Weed Management in Conventional and Roundup Ready Sugarbeet

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Presentation outline

• Conventional sugarbeet reminders
• Glyphosate-resistant weeds
• RR sugarbeet
• Weed management in corn and soybean
Weed control reminders for conventional sugarbeet

• Before planting
  – Choose fields with the fewest weeds, especially kochia and waterhemp
  – Choose best variety for field
    • Maximize crop growth to compete against weeds
  – Choose fields with best drainage possible
  – Scout field before tillage to confirm weed species, density, & size
  – Kill all weeds prior to planting with tillage and/or herbicide
  – Prepare good seedbed for quick sugarbeet emergence
Dr. Jeff Stachler

Weed control reminders for conventional sugarbeet

• Before planting
  – Consider PPI herbicides based upon weed problem
    • Wild oat – resistant to ACCase (group 1) herbicides
      – Far-Go (1.5 qt/A) = Ro-Neet SB (4.0 [coarse] to 5.3 pt/A) = Eptam + Ro-Neet SB (1.1 [coarse] to 2.3 + 2.7 [coarse] to 3.3 pt/A)
    • Waterhemp and pigweed
      – Nortron (6 [coarse & med.] or 7.5 pt/A) = Eptam + Ro-Neet SB (1.1 [coarse] to 2.3 + 2.7 to 3.3 pt/A) > Dual Magnum (follow label) = Ro-Neet SB (4.0 to 5.3 pt/A)
    • Kochia
      – Nortron > Eptam + Ro-Neet SB
  • Lambsquarters
    – Eptam + Ro-Neet SB > Ro-Neet SB > Dual Magnum > Nortron
Pro’s and Con’s to PPI herbicides

• Pro’s
  – Reduce early season weed competition
    • Should maximize yield and profit
  – Improved weed control
    • Especially important for highest weed densities
  – Likely delay 1st POST application and potentially reduce number of POST applications
  – Provides some weed control if too wet to apply first POST application
Pro’s and Con’s to PPI herbicides

• Con’s
  – Too much tillage before planting?
    • Dry out seed bed
    • Two passes best incorporation
      – 4-6” depth for Eptam & Ro-Neet
      – 3-4” depth for Far-Go
    • One pass probably enough if good soil movement
      – 1-2” depth for Nortron
      – 1” depth for Dual
Pro’s and Con’s to PPI herbicides

• Con’s
  – Death or severe injury of Spring cover crop
    • Broadcast appl. = better weed control & less need for cultivation, but cover crop killed & higher costs
    • Band appl. = cheaper & able to plant cover crop, but must row cultivate
  – Greater initial herbicide cost
Weed control reminders for conventional sugarbeet

- **After planting & before sugarbeet emergence**
  - Apply PRE herbicides
    - Nortron (6.0 or 7.5 pt/A, depends upon soil type)
      - Carryover concerns all crops, except corn and soybean
    - Dual Magnum (check rates)
  - **Before sugarbeet emergence**
    - Determine if weeds present before sugarbeet emergence
    - If weeds present, especially kochia and waterhemp
      - Apply glyphosate at 0.75 to 1.125 lb ae/A in band
      - Apply paraquat at 0.5 to 0.75 lb ai/A broadcast or band
        » Do not broadcast under cloudy conditions
      - Apply Ignite 280 at 29 fl oz/A in band
Response of glyphosate-resistant waterhemp – June 18th (time of POST glyphosate)

- Dual Mag. (1.5 pt)
- Nortron (7.5 pt)
- Ro-Neet (3.3 pt) + Eptam (2.3 pt)
- Ro-Neet (5.3 pt)

Control (%)

PRE  |  PPI
---|---
ab   | ab
b    |  
ab   | ab
ab   |  
d    |  
ab   |  

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PRE vs no PRE in conventional sugarbeet – harvest evaluation

Control (%)

Lambsquarters

Redroot Pigweed & Waterhemp

Plus Nortron
No Nortron

0 10 20 30 40 50 60 70 80 90 100

A B a b
PRE or PPI Dual Magnum

• Must sign waiver to release Syngenta from liability
  – Obtain from American Crystal

• Should have product available

• Follow these precautions:
  – Watch rates
  – Don't plant too deep
  – Do not incorporate the Dual very deep
  – Plant a little thicker

• Strengths
  – Pigweed and waterhemp
  – Annual grasses
Weed control reminders for conventional sugarbeet

• Apply 1\textsuperscript{st} POST application to cotyledon weeds (cotyledon sugarbeet)
  – Apply maximum rate if:
    • Larger weeds, hard to kill in past, &/or dense weeds
    – Betanex / Betamix / Progress
      • 8 - 12 fl oz/A / 8 - 12 fl oz/A / 5.7 – 8.7 fl oz/A
    – + UpBeet
      • 0.125 (1/8) oz/A
    – + Stinger
      • 1.3 to 2.6 (lanceleaf sage) fl oz/A
    – + MSO
      • 1.5 % v/v or 2.0 pt/A
  – ?? + Nortron &/or Select / Select Max
    • 1.3 to 3 fl oz/A &/or 2 to 8 fl oz/A / 4 to 16 fl oz/A
## Response of a wild oat population – June 22nd
wild oat stage at application = 1-2 leaves

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Rate (/A)</th>
<th>Mortality (%)</th>
<th>Control (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select Max (dim)</td>
<td>5.4 fl oz (2.7 = 2EC)</td>
<td>100 a</td>
<td>75 b-e</td>
</tr>
<tr>
<td>Select Max (dim)</td>
<td>16 fl oz</td>
<td>100 a</td>
<td>85 abc</td>
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<tr>
<td>Select Max (dim)</td>
<td>32 fl oz</td>
<td>100 a</td>
<td>92 ab</td>
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<tr>
<td>Poast (dim)</td>
<td>16 fl oz</td>
<td>100 a</td>
<td>78 a-d</td>
</tr>
<tr>
<td>Assure II (fop)</td>
<td>11.6 fl oz</td>
<td>93 ab</td>
<td>62 d-h</td>
</tr>
<tr>
<td>Assure II (fop)</td>
<td>23.3 fl oz</td>
<td>78 abc</td>
<td>53 ghi</td>
</tr>
<tr>
<td>Discover NG (fop)</td>
<td>15.9 fl oz</td>
<td>63 cd</td>
<td>35 jk</td>
</tr>
<tr>
<td>Puma (fop)</td>
<td>10.5 fl oz</td>
<td>66 cd</td>
<td>36 ij</td>
</tr>
<tr>
<td>Axial (den)</td>
<td>8.2 fl oz</td>
<td>72 bcd</td>
<td>50 hij</td>
</tr>
<tr>
<td>Axial (den)</td>
<td>16.2 fl oz</td>
<td>93 ab</td>
<td>71 c-g</td>
</tr>
<tr>
<td>Axial (den)</td>
<td>32.6 fl oz</td>
<td>95 ab</td>
<td>87 abc</td>
</tr>
<tr>
<td>Silverado (SU)</td>
<td>0.6 oz</td>
<td>65 cd</td>
<td>57 fgh</td>
</tr>
<tr>
<td>Everest (SACT)</td>
<td>2.4 oz</td>
<td>50 d</td>
<td>57 fgh</td>
</tr>
<tr>
<td>PowerFlex (TPS)</td>
<td>2.4 oz</td>
<td>18 e</td>
<td>53 g-j</td>
</tr>
</tbody>
</table>
Weed control reminders for conventional sugarbeet

- Apply 2\textsuperscript{nd} & 3\textsuperscript{rd} POST applications 5-7 days later (or 175 to 225 GDD)
  - Apply maximum rate if:
    - Larger weeds, hard to kill in past, &/or dense weeds
    - Betanex / Betamix / Progress (>2 to 5 lf sugarbeet)
      - 12 - 16 fl oz/A / 12 - 16 fl oz/A / 8.7 - 11.6 fl oz/A
      - + UpBeet
        - 0.125 (1/8) oz/A
      - + Stinger
        - 1.3 to 2.6 (lanceleaf sage) fl oz/A
      - + MSO
        - 1.5 % v/v or 2.0 pt/A
    - ?? + Nortron &/or Select / Select Max
      - 1.3 to 3 fl oz/A &/or 2 to 8 fl oz/A / 4 to 16 fl oz/A
Weed control reminders for conventional sugarbeet

- **Apply 4\(^{th}\) POST application 5-7 days later** (or 175 to 225 GDD)
  - Apply maximum rate if:
    - Larger weeds, hard to kill in past, &/or dense weeds
    - Betanex / Betamix / Progress (> 5 if sugarbeet)
      - 16 – 24 fl oz/A / 16 – 24 fl oz/A / 11.6 - 17.8 fl oz/A
      - + UpBeet
        - 0.125 (1/8) oz/A
      - + Stinger
        - 1.3 to 2.6 (lanceleaf sage) fl oz/A
    - + MSO
      - 1.5 % v/v or 2.0 pt/A
    - ?? + Nortron &/or Select/Select Max
      - 1.3 to 3 fl oz/A &/or 2 to 8 fl oz/A/4 to 16 fl oz/A
Micro- & mid-rate mixing precautions

- Mix in warm water
- Raise water pH to 8 or 9
  - Basic pH blend (1.0 % v/v)
  - Ammonia (2% solution at 1 gal/100 gal of water)
  - MSO basic pH blend (2 pt/A)
- Premix UpBeet
- Add a grass herbicide
- Clean sprayer frequently
Lay-by herbicides

• Can be included in micro-rate program, but injury may increase

• Improve small-seeded broadleaf and annual grass control
  – Especially pigweed species, including waterhemp

• Should not be applied if Nortron applied PRE or PPI as severe injury can occur
Lay-by herbicides

• **Outlook**
  – 2 to 8 lf sugarbeet, larger only if split applied
  – 12 to 18 fl oz/A (coarse) & 18 to 21 fl oz/A (med.&fine)
  – Maximum of 24 fl oz/A if split-applied

• **Dual Magnum**
  – > 2 lf sugarbeet, >10 to 12 lf probably inhibits contact with soil
  – 1.0 pt/A (coarse), 1.33 pt/A (med.), & 1.67 pt/A (fine)
  – Maximum of 2.6 pt/A if split-applied

• **Treflan**
  – > 2 lf sugarbeet to 6” plants
  – 1.0 pt/A (course), 1.5 pt/A (med. & fine)
  – Beet roots must be covered before application
  – Must incorporate with cultivator (move soil to plants in row)
Mixtures with fungicides and insecticides

• Do not mix the following:
  – Tin fungicide in the micro- or mid-rate programs
  – Quadris in the micro- or mid-rate programs
  – Quadris with an oil adjuvant
  – Lorsban with conventional (full) rates of Betanex, Betamix, and Progress
  – If concerned, apply separately
Glyphosate-resistant weeds
Areas and counties of ND and MN having known and suspected glyphosate-resistant weeds

- Gly-R common ragweed
- Gly-R giant ragweed
- Gly-R waterhemp

2007

Black symbols: confirmed resistant cases; Blue: highly suspected

Provided by: Drs. Jeff Stachler and Mike Christoffers
Areas and counties of ND and MN having known and suspected glyphosate-resistant weeds.

- Gly-R common ragweed
- Gly-R giant ragweed
- Gly-R waterhemp

- 25 to 40% soybean fields gly-R C. Rag.
- 30 to 90% all acres have gly-R waterhemp
- 5 to 80% all acres gly-R waterhemp
- 50 to 95% all acres have gly-R G. Rag.

- 10 to 40% soybean fields gly-R C. Rag.
- 30 to 60% all acres gly-R C. Rag.
- 5 to 80% all acres gly-R waterhemp

Provided by: Drs. Jeff Stachler and Mike Christoffers

Black symbols: confirmed resistant cases; Blue: highly suspected
Identifying glyphosate resistance

- Frequency of resistant plants in field
- Response of individual plants
Example of continuum of response
Website address about herbicide resistance:
http://www.ag.ndsu.edu/weeds/herbicide-resistant-weeds
RR sugarbeet
2010 Sugarbeet grower survey

- Most serious production problem
  - Weeds (6%-lowest) [46% in 2007] {Rhizoc./Aph. – 53%}

- Worst weed problem in RR sugarbeet

<table>
<thead>
<tr>
<th>Year</th>
<th>None</th>
<th>Lambs-quarters</th>
<th>Pigweed</th>
<th>Kochia</th>
<th>Water-hemp</th>
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<td>2007</td>
<td>1</td>
<td>16</td>
<td>34</td>
<td>41</td>
<td>4</td>
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2010 Sugarbeet grower survey

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<td>16</td>
<td>34</td>
<td>41</td>
<td>4</td>
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<td>2008 (RR)</td>
<td>54</td>
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<td>2009 (RR)</td>
<td>39</td>
<td>30</td>
<td>12</td>
<td>3</td>
<td>3</td>
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<tr>
<td>2010 (RR)</td>
<td>30</td>
<td>23</td>
<td>17</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
2010 Sugarbeet grower survey

• Other weeds reported
  – Wild buckwheat  RR corn  RR soybean
  – RR canola  Ragweed  Common cocklebur
  – Smartweed  Wild oat  Volunteer wheat
  – Foxtail  Velvetleaf  Wild mustard
  – Common mallow  Biennial wormwood

• % of growers reporting excellent weed control
  – 2007 = 16
  – 2008 (RR only) = 85
  – 2009 (RR only) = 77
  – 2010 (RR only) = 71
2010 Sugarbeet grower survey

• Average total rate of glyphosate
  – 2008 = 1.95 lb ae/A
  – 2009 = 1.85 lb ae/A
  – 2010 = 2.09 lb ae/A
    – Walsh (2.29 lb/A), Pembina (2.19 lb/A), Cass (2.15 lb/A), & Clay (2.10 lb/A) Counties greatest in American Crystal
    – Richland (3.0 lb/A) County greatest

• Glyphosate + Stinger
  – 2008 = 4.1% of total RR only acreage
  – 2009 = 2.7% of total RR only acreage
  – 2010 = 8.4% of total RR only acreage
## Sugarbeet root yield – September 13, 2010
untreated check = 0.0 tons/A (m)

<table>
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<tr>
<th>Treatment</th>
<th>Timing (inch)</th>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>1 (0 to 1.0”)</td>
<td>3 (0.5 to 8”)</td>
<td>6 (0.5 to 15”)</td>
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<td>fl oz/A</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Weed-free Check</td>
<td>11.8 a</td>
<td>5.4 e-i</td>
<td>5.5 e-h</td>
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<tr>
<td>RUPM 22 (0.75 lb ae/A)</td>
<td>2.1 j-m</td>
<td>1.7 klm</td>
<td>0.0 m</td>
</tr>
<tr>
<td>RUPM fb 22</td>
<td></td>
<td>2.5 h-m</td>
<td></td>
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<tr>
<td>RUPM fb 22 fb 22</td>
<td></td>
<td>4.2 f-k</td>
<td></td>
</tr>
<tr>
<td>Stinger 2</td>
<td>7.3 def</td>
<td>4.2 f-k</td>
<td>0.2 lm</td>
</tr>
<tr>
<td>Stinger 4</td>
<td>8.2 b-e</td>
<td>3.2 g-l</td>
<td>0.5 lm</td>
</tr>
<tr>
<td>Stinger 8</td>
<td>7.6 cde</td>
<td>5.2 e-j</td>
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<td>10.1 a-d</td>
<td>6.3 efg</td>
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<td>10.6 abc</td>
<td>6.5 ef</td>
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<td>Stinger 4 fb 8</td>
<td>11.8 a</td>
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<tr>
<td>Stinger 2 fb 2 fb 4</td>
<td>10.8 ab</td>
<td>6.7 e-f</td>
</tr>
<tr>
<td>Stinger 4 fb 4 fb 4</td>
<td>10.1 a-d</td>
<td>6.5 ef</td>
</tr>
</tbody>
</table>
RR sugarbeet recommendations – common ragweed

- Apply Stinger (2.5 fl oz/A) + glyphosate (1.125 lb ae/A) + AMS to 1” common ragweed

- Apply Stinger (2.5 fl oz/A) + glyphosate (0.75 lb ae/A) + AMS 14 to 21 DAT

- Scout field to determine need for a third application

- Apply Stinger no later than July 18th for Sept. 1 harvest!
RR sugarbeet recommendations – waterhemp (gly-R)

Option 1

• Broadcast apply and incorporate one of the following:
  – Ro-Neet (3.3 pt/A) + Eptam (2.3 pt/A) OR
  – Nortron 7.5 pt/A
    • Both will injure or kill spring cover crop
    • OR band and row cultivate to keep cover crop

• Apply glyphosate (1.125 lb ae/A) + Betamix (2 to 3 pt/A) + Outlook (21 fl oz/A) OR Dual Magnum (1.6 pt/A) + AMS to 1” waterhemp.
  – If Nortron, then no Outlook or Dual
RR sugarbeet recommendations – waterhemp (gly-R)  
Option 1

• Scout field to determine need for additional applications

• If needed, apply glyphosate (0.75 lb ae/A) + AMS 10 to 14 DAT
  – + Betanex (4 to 6 pts/A) OR
  – Row cultivate

• One last option: apply glyphosate (0.75 lb ae/A) + AMS to waterhemp starting to shed pollen or 30 days prior to harvest, which ever comes first.
RR sugarbeet recommendations – waterhemp (gly-R)  
Option 2

- Apply glyphosate (1.125 lb ae/A) + Betamix (12 fl oz/A) + Nortron (3 fl oz/A) + MSO* + AMS to cotyledon waterhemp

- Apply Betamix (16 fl oz/A) + Nortron (3 fl oz/A) + MSO 5 to 7 days later

- Apply glyphosate (0.75 lb ae/A) + Betamix (16 fl oz/A) + Nortron (3 fl oz/A) + MSO* + AMS 5-7 days

* Destiny HC, Savy, MSO concentrate (Loveland) at 1.5 to 2.0 pt/A
RR sugarbeet recommendations – waterhemp (gly-R)
Option 2

• Apply Betamix (24 fl oz/A) + Nortron (3 fl oz/A) + MSO 5 to 7 days later

• Apply glyphosate (0.75 lb ae/A) + Betamix (24 fl oz/A) ??? + MSO* + AMS 5-7 days

• Scout to determine need for cultivation

* Destiny HC, Savy, MSO concentrate (Loveland) at 1.5 to 2.0 pt/A
*** Must use > 15 GPA carrier volume and small droplets
RR sugarbeet recommendations – general

- Apply glyphosate (1.125 lb ae/A) + AMS (8.5 lb/100 gal) + NIS to 1” weeds (2 if sugarbeet)
- Apply glyphosate (0.75 lb ae/A) + AMS + NIS at 14 to 21 DAT
  - If resistant weeds, add other herbs. & sooner (10 DAT)
- Scout field to determine need for a third application
  - Apply glyphosate (0.75 lb ae/A) + AMS
- Always include NIS (0.25 to 1.0 %v/v) with glyphosate, unless prohibited
Weed management in corn and soybean
Weed control recommendations in preceding crops to sugarbeet

• Wheat
  – Most effective herbicides with alternative sites of action

• Corn (RR)
  – PRE
    • Verdict (Integrity) (10 to 18 fl oz/A)
  – fb Status (5 oz/A) + glyphosate (1.125 lb ae/A) + NIS + AMS
  – fb glyphosate (1.125 lb ae/A) + NIS + AMS ???

• Soybean (LL)
  – PRE
    • Verdict (5 fl oz/A) + Outlook (8 to 12 fl oz/A)
    • Valor (2.5 to 3.0 fl oz/A)
    • Fierce (3.0 fl oz/A) (18 month rotation)
  – fb Ignite 280 (22 fl oz/A) + AMS (3.0 lb/A)
Final reminders

• Not all fields are alike, manage accordingly
  – Manage weediest fields more aggressively
    • Use ALL available tools

• Field perimeter weed management
  – Inside and outside the field perimeter
Field perimeter management
Final reminders

• Diversify weed management
  – Cultural, mechanical, and alternative sites of action herbicides

• Use the correct herbicides for the species present at the correct time

• Use PRE herbicides
  – Reduces early-season weed competition which is most detrimental
Final reminders

• Maximize herbicide activity!
  – Apply to small weeds
  – Correct herbicide for species present
  – Correct adjuvant and amount
    • NIS for glyphosate (0.25%-full; 0.5%-partial; 1%-none)
    • MSO for ALS, HPPD, & most PPO herbicides
    • Apply Oils on /A basis
  – Correct spray volume – contact vs systemic
    • >15 gpa vs ≤ 10 gpa
  – Correct nozzle and droplet size
  – Correct time of day
  – Apply during best environment
Final reminders

• Apply POST herbicides to small weeds
  – 1” sugarbeet and 1-3” for other crops

• Timing of sequential glyphosate applications
  – Must wait at least 10 days, 14 is usually better

• Scout
  – Before and after herbicide applications
• Thank You for Your Support!

• Thank you 2010 cooperators
  – Dennis DeBoer, Charlie Morrison, Wayne Nelson, Kenny Sundat, Brian Ryberg, Keith Johnson, Terry Ahlbrecht and Larry Trettin

• Thank you Lenny Luecke and colleagues

• Are there ANY questions?

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  – 218-790-8131 (Cell)