TURNING POINT SURVEY OF FUNGICIDE USE IN SUGARBEET IN MINNESOTA AND EASTERN NORTH DAKOTA IN 2018

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The fourth annual fungicide practices live polling questionnaire was conducted using Turning Point Technology at the 2019 Winter Sugarbeet Growers' Seminars held during Jan and Feb 2019. Responses are based on production practices from the 2018 growing season. The survey focuses on responses from growers in attendance at the Fargo, Grafton, Grand Forks, Wahpeton, ND and Willmar, MN Grower Seminars. Respondents from each seminar indicated the county in which the majority of their sugarbeets were produced (Tables 1- 5). The average sugarbeet acreage per respondent grown in 2018 was calculated from Table 6 at between 400 and 599 acres.

Survey participants were asked about soilborne diseases and control practices. Sixty-nine percent said their fields were affected by Rhizoctonia, 15% said Aphanomyces was the biggest issues, 10% said they had issues with multiple diseases including Rhizoctonia, Aphanomyces, Fusarium and Rhizomania, 4% said they had no soilborne disease issues, and 1% each listed either Fusarium or Rhizomania as their biggest issue (Table 7). Additionally, participants were asked about the prevalence of Rhizoctonia in sugarbeet with which preceding crops. Sixty one percent of respondents said they saw more rhizoctonia when soybeans preceded their sugarbeet crop. Twelve percent reported more Rhizoctonia following dry beans, 11% saw more Rhizoctonia following a field corn crop, 9% said any crop, 4% said potatoes, 1% each stated sweet corn, small grains or other as the crop preceding sugarbeets they saw the most Rhizoctonia develop (Table 8). Of the respondents to the question regarding specialty variety used for Rhizoctonia, 76% respondents said yes they did use a specialty variety for Rhizoctonia while 24% said no (Table 9).

Participants were asked what methods were used to control Rhizoctonia and 42% said they used a seed treatment only, 36% used a seed treatment and a POST fungicide, 12% used a seed treatment plus an in-furrow fungicide while 9% also said they used a seed treatment, in-furrow fungicide and a POST fungicide, and 1% said they used seed treatment, in-furrow and a double POST application (Table 10). Seventy two percent of respondents used a Kabina seed treatment while 15% used Metlock Suite + Kabina, 8% used Systiva, 3% used Vibrance, and 2% used Metlock Suite and Vibrance (Table 11). Eighty three percent used an in-furrow starter fertilizer and 17% did not (Table 12). Of the respondents who applied an in-furrow fungicide, 21% used Quadris or generic, 7% used other fungicide and 4% used Headline or generic; 68% of respondents used no fungicide in-furrow (Table 13).

Respondents were asked what POST fungicides were used to control Rhizoctonia and 39% did not use a POST fungicide to control Rhizoctonia. Forty-eight percent used Quadris or generic, 7% used Proline, 4% used Priaxor, 1% used other POST fungicide and >1% used Headline (Table 14). Participants were then asked to grade the effectiveness of the POST fungicides that were used. Thirty-eight percent received good results, 38% said they were unsure of their results, 12% reported fair results, 7% said the fungicides performed excellently and 5% said they performed poorly (Table 15). Respondents were also asked how they applied POST fungicide and 52% stated they used band and 48% used a broadcast application (Table 16).

Participants were also asked about use of waste lime to control Aphanomyces. Sixty-three percent of participants did not use waste lime in their fields while 28% used between 6 and 10 tons/acre while 9% used less than 5 tons/acre (Table 17). Respondents were also asked about their soil pH. Forty-six percent said it was between 7.5 and 8.0, 24% said between 8.0 and 8.5, 19% between 7.0 and 7.5, 9% between 6.5 and 7.0, 1% said between 6.0 and 6.5 and another 1% said between 8.5 and 9.0 (Table 18). As a follow-up question, growers were asked whether or not they were concerned about using waste lime on soils above 8.0 pH. Seventy-seven percent said no while the remaining 23% said they were concerned (Table 19). Finally, the growers were asked how effective their waste lime

application was. Forty-five percent of respondents did not apply lime, 21% said they had good results, 19% said excellent, 11% were unsure, 3% reported fair results and 1% said poor (Table 20).

One of the survey questions also asked if growers had used a specialty variety for Aphanomyces in 2018. Sixty-three percent of respondents said yes and 37% said no (Table 21).

Survey participants were then asked a series of questions regarding their CLS fungicide practices on sugarbeet in 2018. Twenty-five percent said that they used 4 sprays to control CLS, 19% used three applications, 18% used two applications, 15% used five applications, 11% used six applications, 5% used one application, 4% used seven applications, 1% did not use a CLS application and 1% applied more than seven CLS applications (Table 22). Respondents were then asked about the effectiveness of their CLS sprays. Forty-one percent said they had good results, 21% said they had fair results, 18% reported excellent results, 16% reported poor results, and 4% of respondents were unsure (Table 23).

Respondents were asked about when their CLS application started and ended. Forty-eight percent of participants said that they began their applications between July 1 and 10, 25% said it started between July 11 and 20, 16% said it was between July 21 and 31, 7% said before July 1, 3% said that CLS sprays started between August 1 and 10 and 1% said after August 10 (Table 24). Forty-six percent of respondents said that their last CLS spray was between September 1 and 10, 23% said between August 21 and 31, 17% said between September 11 and 20, 7% said between August 11 and 20, 3% said after September 20, 2% said they only made one or zero CLS applications, 2% said between August 1-10 and >1% before August 1 (Table 25).

Participants were then asked if they experienced field failure and what date that occurred. Fifty-four percent said they did not experience field failure, 17% said it occurred around August 15, 11% said it occurred around August 31, 9% said July 31, 6% said September 15, 2% said after September 30, 1% said around September 30 (Table 26).

Participants were then asked about their specific fungicide use to control CLS. Fifty-eight percent of growers said that their first application was Tin + Topsin, 20% said EBDC + Triazole, 7% said Tin + Triazole, 7% said Tin + EBDC, 7% said they used a single chemistry application and 1% said QOI + other (Table 27). For the second application, 37% of respondents said they used Tin + Topsin, 36% said EBDC + Triazole, 9% said a single chemistry application was used, 6% said Tin + Triazole, 5% said Tin + EBDC, 3% said QOI + other chemistry, 2% said Triazole + Copper, and 1% each said Tin + Copper, EBDC + Copper, and other (Table 28). For the third application, 32% said EBDC + Triazole, 15% said a single chemistry application, 12% used Tin + Triazole, 11% used Tin + EBDC, 9% used Tin + Copper, 8% used Tin + Topsin, 5% used QOI + other chemistry, 5% used an "other" fungicide not listed, 2% said Triazole + Copper and 1% used EBDC + Copper (Table 29). For the fourth application, 18% used Tin + Triazole, 15% used a singly chemistry application, 13% said other, 12% said EBDC + Copper, 11% said EBDC + Triazole, 10% said Triazole + Copper, 7% said Tin + EBDC, 6% said Tin + Copper, 4% said Tin + Topsin and another 4% said QOI + other. (Table 31).

Survey participants were also asked whether they used QoI fungicides for CLS control. Forty-two percent said yes, they used QoI fungicides in a mixture, 38% percent said no, and 20% said they used QoI fungicides alone (Table 32).

Of the total fungicide applications for CLS, 65% did not use an aerial applicator, 22% used an aerial applicator for 1-20% of their applications, 5% used an aerial applicator for 21-40% of their fungicide applications, 4% said they used an aerial applicator for 100% of applications, 2% fell in the 41-60% range, 1% in the 61-80% range, and 1% in the 81-99% range (Table 33).

Regarding water usage in gallons per acre as applied by tractor, 47% of respondents used 11-15 gallons per acre, 41% used 16-20 gallons per acre, 8% used more than 20 gallons per acre, 3% used 6-10 gallons per acre and >1% used 1-5 gallons per acre (Table 34).

Table 1. 2019 Fargo Grower Seminar – Number of survey respondents by county growing sugarbeet in 2018.

County	Number of Responses	Percent of Responses
Barnes	-	-
Becker	1	3
Cass	12	32
Clay	10	26
Norman[1]	12	32
Ransom	-	-
Richland	2	5
Steele	-	-
Trail	1	3
Wilkin[2]	-	-
Total	38	101

Table 2. 2019 Grafton Grower Seminar – Number of survey respondents by county growing sugarbeet in 2018.

County	Number of Responses	Percent of Responses
Cavalier	-	-
Grand Forks	3	8
Kittson	5	13
Marshall	2	5
Nelson	-	-
Pembina	13	33
Polk	-	-
Ramsey	-	-
Walsh	14	36
Other	2	5
Total	39	100

Table 3. 2019 Grand Forks Grower Seminar – Number of survey respondents by county growing sugarbeet in 2018.

County	Number of Responses	Percent of Responses
Grand Forks	19	21
Mahnomen	1	1
Marshall	9	10
Nelson	-	-
Pennington/Red Lake	1	1
Polk	45	51
Steele	-	-
Traill	2	2
Walsh	4	4
Other	8	9
Total	89	99

Table 4. 2019 Wahpeton Grower Seminar – Number of survey respondents by county growing sugarbeet in 2018.

County	Number of Responses	Percent of Responses
Cass	-	-
Clay	3	10
Grant	4	13
Otter Tail	-	-
Ransom	-	-
Richland	6	20
Roberts	-	-
Stevens	-	-
Traverse	1	3
Wilkin	16	53
Total	30	99

Table 5. 2019 Willmar Grower Seminar - Number of survey respondents by county growing sugarbeet in 2018.

County	Number of Responses	Percent of Responses
Chippewa	27	33
Kandiyohi	8	10
Pope	1	1
Redwood	4	5
Renville	26	32
Stearns	-	-
Stevens	5	6
Swift	6	7
Other	4	5
Total	81	99

Table 6. Total sugarbeet acreage operated by respondents in 2018.

		Acres of sugarbeet									
Location	Responses	<99	100-199	200-299	300-399	400-599	600-799	800-999	1000-1499	1500-1999	2000+
		----------% of responses----------									
Fargo	36	6	6	8	3	28	17	6	8	11	8
Grafton	42	5	14	-	10	33	14	17	5	2	-
Grand Forks	83	11	7	5	4	16	20	7	17	8	5
Wahpeton	30	7	3	-	30	20	10	7	13	7	3
Willmar	82	7	12	10	6	17	18	4	15	10	1
Total	273	8	9	5	8	21	17	7	13	8	3

Table 7. What soil-borne diseases affected your sugarbeet production in 2018?

Location	Respondents	Root disease					
		Rhizoctonia	Aphanomyces	Fusarium	Rhizomania	All	Neither
		----------% of respondents----------					
Fargo	36	56	11	6	6	17	6
Grafton	42	69	19	2	-	5	5
Grand Forks	88	60	11	-	-	10	7
Wahpeton	30	87	10	-	-	3	-
Willmar	82	68	18	-	1	11	1
Total	278	69	15	1	1	10	4

Table 8. With which of the preceding crops do you see more Rhizoctonia in sugarbeet?

Location	Respondents	Field Corn	Sweet Corn	Soybean	Dry edible beans	Potatoes	Small grains	Other	Any crop
		----------% respondents----------							
Fargo	31	-	-	7	6	-	6	-	10
Grafton	39	-	3	51	18	21	-	-	8
Grand Forks	65	8	-	60	25	2	-	2	5
Wahpeton	26	27	-	58	-	-	-	-	15
Willmar	72	19	1	63	4	1	-	1	10
Total	233	11	1	61	12	4	1	1	9

Table 9. Have you used a specialty variety for Rhizoctonia in 2018?

Location	Respondents	Yes	No
		----------% respondents----------	
Fargo	39	74	26
Grafton	40	80	20
Grand Forks	84	73	27
Wahpeton	27	81	19
Total	190	76	24

Table 10. What methods were used to control *Rhizoctonia solani* in 2018?

Location	Respondents	Seed Treatment Only	Seed Treatment + In-Furrow	Seed Treatment + POST	Seed Treatment + In-Furrow + POST	Seed Treatment + In-Furrow + 2x Post
		----------% respondents----------				
Fargo	39	36	10	36	18	-
Grafton	41	20	12	59	7	2
Grand Forks	83	28	22	39	12	-
Wahpeton	28	86	4	7	4	-
Willmar	81	54	5	32	5	4
Total	272	42	12	36	9	1

Table 11. Which seed treatment did you use to control *Rhizoctonia solani* in 2018?

		Seed treatment				
Location	Respondents	Kabina	Metlock Suite + Kabina	Vibrance	Systiva	Metlock Suite + Vibrance
		----------% of respondents----------				
Fargo	39	72	8	3	15	3
Grafton	36	72	14	3	8	3
Grand Forks	80	66	21	5	8	-
Wahpeton	29	90	7	-	-	3
Total	184	72	15	3	8	2

Table 12. Did you apply any in-furrow starter fertilizer in 2018?

		Variety type	
Location	Respondents	Yes	No
		----------% respondents----------	
Fargo	40	75	25
Grafton	43	88	12
Grand Forks	81	93	7
Wahpeton	31	65	35
Willmar	82	83	17
Total	277	83	17

Table 13. Which fungicide did you apply in-furrow to control *R. solani* in 2018?

		In-furrow fungicide use			
Location	Respondents	Headline or generic	Quadris or generic	Other	None
		----------% of respondents----------			
Fargo	39	5	26	5	64
Grafton	40	-	30	10	60
Grand Forks	83	5	30	14	51
Wahpeton	30	-	10	3	87
Willmar	82	5	10	1	84
Total	274	4	21	7	68

Table 14. Which POST fungicide did you use to control *R. solani* in 2018?

		POST fungicide					
Location	Respondents	Headline	Quadris	Proline	Priaxor	Other	None
		----------% of respondents----------					
Fargo	38	-	63	5	8	-	24
Grafton	41	-	54	7	15	-	24
Grand Forks	80	-	66	4	1	1	28
Wahpeton	29	-	7	10	3	3	76
Willmar	81	1	35	9	1	1	53
Total	269	>1	48	7	4	1	39

Table 15. How effective were your POST fungicides at controlling *Rhizoctonia solani* in 2018?

Location	Respondents	Effectiveness of fungicides				
		Excellent	Good	Fair	Poor	Unsure
		----------% of respondents----------				
Fargo	34	9	53	15	-	24
Grafton	38	13	58	16	-	13
Grand Forks	72	12	53	7	4	24
Wahpeton	20	-	10	20	-	70
Willmar	69	-	12	13	12	64
Total	233	7	38	12	5	38

Table 16. How did you apply POST fungicide for controlling Rhizoctonia Solani?

Location	Respondents	Band	Broadcast
		----------% of respondents----------	
Fargo	31	48	52
Grafton	34	50	50
Grand Forks	67	60	40
Wahpeton	10	40	60
Willmar	46	48	52
Total	188	52	48

Table 17. What rate of precipitated calcium carbonate (waste lime) did you use in 2018?

Location	Respondents	Lime use rate		
		None	<5 T/A	5-10 T/A
		----------% of respondents----------		
Fargo	37	57	5	38
Grafton	40	72.5	-	27.5
Grand Forks	84	74	-	26
Wahpeton	31	29	6	65
Willmar	79	65	25	10
Total	271	63	9	28

Table 18. What is your soil pH?

Location	Respondents	Soil pH					
		6.0-6.5	6.5-7.0	7.0-7.5	7.5-8.0	8.0-8.5	8.5-9.0
		----------% of respondents----------					
Fargo	35	3	14	14	34	34	-
Grafton	39	3	10	3	59	23	3
Grand Forks	81	-	6	15	38	40	1
Wahpeton	29	-	7	21	55	17	-
Willmar	82	-	11	32	50	6	1
Total	266	1	9	19	46	24	1

Table 19. Are you concerned about using waste lime on pH soils above 8.0?

Location	Respondents	Safety concerns	
		Yes	No
		----------% respondents----------	
Fargo	35	23	77
Grafton	36	25	75
Grand Forks	72	15	57
Wahpeton	28	25	75
Total	171	23	77

Table 20. How effective was waste lime at controlling Ap**hanomyces in 2018?**

Location	Respondents	Waste lime effectiveness					
		Excellent	Good	Fair	Poor	Unsure	No Lime
		----------% of respondents----------					
Fargo	37	30	19	3	-	11	38
Grafton	39	13	18	5	-	5	59
Grand Forks	78	13	17	3	1	17	50
Wahpeton	29	28	41	-	-	7	24
Total	183	19	21	3	1	11	45

Table 21. Have you used a specialty variety for Aphanomyces in 2018?

Location	Respondents	Variety type	
		Yes	No
		----------% respondents----------	
Fargo	36	67	33
Grafton	38	61	39
Grand Forks	75	68	32
Wahpeton	29	52	48
Total	178	63	37

Table 22. How many fungicide applications did you make to control CLS in 2018?

Location	Respondents	Number of applications								
		0	1	2	3	4	5	6	7	>7
		----------% of respondents----------								
Fargo	40	-	3	10	33	48	8	-	-	-
Grafton	42	-	17	60	21	2	-	-	-	-
Grand Forks	82	2	5	23	28	39	2	-	-	-
Wahpeton	30	-	-	-	10	23	47	20	-	-
Willmar	81	-	2	1	5	14	28	30	15	3
Total	275	1	5	18	19	25	15	11	4	1

Table 23. How effective were your fungicide applications on CLS in 2018?

		Effectiveness of CLS sprays					
Location	Respondents	Excellent	Good	Fair	Poor	Unsure	No applications
		----------% of respondents----------					
Fargo	40	15	73	13	-	-	-
Grafton	41	27	73	-	-	-	-
Grand Forks	77	36	51	9	-	4	-
Wahpeton	31	3	26	45	19	6	-
Willmar	81	2	6	37	47	7	-
Total	270	18	41	21	16	4	-

Table 24. What date was your first CLS application?

		Date of first CLS application					
Location	Respondents	Before July 1	July 1-10	July 11-20	July 21-31	August 1-10	After August 10
		----------% of respondents----------					
Fargo	38	8	39	32	18	-	3
Grafton	41	-	22	34	32	12	-
Grand Forks	75	1	35	29	28	4	3
Wahpeton	28	21	54	21	-	4	-
Willmar	79	10	75	15	-	-	-
Total	261	7	48	25	16	3	1

Table 25. What date was your last CLS application in 2018?

		Date of last CLS application							
Location	Respondents	Before August 1	August 1-10	August 11-20	August 21-31	Sept 1-10	Sept 11-20	Later than Sept 20	Made zero or 1 CLS applications
		----------% of respondents----------							
Fargo	39	-	-	8	18	44	26	3	3
Grafton	40	-	-	8	33	45	10	3	3
Grand Forks	78	-	4	6	22	53	10	5	-
Wahpeton	29	-	-	-	24	52	21	3	-
Willmar	80	1	1	10	23	40	23	-	3
Total	266	>1	2	7	23	46	17	3	2

Table 26. When did you experience failure of fungicides to control CLS in 2018?

		Date of fungicide failure						
Location	Respondents	No failure	July 31	August 15	August 31	September 15	September 30	After September 30
		----------% of respondents----------						
Fargo	36	81	-	6	3	3	3	6
Grafton	38	87	5	3	-	3	-	3
Grand Forks	77	87	4	-	3	5	1	-
Wahpeton	30	23	3	37	27	7	-	3
Willmar	78	4	22	40	23	10	-	1
Total	259	54	9	17	11	6	1	2

Table 27. What fungicides did you apply with your first CLS application in 2018?

		Fungicide									
Location	Respondents	Tin + Topsin	Tin + EBDC	EBDC + Triazole	Tin + Triazole	Tin + copper	EBDC + Copper	QOI + Other chemistry	Triazole + Copper	Single Chemistry	Other
		----------% of respondents----------									
Fargo	34	56	3	24	3	-	-	3	-	12	-
Grafton	34	65	9	3	21	-	-	-	-	3	-
Grand Forks	76	50	8	30	5	-	-	-	-	7	-
Wahpeton	29	76	7	10	-	-	-	-	-	7	-
Total	173	58	7	20	7	-	-	1	-	7	-

Table 28. What fungicides did you apply with your second CLS application in 2018?

		Fungicide									
Location	Respondents	Tin + Topsin	Tin + EBDC	EBDC + Triazole	Tin + Triazole	Tin + Copper	EBDC + Copper	QOI + Other chemistry	Triazole + Copper	Single Chemistry	Other
		----------% of respondents----------									
Fargo	27	44	4	26	7	-	4	7	4	-	4
Grafton	31	16	3	32	10	-	-	10	-	26	3
Grand Forks	76	49	7	33	5	-	-	-	-	7	-
Wahpeton	27	19	4	60	-	4	-	-	11	4	-
Total	161	37	5	36	6	1	1	3	2	9	1

Table 29. What fungicides did you apply with your third CLS application in 2018?

		Fungicide									
Location	Respondents	Tin + Topsin	Tin + EBDC	EBDC + Triazole	Tin + Triazole	Tin + Copper	EBDC + Copper	QOI + other chemistry	Triazole + Copper	Single Chemistry	Other
		----------% of respondents----------									
Fargo	29	-	10	31	17	7	-	14	3	10	7
Grafton	14	-	-	21	-	-	-	14	-	64	-
Grand Forks	52	4	10	48	13	2	2	-	2	12	8
Wahpeton	26	31		8	8		-		4	-	-
Total	121	8	11	32	12	9	1	5	2	15	5

Table 30. What fungicides did you apply with your fourth CLS application in 2018?

		Fungicide									
Location	Respondents	Tin + Topsin	Tin + EBDC	EBDC + Triazole	Tin + Triazole	Tin + Copper	EBDC + Copper	QOI + other chemistry	Triazole + Copper	Single Chemistry	Other
		----------% of respondents----------									
Fargo	16	-	-	6	6	-	-	19	13	44	13
Grafton	1	-	-	-	-	-	-	-	-	-	1
Grand Forks	41	7	12	12	29	2	2	-	2	12	20
Wahpeton	24	-	4	13	8	17	38	-	21	-	-
Total	82	4	7	11	18	6	12	4	10	15	13

Table 31. What fungicides did you apply with your fifth CLS application in 2018?

		Fungicide									
Location	Respondents	Tin + Topsin	Tin + EBDC	EBDC + Triazole	Tin + Triazole	Tin + Copper	EBDC + Copper	QOI + other chemistry	Triazole + Copper	Single Chemistry	Other
		----------% of respondents----------									
Fargo	5	-	-	-	-	-	40	20	-	20	20
Grand Forks	10	-	10	10	10	-	-	-	-	-	70
Wahpeton	17	6	18	12	6	18	18	-	12	6	6
Total	32	3	13	9	6	9	16	3	6	6	28

Table 32. Did you use any QoI fungicides for CLS control?

		Variety type		
Location	Respondents	No	Yes – in a mixture	Yes - alone
		----------% respondents----------		
Fargo	30	53	30	17
Grafton	35	46	14	40
Grand Forks	77	18	64	18
Wahpeton	25	68	28	4
Total	167	38	42	20

Table 33. What percent of total fungicide applications for CLS were sprayed by an aerial applicator?

		Percentages						
Location	Respondents	0%	1-20%	21-40%	41-60%	61-80%	81-99%	100%
		----------% of respondents----------						
Fargo	40	68	8	10	5	-	5	5
Grafton	41	88	5	2	-	-	-	5
Grand Forks	80	70	14	5	2	1	-	8
Wahpeton	30	70	20	3	3	3	-	-
Willmar	82	46	48	5	-	1	-	-
Total	273	65	22	5	2	1	1	4

Table 34. How many gallons of water per acre did you use to apply CLS fungicides by tractor?

Location	Respondents	Gallons per acre				
		1-5	6-10	11-15	16-20	20+
		----------% of respondents----------				
Fargo	36	-	-	51	14	6
Grafton	40	-	3	58	38	3
Grand Forks	73	1	7	64	22	5
Wahpeton	29	-	7	28	59	7
Willmar	81	-	1	19	64	16
Total	259	0.4	3	47	41	8