# TURNING POINT SURVEY OF WEED CONTROL AND PRODUCTION PRACTICES IN SUGARBEET IN MINNESOTA AND EASTERN NORTH DAKOTA IN 2017

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The third annual weed control and production practices live polling questionnaire was conducted using Turning Point Technology at the 2018 winter Sugarbeet Grower Seminars. Responses are based on production practices from the 2017 growing season. The survey focuses on responses from growers in attendance at the Fargo, Grafton, Grand Forks, 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, 5). Survey results represents approximately 198,500 acres reported by 313 respondents (Table 6) compared to 158,272 acres represented in 2016. The average sugarbeet acreage per respondent grown in 2017 was calculated from Table 5 at 634 acres compared to 673 acres in 2016.

Survey participants were asked a series of questions regarding their production practices used in sugarbeet in 2017. Fifty-two percent of respondents indicated wheat was the crop preceding sugarbeet (Table 7), 28% indicated corn, and 8% indicated soybean. Preceding crop varied by location with 75% of Fargo growers indicating wheat preceded sugarbeet and 81% of Willmar growers indicated corn as their preceding crop. Seventy-four percent of growers who participated in the winter meetings used a nurse or cover crop in 2017 (Table 8), which decreased from 79% in 2016. Cover crop species also varied widely by location with oat being used by 53% of growers at the Willmar meeting and no cover crop being used by the majority (35%) of growers at the Grand Forks meeting.

Growers indicated Rhizoctonia was their most serious production problem in sugarbeet in 2017 (Table 9) with 27% of all respondents naming Rhizoctonia compared to Cercospora Leaf Spot (CLS) being named most serious by 57% of all participants in 2016. Weather was the most serious problem for 21% of growers, mainly those in the northern valley, and weeds were named as most serious by 11% of responses.

Waterhemp was named as the most serious weed problem in sugarbeet in 2017 by 48% of respondents (Table 10) compared to 59% in 2016. Seven percent of respondents indicated common lambsquarters, 5% kochia, and 20% 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% and 75% of Willmar and Wahpeton respondents, respectively, indicating waterhemp was most problematic weed. Common ragweed was the worst weed for respondents of the Grand Forks meeting with 48% of responses.

Respondents to the survey indicated making 0 to 5 glyphosate applications in their 2017 sugarbeet crop (Table 11) with a calculated average of 2.21 applications per acre. The calculated average in 2016 was 2.28 applications per acre.

Glyphosate was most commonly applied with a chloroacetamide herbicide postemergence (lay-by) in 2017 with 34% of responses indicating this herbicide combination was used (Table 12). Seventy-five percent and 52% of Willmar and Wahpeton respondents, respectfully, applied glyphosate with Outlook, S-metolachlor, or Warrant but only 27%, 1% and 0% of Fargo, Grand Forks, and Grafton respondents, respectfully, used this combination. Use of chloroacetamides with glyphosate seems to coincide greatest to areas where glyhphosate-resistant waterhemp is common. Glyphosate alone and glyphosate plus a broadleaf herbicide were tied for the second most common herbicide used in sugarbeet in 2017 with 28% of responses, followed by glyphosate plus a grass herbicide for 4% of

the responses. Satisfaction to weed control from glyphosate applied alone is shown in Table 13 and ranged from 21% of responses indicating excellent control to 4% of responses indicating poor weed control. The majority of responses, 37%, indicated glyphosate was still providing good weed control in sugarbeet in 2017.

Preplant incorporated (PPI) or preemergence (PRE) herbicides were applied by 33% of survey respondents in 2017 (Table 14). Less than 10% of Grafton and Grand Forks survey participants applied a PPI or PRE herbicide. Conversely, 83% of Wahpeton survey participants did apply a PPI or PRE herbicide in sugarbeet in 2017 compared to 75% in 2016. Once again, a likely reason for this variation is the more common 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 16% of all responses followed by ethofumesate with 7% of responses (Table 15). Of the growers who indicated using a soil-applied herbicide, 80% indicated excellent to good weed control from that herbicide (calculated from Table 15).

The application of soil-residual herbicides applied 'lay-by' to the 2017 sugarbeet crop was indicated by 51% of respondents (Table 16). Outlook was the most commonly applied lay-by herbicide with 30% of responses. The majority of growers responding at the Willmar meeting indicated using Outlook (77% of responses), while S-metolachlor was more commonly applied by growers of the Fargo (38% of responses) and Wahpeton (66% of responses) meetings. Satisfaction of weed control from lay-by applications ranged from excellent to unsure (Table 17). Of respondents indicating they applied a lay-by herbicide, 85% indicated excellent or good weed control (calculated from Table 17).

Forty-six percent of survey respondents indicated using some form of mechanical weed control or hand labor in 2017 (Table 18). Of the responses given, 26% indicated at least some hand-weeding, 16% used row-cultivation, and 2% indicated using a rotary hoe for weed control in sugarbeet. Thirteen percent reported row-crop cultivation on less than ten percent of their acres (Table 19). Respondents who cultivated generally reported good to fair weed control from the cultivation (Table 20).

Hand-weeding the 2017 sugarbeet crop was reported by 41% of respondents (Table 21). Most respondents who hand-weeded indicated less than 10% of their acres were hand-weeded. Fewer than half of the respondents indicated hand-weeding at the Grafton, Wahpeton, Grand Forks, and Fargo meetings, while greater than half the participants at the Willmar meeting reported some hand weeding. For growers who reported hand-weeding, 82% reported 'excellent' or 'good' hand-weeding control (Table 22).

**Table 1. 2018 Fargo Grower Seminar – Number of survey respondents by county growing sugarbeet in 2017.**

| County | Number of Responses | Percent of Responses |
|---|---|---|
| Becker | 2 | 4 |
| Cass | 7 | 14 |
| Clay | 11 | 23 |
| Norman[1] | 22 | 45 |
| Richland | 1 | 2 |
| Steele | 1 | 2 |
| Traill | 4 | 8 |
| Wilkin[2] | 1 | 2 |
| Total | 49 | 100 |

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

**Table 2. 2018 Grafton Grower Seminar – Number of survey respondents by county growing sugarbeet in 2017.**

| County | Number of Responses | Percent of Responses |
|---|---|---|
| Grand Forks | 5 | 8 |
| Kittson | 7 | 11 |
| Marshall | 5 | 8 |
| Pembina | 16 | 27 |
| Polk | 1 | 2 |
| Ramsey | 1 | 2 |
| Walsh | 25 | 42 |
| Total | 60 | 100 |

**Table 3. 2018 Grand Forks Grower Seminar – Number of survey respondents by county growing sugarbeet in 2017.**

| County | Number of Responses | Percent of Responses |
|---|---|---|
| Grand Forks | 23 | 29 |
| Mahnomen | 1 | 1 |
| Marshall | 10 | 12 |
| Polk | 35 | 43 |
| Traill | 4 | 5 |
| Walsh | 3 | 4 |
| Other | 5 | 6 |
| Total | 81 | 100 |

**Table 4. 2018 Wahpeton Grower Seminar - Number of survey respondents by county growing sugarbeet in 2017.**

| County | Number of Responses | Percent of Responses |
|---|---|---|
| Clay | 2 | 5 |
| Grant | 5 | 12 |
| Richland | 10 | 24 |
| Traverse | 2 | 5 |
| Wilkin | 22 | 54 |
| Total | 41 | 100 |

**Table 5. 2018 Willmar Grower Seminar - Number of survey respondents by county growing sugarbeet in 2017.**

| County | Number of Responses | Percent of Responses |
|---|---|---|
| Chippewa | 34 | 34 |
| Kandiyohi | 15 | 15 |
| Redwood | 5 | 5 |
| Renville | 31 | 31 |
| Stevens | 4 | 4 |
| Swift | 7 | 7 |
| Other | 4 | 4 |
| Total | 109 | 100 |

**Table 6. Total sugarbeet acreage operated by respondents in 2017.**

| Location | Responses | <99 | 100-199 | 200-299 | 300-399 | 400-599 | 600-799 | 800-999 | 1000-1499 | 1500-1999 | 2000+ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | \-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-%of responses\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\- | | | | | | | | | |
| Fargo | 46 | 4 | 4 | 4 | 22 | 19 | 15 | 9 | 9 | 7 | 7 |
| Grafton | 56 | 4 | 14 | 7 | 20 | 23 | 14 | 5 | 7 | 4 | 2 |
| Grand Forks | 72 | 6 | 8 | 10 | 14 | 22 | 12 | 11 | 10 | 1 | 6 |
| Wahpeton | 40 | 0 | 12 | 12 | 15 | 15 | 12 | 18 | 10 | 3 | 3 |
| Willmar | 99 | 1 | 12 | 13 | 8 | 25 | 17 | 5 | 13 | 4 | 2 |
| Total | 313 | 3 | 11 | 10 | 14 | 22 | 15 | 9 | 10 | 3 | 3 |


**Table 7. Crop grown in 2016 that preceded sugarbeet in 2017.**

| Location | Responses | Barley | Canola | Corn | Dry Bean | Potato | Soybean | Wheat | Other |
|---|---|---|---|---|---|---|---|---|---|
| | | \-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-%of responses\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\- | | | | | | | | |
| Fargo | 47 | 0 | 0 | 4 | 4 | 2 | 12 | 75 | 2 |
| Grafton | 59 | 2 | 0 | 0 | 3 | 13 | 2 | 80 | 0 |
| Grand Forks | 76 | 7 | 0 | 0 | 4 | 7 | 2 | 80 | 0 |
| Wahpeton | 42 | 5 | 0 | 24 | 0 | 0 | 16 | 55 | 0 |
| Willmar | 98 | 0 | 0 | 81 | 1 | 0 | 5 | 0 | 13 |
| Total | 322 | 2 | 0 | 28 | 2 | 4 | 8 | 52 | 4 |


**Table 8. Nurse or cover crop used in sugarbeet in 2017.**

| Location | Responses | Barley | Oat | Rye | Wheat | Other[1] | None |
|---|---|---|---|---|---|---|---|
| | | \-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-%of responses\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\- | | | | | |
| Fargo | 49 | 37 | 2 | 2 | 4 | 2 | 53 |
| Grafton | 56 | 30 | 18 | 0 | 25 | 2 | 25 |
| Grand Forks | 83 | 48 | 4 | 1 | 11 | 1 | 35 |
| Wahpeton | 40 | 53 | 0 | 2 | 25 | 2 | 18 |
| Willmar | 103 | 0 | 53 | 1 | 33 | 1 | 12 |
| Total | 331 | 29 | 21 | 1 | 21 | 2 | 26 |

[1]Includes Mustard and 'Other'


**Table 9. Most serious weed problem in sugarbeet in 2017.**

| Location | Responses | CLS[1] | Rhizo-mania | Aph[2] | Rhizoc-tonia | Fusarium | Weeds | Herbicide Injury | Root Maggot | Weather | Stand[3] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | \-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-%of responses\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\-\- | | | | | | | | | |
| Fargo | 47 | 22 | 2 | 6 | 49 | 0 | 11 | 0 | 2 | 6 | 2 |
| Grafton | 55 | 5 | 5 | 18 | 38 | 2 | 9 | 0 | 2 | 17 | 4 |
| Grand Forks | 66 | 15 | 1 | 3 | 23 | 0 | 5 | 0 | 0 | 52 | 1 |
| Wahpeton | 39 | 43 | 3 | 5 | 23 | 0 | 10 | 0 | 3 | 13 | 0 |
| Willmar | 102 | 37 | 7 | 4 | 15 | 1 | 17 | 1 | 0 | 13 | 5 |
| Total | 309 | 25 | 4 | 7 | 27 | <1 | 11 | <1 | 1 | 21 | 3 |

[1]Cercospora Leaf Spot
[2]Aphanomyces
[3]Emergence/Stand

**Table 10. Most serious weed problem in sugarbeet in 2017.**

| Location | Responses | biww[1] | colq | cora | Foxtail spp. | kochia | gira | rrpw | Smart weed | RR Canola | wahe |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ---------------------------------------------% of responses-------------------------------------- | | | | | | | | | |
| Fargo | 44 | 0 | 5 | 27 | 0 | 5 | 2 | 2 | 0 | 5 | 54 |
| Grafton | 55 | 5 | 5 | 18 | 38 | 2 | 9 | 0 | 2 | 17 | 4 |
| Grand Forks | 75 | 3 | 13 | 48 | 0 | 16 | 7 | 1 | 1 | 4 | 7 |
| Wahpeton | 41 | 0 | 5 | 13 | 0 | 2 | 0 | 0 | 2 | 2 | 76 |
| Willmar | 102 | 0 | 6 | 0 | 0 | 0 | 3 | 0 | 1 | 2 | 88 |
| Total | 317 | 2 | 7 | 20 | 7 | 5 | 4 | <1 | 1 | 5 | 48 |

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

**Table 11. Average number of glyphosate applications per acre in sugarbeet during 2017 season.**

| Location | Responses | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| | | -----------------------------% of responses---------------------------- | | | | | |
| Fargo | 45 | 0 | 18 | 64 | 16 | 0 | 2 |
| Grafton | 56 | 0 | 14 | 66 | 20 | 0 | 0 |
| Grand Forks | 84 | 0 | 6 | 64 | 26 | 3 | 1 |
| Wahpeton | 39 | 0 | 13 | 54 | 31 | 2 | 0 |
| Willmar | 98 | 1 | 6 | 59 | 29 | 4 | 1 |
| Total | 322 | <1 | 10 | 62 | 25 | 2 | 1 |

**Table 12. Herbicides used in a weed control systems approach in sugarbeet in 2017.**

| Location | Responses | Glyphosate Application Tank-Mixes | | | | | |
|---|---|---|---|---|---|---|---|
| | | Gly Alone | Gly+Lay-by | Gly+Broadleaf | Gly+Grass | Other | None Used |
| | | ---------------------------------------% of responses--------------------------------- | | | | | |
| Fargo | 48 | 15 | 27 | 46 | 2 | 4 | 6 |
| Grafton | 56 | 68 | 0 | 14 | 4 | 4 | 10 |
| Grand Forks | 81 | 42 | 1 | 54 | 1 | 1 | 1 |
| Wahpeton | 40 | 10 | 52 | 25 | 8 | 5 | 0 |
| Willmar | 107 | 8 | 75 | 8 | 6 | 3 | 0 |
| Total | 332 | 28 | 34 | 28 | 4 | 3 | 3 |

**Table 13. Satisfaction in weed control from glyphosate applied in sugarbeet in 2017.**

| Location | Responses | Satisfaction of Weed Control from Glyphosate | | | | | |
|---|---|---|---|---|---|---|---|
| | | Excellent | Good | Fair | Poor | Unsure | Not Used Alone |
| | | ---------------------------------% of responses---------------------------- | | | | | |
| Fargo | 46 | 9 | 50 | 22 | 2 | 4 | 13 |
| Grafton | 53 | 54 | 40 | 4 | 0 | 0 | 2 |
| Grand Forks | 82 | 38 | 39 | 10 | 0 | 1 | 12 |
| Wahpeton | 42 | 0 | 47 | 19 | 5 | 5 | 24 |
| Willmar | 102 | 3 | 24 | 22 | 10 | 2 | 39 |
| Total | 325 | 21 | 37 | 15 | 4 | 2 | 21 |

**Table 14. Preplant incorporated and preemergence herbicides used in sugarbeet in 2017.**

| Location | Responses | S-metolachlor | ethofumesate | Ro-Neet SB | S-metolachor +ethofumesate | Other | None |
|---|---|---|---|---|---|---|---|
| | | -----% of responses----- | | | | | |
| Fargo | 41 | 29 | 2 | 0 | 2 | 8 | 59 |
| Grafton | 53 | 0 | 0 | 0 | 0 | 6 | 94 |
| Grand Forks | 78 | 3 | 0 | 0 | 0 | 0 | 97 |
| Wahpeton | 34 | 62 | 3 | 0 | 15 | 3 | 17 |
| Willmar | 101 | 13 | 18 | 0 | 10 | 9 | 50 |
| Total | 307 | 16 | 7 | 0 | 5 | 5 | 67 |

**Table 15. Satisfaction in weed control from preplant incorporated and preemergence herbicides in 2017.**

| Location | Responses | Excellent | Good | Fair | Poor | Unsure | None Used |
|---|---|---|---|---|---|---|---|
| | | -----% of responses----- | | | | | |
| Fargo | 45 | 7 | 20 | 11 | 4 | 0 | 58 |
| Grafton | 52 | 0 | 0 | 0 | 0 | 0 | 100 |
| Grand Forks | 68 | 1 | 1 | 1 | 0 | 0 | 96 |
| Wahpeton | 39 | 33 | 41 | 5 | 5 | 0 | 16 |
| Willmar | 100 | 5 | 37 | 8 | 0 | 1 | 49 |
| Total | 304 | 7 | 21 | 5 | 1 | <1 | 65 |

**Table 16. Soil-residual herbicides applied early postemergence (lay-by) in sugarbeet in 2017.**

| Location | Responses | S-metolachlor | Outlook | Warrant | Other | None |
|---|---|---|---|---|---|---|
| | | -----% of responses----- | | | | |
| Fargo | 45 | 38 | 2 | 0 | 2 | 58 |
| Grafton | 48 | 2 | 2 | 2 | 2 | 92 |
| Grand Forks | 74 | 1 | 4 | 0 | 0 | 95 |
| Wahpeton | 41 | 66 | 27 | 5 | 0 | 2 |
| Willmar | 101 | 2 | 77 | 16 | 0 | 5 |
| Total | 309 | 16 | 30 | 6 | 1 | 47 |

**Table 17. Satisfaction of weed control from soil-residual herbicides applied early postemergence (lay-by) in sugarbeet in 2017.**

| Location | Responses | Excellent | Good | Fair | Poor | Unsure | None Used |
|---|---|---|---|---|---|---|---|
| | | -----% of responses----- | | | | | |
| Fargo | 47 | 2 | 26 | 8 | 0 | 2 | 62 |
| Grafton | 46 | 0 | 0 | 0 | 0 | 0 | 100 |
| Grand Forks | 32 | 3 | 0 | 3 | 0 | 3 | 91 |
| Wahpeton | 39 | 15 | 64 | 18 | 0 | 0 | 3 |
| Willmar | 100 | 13 | 72 | 10 | 0 | 0 | 5 |
| Total | 264 | 8 | 41 | 8 | 0 | 1 | 42 |

**Table 18. Mechanical weed control methods used in sugarbeet in 2017.**

| Location | Responses | Rotary Hoe | Row-Cultivation | Hand-Weeded | Other | None |
|---|---|---|---|---|---|---|
| | | --------------------------------------% of responses-------------------------------- | | | | |
| Fargo | 48 | 0 | 6 | 31 | 2 | 61 |
| Grafton | 49 | 0 | 4 | 10 | 0 | 86 |
| Grand Forks | 76 | 3 | 6 | 24 | 3 | 64 |
| Wahpeton | 42 | 0 | 12 | 21 | 10 | 57 |
| Willmar | 110 | 4 | 34 | 35 | 0 | 27 |
| Total | 325 | 2 | 16 | 26 | 2 | 54 |

**Table 19. Percent of sugarbeet acres row-crop cultivated in 2017.**

| Location | Responses | % Acres Row-Cultivated | | | | |
|---|---|---|---|---|---|---|
| | | 0 | < 10 | 10-50 | 51-100 | >100 |
| | | ----------------------------------% of responses---------------------------- | | | | |
| Fargo | 50 | 82 | 8 | 8 | 0 | 2 |
| Grafton | 53 | 83 | 9 | 4 | 0 | 4 |
| Grand Forks | 78 | 78 | 18 | 3 | 1 | 0 |
| Wahpeton | 42 | 80 | 10 | 10 | 0 | 0 |
| Willmar | 101 | 46 | 14 | 12 | 11 | 17 |
| Total | 324 | 70 | 13 | 7 | 4 | 6 |

**Table 20. Satisfaction of weed control from row-crop cultivation in sugarbeet in 2017.**

| Location | Responses | Excellent | Good | Fair | Poor | Unsure | No Row-Cultivation |
|---|---|---|---|---|---|---|---|
| | | --------------------------------% of responses---------------------------- | | | | | |
| Fargo | 45 | 0 | 4 | 7 | 2 | 2 | 85 |
| Grafton | 52 | 6 | 6 | 4 | 0 | 2 | 82 |
| Grand Forks | 47 | 2 | 11 | 8 | 0 | 0 | 79 |
| Wahpeton | 41 | 2 | 5 | 10 | 5 | 0 | 78 |
| Willmar | 100 | 5 | 22 | 19 | 2 | 2 | 50 |
| Total | 285 | 4 | 12 | 11 | 2 | 1 | 70 |

**Table 21. Percent of sugarbeet acres hand-weeded in 2017.**

| Location | Responses | % Acres Hand-Weeded | | | | |
|---|---|---|---|---|---|---|
| | | 0 | < 10 | 10-50 | 51-100 | >100 |
| | | ----------------------------------% of responses---------------------------- | | | | |
| Fargo | 49 | 59 | 25 | 10 | 2 | 4 |
| Grafton | 50 | 82 | 16 | 0 | 2 | 0 |
| Grand Forks | 80 | 61 | 30 | 5 | 3 | 1 |
| Wahpeton | 43 | 72 | 21 | 7 | 0 | 0 |
| Willmar | 100 | 40 | 22 | 26 | 8 | 4 |
| Total | 322 | 59 | 23 | 12 | 4 | 2 |

**Table 22. Satisfaction of weed control from hand-weeding sugarbeet in 2017.**

| Location | Responses | Excellent | Good | Fair | Poor | Unsure | No Hand-Weeding |
|---|---|---|---|---|---|---|---|
| | | --------------------------------% of responses---------------------------- | | | | | |
| Fargo | 39 | 13 | 20 | 0 | 8 | 0 | 59 |
| Grafton | 49 | 10 | 10 | 0 | 0 | 0 | 80 |
| Grand Forks | 64 | 25 | 12 | 2 | 0 | 0 | 61 |
| Wahpeton | 43 | 14 | 5 | 7 | 0 | 0 | 74 |
| Willmar | 100 | 9 | 34 | 13 | 0 | 1 | 43 |
| Total | 295 | 14 | 19 | 6 | 1 | <1 | 60 |