses--------------------------					
Grafton	51	4	22	57	16	0	2
Fargo	35	0	14	63	23	0	0
Wahpeton	46	0	4	39	50	7	0
Willmar	106	1	11	42	40	5	1
Total	238	1	13	48	34	3	1

Table 11. Herbicides used in a weed control systems approach in sugarbeet in 2016.

Location	Responses	Gly Alone	Gly+Lay-by	Gly+Broadleaf	Gly+Grass	Other	None Used
				Glyphosate Application Tank-Mixes			
		--% of responses----------------------------------					
Grafton	51	80	0	16	0	0	4
Fargo	43	30	26	37	7	0	0
Wahpeton	58	17	55	22	5	0	0
Willmar	187	21	42	19	14	3	1
Total	339	31	36	21	10	1	1

Table 12. Satisfaction in weed control from glyphosate applied in sugarbeet in 2016.

Location	Responses	Excellent	Good	Fair	Poor	Unsure	Not Used Alone
				Satisfaction of Weed Control from Glyphosate			
		---------------------------------% of responses---------------------------					
Grafton	49	47	49	2	0	2	0
Fargo	34	6	65	21	3	0	6
Wahpeton	46	2	35	41	4	0	17
Willmar	104	9	35	29	10	2	16
Total	233	15	42	24	6	1	12

Table 13. Preplant incorporated and preemergence herbicides used in sugarbeet in 2016.

Location	Responses	S-metolachlor	ethofumesate	Ro-Neet SB	S-metolachor +ethofumesate	Other	None
				PPI or PRE Herbicides Applied			
		--% of responses----------------------------------					
Grafton	50	0	0	0	2	4	94
Fargo	35	37	0	0	3	3	57
Wahpeton	44	43	11	2	16	2	25
Willmar	108	19	24	0	6	9	42
Total	237	22	13	<1	7	6	52

Table 14. Satisfaction in weed control from preplant incorporated and preemergence herbicides in 2016.

Location	Responses	Excellent	Good	Fair	Poor	Unsure	None Used
				PPI or PRE Weed Control Satisfaction			
		------------------------------% of responses--------------------------					
Grafton	54	13	2	0	2	0	83
Fargo	34	21	21	12	3	0	44
Wahpeton	42	12	50	14	2	0	21
Willmar	105	17	30	10	3	1	39
Total	235	16	25	9	2	<1	47

Table 15. Soil-residual herbicides applied early postemergence (lay-by) in sugarbeet in 2016.

Location	Responses	S-metolachlor	Ethofumesate	Outlook	Warrant	Other	None
				Lay-by Herbicides Applied			
		--% of responses----------------------------------					
Grafton	53	0	0	0	0	2	98
Fargo	35	40	3	9	0	6	43
Wahpeton	48	46	17	19	6	0	13
Willmar	148	8	7	56	20	1	7
Total	284	17	7	33	12	2	29

Table 16. Satisfaction of weed control from soil-residual herbicides applied early postemergence (lay-by) in sugarbeet in 2016.

Location		Responses	Lay-by Weed Control Satisfaction					
			Excellent	Good	Fair	Poor	Unsure	None Used
			-------------------------------% of responses--------------------------					
Grafton		52	0	0	0	15	0	85
Fargo		36	14	33	6	3	0	44
Wahpeton		42	10	60	19	2	0	10
Willmar		108	32	48	10	1	1	7
	Total	238	18	37	9	5	<1	30

Table 17. Mechanical weed control methods used in sugarbeet in 2016.

Location		Responses	Rotary Hoe	Row-Cultivation	Hand-Weeded	Other	None
			-------------------------------------% of responses----------------------------------				
Grafton		51	2	2	12	4	80
Fargo		37	0	8	46	0	46
Wahpeton		48	2	4	23	4	67
Willmar		130	1	32	40	3	25
	Total	266	1	18	32	3	46

Table 18. Percent of sugarbeet acres row-crop cultivated in 2016.

Location		Responses	% Acres Row-Cultivated				
			0	< 10	10-50	51-100	>100
			-----------------------------------% of responses----------------------------				
Grafton		51	59	29	8	2	2
Fargo		35	74	23	0	3	0
Wahpeton		46	70	22	9	0	0
Willmar		103	48	12	8	7	26
	Total	235	58	19	7	4	12

Table 19. Number of row-crop cultivation passes in sugarbeet in 2016.

Location		Responses	1	2	3	4	No Row-Cultivation
			---------------------------------% of responses------------------------------				
Grafton		53	32	0	0	2	66
Fargo		34	24	0	0	0	76
Wahpeton		44	16	5	0	0	80
Willmar		105	38	4	0	0	58
	Total	236	31	3	0	<1	67

Table 20. Satisfaction of weed control from row-crop cultivation in sugarbeet in 2016.

Location		Responses	Excellent	Good	Fair	Poor	Unsure	No Row-Cultivation
			-------------------------------% of responses--------------------------					
Grafton		48	6	0	4	15	8	67
Fargo		35	0	9	17	0	6	69
Wahpeton		44	2	0	20	0	2	75
Willmar		105	3	16	18	2	4	57
	Total	232	3	9	16	4	5	64

Table 21. Percent of sugarbeet acres hand-weeded in 2016.

Location	Responses	% Acres Hand-Weeded				
		0	< 10	10-50	51-100	>100
		--------------------------------% of responses----------------------------				
Grafton	51	71	12	0	0	18
Fargo	36	42	50	8	0	0
Wahpeton	45	67	27	2	2	2
Willmar	103	43	30	19	4	4
Total	235	53	29	10	2	6

Table 22. Cost per acre for hand-weeding for hand weeding sugarbeet in 2016.

Location	Responses	Cost of Hand-Weeding per Acre					
		<$9.99	$10-$19.99	$20-$29.99	$30-$39.99	$40+	No Hand-Weeding
		--% of responses-------------------------------------					
Grafton	51	12	0	0	2	14	73
Fargo	35	46	6	0	0	6	43
Wahpeton	43	12	9	5	0	5	70
Willmar	105	17	29	6	3	2	44
Total	234	19	15	3	2	6	55

Table 23. Satisfaction of weed control from hand-weeding sugarbeet in 2016.

Location	Responses	Excellent	Good	Fair	Poor	Unsure	No Hand-Weeding
		---------------------------------% of responses---------------------------					
Grafton	50	4	2	6	16	0	72
Fargo	35	31	11	9	9	0	40
Wahpeton	44	9	14	2	2	0	73
Willmar	103	6	31	17	4	1	41
Total	232	10	19	11	7	<1	53