SURVEY OF WEED CONTROL AND PRODUCTION PRACTICES
ON SUGARBEET IN WESTERN NORTH DAKOTA AND EASTERN MONTANA IN 2009

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Other portions of this survey are published in the Entomology and Plant Pathology sections.

The thirteenth weed control and production practices questionnaire was mailed in September 2009 to sugarbeet growers in western North Dakota and eastern Montana. The last survey was conducted in 2007. Growers were requested to evaluate weed control and sugarbeet injury from specific herbicides, and to list the most important weed and production problems. In addition, growers were requested to list insecticide use, fungicide use, acreage by sugarbeet type, acres of hand-weeded sugarbeet, herbicide application methods, and cost of hand thinning and hand weeding. Growers were also requested to provide the number of row cultivations by sugarbeet type, whether conventional herbicide rates increased, if any glyphosate-resistant weeds were observed, and list suspected glyphosate-resistant weed species. Insecticide use and fungicide use portions of the survey can be found in the Entomology and Plant Pathology sections.

Growers planted 24,500 acres of sugarbeet in western North Dakota and eastern Montana in 2009. Fifteen growers representing 14% of the total acres responded to the survey. Of the 3,441 acres reported, only 2 acres were conventional sugarbeet and will be ignored throughout the remainder of the report, except for Tables 1 and 2. The remaining 3,439 acres were Roundup Ready® (RR) sugarbeet. Growers in western North Dakota and eastern Montana have rapidly and nearly completely switched to planting RR sugarbeet since the last survey in 2007. No other transgenic crop has been adopted as rapidly. Other portions of the survey are reported in the Entomology and Plant Pathology sections.

Table 1 is a summary of herbicide use and performance averaged over all counties. The number of growers reporting the use of an herbicide treatment is listed and the acres treated are expressed as a percentage of the total reported acreage. Multiple herbicide treatments are tabulated for each herbicide treatment, thus the number of growers reporting in Table 1 exceeds the total number of responses. Also, multiple herbicide treatments on the same acreage are listed separately in the tables, thus acres treated exceeds 100%. The ratings of weed control and sugarbeet injury are presented as the percentage of growers evaluating weed control as excellent, good, fair, or poor and injury as none, slight, moderate, or severe.

The trade names listed in Table 1 for the herbicides are the original trade names. These old trade names also represent the generic formulations of the same active ingredient. Thus Nortron also represents Etho SC and Ethotron; Betamix represents D-P Mix and Phen-Des; Betanex represents Des and Alphanex; Progress represents Des-Phen-Etho; Stinger represents ClopyrAg; and Select represents Select Max, Prism, and Arrow.

Total sugarbeet acreage treated with herbicides in 2009 was 237% (Table 1), compared to 411% in 2007, 400% in 2005, 440% in 2003, and 408% in 2001. Total acreage treated with herbicides declined 42% compared to 2007. In other words, survey respondents have reduced the number of herbicide applications by 42% since 2007. Postemergence herbicides were the only type of herbicides or method of control reported in 2009 (Table 1). Postemergence herbicide use was 237% in 2009, 277% in 2007, 311% in 2005, 312% in 2003, and 335% in 2001. Postemergence herbicides were applied only 2.4 times in 2009, compared to 2.8
times in 2007. Postemergence herbicide use only declined 14% since 2007. Only glyphosate, Poast, Select, and Stinger were reportedly applied to sugarbeets in western North Dakota and eastern Montana in 2009. The most common herbicide treatment in 2009 was glyphosate applied at 1.0 pound acid equivalent per acre (lb ae/A). The average total rate of glyphosate applied per acre by survey respondents in 2009 was 2.4 lb ae/A (calculated from Table 1), compared to 1.85 lb ae/A in eastern North Dakota and Minnesota. Stinger was only applied by survey respondents to 1.4% of the total treated acreage in 2009 (Table 1), compared to 245% in 2007, 269% in 2005, 302% in 2003, and 269% in 2001. Select was applied to 1%, Poast to 1%, and Assure II to 0% of the acreage in 2009, compared to 84, 99, and 6% of the acreage, respectively, in 2007. Herbicide use and weed control practices have likely never changed as dramatically between surveys as is currently being reported.

Fifty-five percent of survey respondents reported excellent weed control in 2009, compared to 16% in 2007 and 11% in 2005. Sixty-five percent of survey respondents reported no sugarbeet injury in 2009, compared to 10% in 2007 and 28% in 2005. Never in the history of this survey has so many respondents reported excellent weed control and no sugarbeet injury, thanks to the availability and adoption of RR sugarbeet.

Averaged over all herbicides applied in 2009, 100% were broadcast applied with a ground sprayer (Table 2). No respondents reported application of herbicides by aircraft or in a band.

A summary of the “most serious production problem” responses from 1989 to 2009 is shown in Table 3. In 2009, 29% of respondents indicated root diseases (including aphanomyces, fusarium, rhizoctonia, and rhizomania) as their “most serious production problem” in sugarbeet, compared to 17% in 2005, 22% in 2003, and 25% in 1991. Also, 29% of respondents indicated emergence or stand establishment as their most serious problem in 2009. Twenty-one percent of respondents reported no problems in 2009, the highest response in the history of this survey. Cercospora leaf spot was named as a “most serious production problem” by 7% of the respondents. For the first time in the history of conducting this survey, NO respondents reported weeds as a “most serious production problem”. Respondents annually report weeds as the “most serious production problem”, except for 2001, 1993, 1992, 1991, and 1989.

Kochia was named most often as the “worst weed” problem by 75% of the survey respondents in 2007 and 2005 (Table 4), but only 17% of respondents reported kochia as a problem in 2009. In 2009, common lambsquarters was named the “worst weed” problem by 22% of respondents, the greatest percentage of responses every recorded. For the first time in the history of the survey, 22% of respondents reported no weed problems. Milkweed was reported by two respondents as an “other” “worst weed” problem. The effectiveness of glyphosate compared to conventional herbicides greatly enhances weed control in sugarbeet. One grower reported the presence of glyphosate-resistant weeds and listed kochia as the suspected glyphosate-resistant weed.

Hand weeding has virtually disappeared in western North Dakota and eastern Montana with less than 1% of acres reported receiving hand weeding (Table 5). The effectiveness of glyphosate applied to RR sugarbeet has allowed for the near disappearance of hand weeding.

Sugarbeet acreage operated by survey respondents in 2009 varied from less than 50 acres to 650 acres (Table 7). The average and median number of sugarbeet acres per respondent was 230 and 110 acres, respectively, in 2009.

Row crop cultivation was used by one third of survey respondents in 2009 (Table 8). Sixty seven percent of respondents indicated zero cultivation per field, the largest percentage in the history of the survey. The average number of row crop cultivations was 0.4 per field in 2009, compared to 1.7 cultivations per field in 2007. The number of row crop cultivations declined sharply due to the effectiveness of glyphosate in RR sugarbeet.
Table 1. Summary of all herbicides used in sugarbeet in Eastern North Dakota and Western Montana reported in 2009. 15 growers reported on 3,441 acres.

<table>
<thead>
<tr>
<th>HERBICIDES</th>
<th>ACRES TREATED</th>
<th>REPORTING GROWERS</th>
<th>REPORTING % OF GROWERS</th>
<th>% GROWERS REPORTING TOTAL appl WEED CONTROL</th>
<th>% GROWERS REPORTING TOTAL WEED CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>(IN ORDER OF ACRES TREATED)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>GLYP 1.0 LB</td>
<td>9</td>
<td>154.4</td>
<td>2.3</td>
<td>44</td>
<td>56</td>
</tr>
<tr>
<td>GLYP 1.125 LB</td>
<td>3</td>
<td>62.0</td>
<td>1.7</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>GLYP 0.75 LB</td>
<td>4</td>
<td>18.0</td>
<td>2.5</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>GLYP+STINGER</td>
<td>1</td>
<td>1.2</td>
<td>2.0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>POAST</td>
<td>1</td>
<td>0.9</td>
<td>1.0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>GLYP+SELECT</td>
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<td>0.9</td>
<td>1.0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>BNEX+STING+UPBET</td>
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<td>0.2</td>
<td>3.0</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

**B. POSTEMERGENCE HERBICIDES:**

Table 2. Method of herbicide application in sugarbeet in 2009.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Acres treated</th>
<th>Band</th>
<th>Broadcast with ground sprayer</th>
<th>Broadcast with aerial application</th>
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<tr>
<td>Poast</td>
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<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Bnex/Bmix/Prog+Stinger+UpBeet</td>
<td>6</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Glyphosate – 0.75 lb ae/A</td>
<td>618</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Glyphosate – 1.0 lb ae/A</td>
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<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Glyphosate – 1.125 lb ae/A</td>
<td>2022</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Glyphosate + Stinger</td>
<td>40</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Glyphosate + Select</td>
<td>30</td>
<td>-</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>27309</td>
<td>0</td>
<td>100</td>
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Table 3. A summary of the most serious production problem responses from 1989 to 2009.

<table>
<thead>
<tr>
<th>Year</th>
<th>Respondents</th>
<th>Weeds</th>
<th>Weather</th>
<th>Root Diseases 1</th>
<th>Labor Management</th>
<th>Emergence/ Stand</th>
<th>Cercospora Leaf Spot</th>
<th>No Problem</th>
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<td>6</td>
<td>5</td>
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<td>10</td>
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<td>0</td>
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<td>9</td>
<td>24</td>
<td>2</td>
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<td>22</td>
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<td>1995</td>
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<td>44</td>
<td>5</td>
<td>5</td>
<td>2</td>
<td>13</td>
<td>26</td>
<td>3</td>
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<tr>
<td>1993</td>
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<td>18</td>
<td>7</td>
<td>4</td>
<td>23</td>
<td>12</td>
<td>9</td>
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<td>5</td>
<td>0</td>
<td>36</td>
<td>11</td>
<td>3</td>
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<td>25</td>
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<tr>
<td>1990</td>
<td>70</td>
<td>41</td>
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<td>11</td>
<td>6</td>
<td>10</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>1989</td>
<td>81</td>
<td>20</td>
<td>5</td>
<td>22</td>
<td>6</td>
<td>21</td>
<td>0</td>
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</tr>
</tbody>
</table>

1Root Diseases include aphanomyces, fusarium, rhizoctonia, and rhizomania.
### Table 4. A summary of the worst weed responses from 1989 to 2009.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Responses</th>
<th>RRPW¹</th>
<th>COLQ</th>
<th>KOCZ</th>
<th>NISH</th>
<th>WIOA</th>
<th>NONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>18</td>
<td>0</td>
<td>22</td>
<td>17</td>
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<td>6</td>
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<td>15</td>
<td>75</td>
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<tr>
<td>2005</td>
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<tr>
<td>1999</td>
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<td>45</td>
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</tr>
<tr>
<td>1997</td>
<td>43</td>
<td>58</td>
<td>16</td>
<td>12</td>
<td>5</td>
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<td>-</td>
</tr>
<tr>
<td>1995</td>
<td>63</td>
<td>52</td>
<td>3</td>
<td>29</td>
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<td>5</td>
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<tr>
<td>1990</td>
<td>70</td>
<td>46</td>
<td>10</td>
<td>23</td>
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<td>1989</td>
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<td>11</td>
<td>22</td>
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</tbody>
</table>

¹RRPW=redroot pigweed, COLQ=common lambsquarters, KOCZ=kochia, NISH=nightshade, WIOA=wild oat

### Table 5. A summary of hand weeded acres as a percent of acres planted in eastern Montana and western North Dakota from 1989 to 2009.

<table>
<thead>
<tr>
<th>Year</th>
<th>Respondent Acres Planted</th>
<th>Hand Weeded % of acres planted</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>3,441</td>
<td>&lt;1</td>
</tr>
<tr>
<td>2007</td>
<td>8,346</td>
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<tr>
<td>2005</td>
<td>7,733</td>
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</tr>
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<td>1992</td>
<td>12,791</td>
<td>76</td>
</tr>
<tr>
<td>1991</td>
<td>15,784</td>
<td>85</td>
</tr>
<tr>
<td>1990</td>
<td>12,607</td>
<td>78</td>
</tr>
<tr>
<td>1989</td>
<td>15,857</td>
<td>89</td>
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</table>
### Table 6. A summary of the cost of hand weeding plus hand thinning from 1991 to 2009.

<table>
<thead>
<tr>
<th>Year</th>
<th>Responses</th>
<th>0</th>
<th>1-10</th>
<th>11-15</th>
<th>16-20</th>
<th>21-25</th>
<th>26-30</th>
<th>31-35</th>
<th>36-40</th>
<th>41-45</th>
<th>46-50</th>
<th>51-55</th>
<th>56-60</th>
<th>&gt;60</th>
<th>% of respondents</th>
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<td>7</td>
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<td>3</td>
<td>0</td>
<td>8</td>
<td>29</td>
<td>18</td>
<td>23</td>
<td></td>
<td></td>
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</tbody>
</table>

### Table 7. A summary of sugarbeet acres produced by survey respondents from 1997 to 2009.

<table>
<thead>
<tr>
<th>Year</th>
<th>Responses</th>
<th>1-49</th>
<th>50-99</th>
<th>100-199</th>
<th>200-299</th>
<th>300-399</th>
<th>400-599</th>
<th>600-799</th>
<th>800-999</th>
<th>1000-1500</th>
<th>&gt;1500</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>15</td>
<td>7</td>
<td>40</td>
<td>13</td>
<td>7</td>
<td>13</td>
<td>7</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>21</td>
<td>5</td>
<td>19</td>
<td>5</td>
<td>19</td>
<td>10</td>
<td>24</td>
<td>0</td>
<td>14</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>24</td>
<td>4</td>
<td>13</td>
<td>17</td>
<td>13</td>
<td>38</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>44</td>
<td>11</td>
<td>16</td>
<td>21</td>
<td>11</td>
<td>24</td>
<td>5</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>64</td>
<td>5</td>
<td>15</td>
<td>28</td>
<td>20</td>
<td>9</td>
<td>5</td>
<td>11</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1999</td>
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<td>2</td>
<td>17</td>
<td>28</td>
<td>23</td>
<td>11</td>
<td>8</td>
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<td>4</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>43</td>
<td>4</td>
<td>23</td>
<td>25</td>
<td>12</td>
<td>25</td>
<td>8</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

### Table 8. A summary of the number of row crop cultivations per field for weeds from 1989 to 2009.

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<th>Year*</th>
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<th>0</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>15</td>
<td>67</td>
<td>27</td>
<td>6</td>
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<td>0</td>
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</tr>
<tr>
<td>2007</td>
<td>19</td>
<td>6</td>
<td>26</td>
<td>63</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2001</td>
<td>64</td>
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<td>16</td>
<td>69</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1999</td>
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<td>24</td>
<td>60</td>
<td>13</td>
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<td>0</td>
<td></td>
</tr>
<tr>
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<td>55</td>
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</tr>
<tr>
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<td>53</td>
<td>20</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>