2014 Herbicide and Weed Control Update

Rich Zollinger
NDSU Extension Weed Specialist
New Herbicides for 2014 – Major announcement…..
New Herbicides - Historic

- aminocyclopyrachlor (Dupont) – Growth reg.
  - Perspective - for pasture/rangeland
- florasulam / pyroxulam (Dow/Syngenta) – ALS
  - GoldSky, Orion, PowerFlex, Huskie Complete
- pyrasulfotole (Bayer) – HPPD inhibitor
  - Huskie Complete
- pyroxasulfone (Kumiai) – Group 15 (a.i. Harness)
  - Zidua, Anthem, Fierce
- saflufenacil (BASF) – PPO inhibitor
  - Sharpen, Verdict, OpTill
- thiencarbazone (Bayer) – ALS inhibitor
  - Huskie Complete, Capreno, Corvus
New Herbicide for 2014
2014 generic brand names

Alluvex (Dupont) = 1:1 Resolve+Harmony
FullDeck (Helena) = MCPA+Starane+Stinger
Gramoxone SL 2.0 (Syng) = new formulation
Metribuzin (CPS/MANA) = same ai as Sencor
Panoflex (Dupont) = 4:1 Express+Harmony
Panther (Nufarm) = same ai as Valor
Paraquat (Willowood) = same ai as Gramoxone
Pummel (MANA) = same ai Dual + Pursuit
Rumble (MANA) = same ai as Reflex
Tailwind (MANA) = same ai as Boundary
Torment (MANA) = same as Reflex+Pursuit
Tuscany (Nufarm) = same ai as Valor
Vise (MANA) = same ai as Prefix
Herbicide resistant weeds – historic perspective

ACCase R Wild oat  
ALS R kochia
ACCase resistant green foxtail
### ACCase/Group 1 Chemistry

<table>
<thead>
<tr>
<th>FOPS</th>
<th>DIMS</th>
<th>DENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puma/Wolverine (fenoxaprop)</td>
<td>Poast / Rezult (sethoxydim)</td>
<td>Axial (pinoxaden)</td>
</tr>
<tr>
<td>Discover (clodinafop)</td>
<td>Shadow / Select / Arrow / Section / Volunteer / Trigger (clethodim)</td>
<td></td>
</tr>
<tr>
<td>Assure II / Targa (quizalifop)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fusilade / Fusion (fluazifop)</td>
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Clethodim is the last line of Group 1 (ACCase) defense. When resistant to clethodim then resistant to all.
Overuse of ACCase herbicides

ACCase R Green foxtail
2 weeks after treatment

Untreated Everest Puma Axial Select Assure II

ALS

ACCase Group 1

TG Sample B
How do you control ACCase R grasses in:

• Sunflower
• Peas
• Lentils
• Drybeans
• Flax
• Barley

• Group 1 is often your only option!
Recommendations

• Tankmix Group 1 + Group 2 in broadleaf crops where affordable (Beyond+clethodim)
• Rotate Group 1 and Group 2
• If use Group 1 in 1st year then plant wheat in 2nd year:
  – Everest has been effective but for how long?
  – Everest in wheat - can rotate to RR or LL soy or canola the next year
  – Will give 2 years of alternate chemistry.

Dr. Brian Jenks, NorthCentral R&E Center, Minot
ND is loosing crop diversity

<table>
<thead>
<tr>
<th>Crop</th>
<th>Acres</th>
<th>States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corn</td>
<td>~4 m acres</td>
<td>Illinois</td>
</tr>
<tr>
<td>Soy</td>
<td>~5 m acres</td>
<td>Indiana, Iowa</td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td>N. Ikota</td>
</tr>
<tr>
<td>Dry beans</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field pea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lentil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sunflower</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canola</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flax</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugarbeet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Over use of glyphosate

- Corn: RR = > 97% ND acres
- Soy: RR = > 97% ND acres
- Wheat
- Dry beans
- Field pea
- Lentil
- Sunflower
- Canola: RR = > 75% ND acres
- Flax
- Sugarbeet: RR = > 98% ND acres
Glyphosate-resistant weeds in ND and MN

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

Black symbols: confirmed resistant cases; Blue: highly suspected

Provided by: Drs. Jeff Stachler and Mike Christoffers
Glyphosate-resistant weeds in ND and MN

2010

GR ragweed

GR waterhemp

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

Black symbols: confirmed resistant cases; Blue: highly suspected

Provided by: Drs. Jeff Stachler and Mike Christoffers

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Glyphosate-resistant weeds in ND and MN

2013

GR Ragweed & waterhemp

GR kochia

Gly-R horseweed / marestail
Gly-R kochia
Gly-R common ragweed
Gly-R giant ragweed
Gly-R waterhemp

Black symbols: confirmed resistant cases; Blue: highly suspected

Provided by: Drs. Jeff Stachler, Jeff Gunsolus, Mike Christoffers, and Kirk Howatt

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NDSU Extension

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Glyphosate and Starane R Kochia

- = glyphosate
- = Starane (fluroxypyr)
Sunflower acreage treated with herbicides


- Sonalan
- Treflan
- Prowl
- Post grass
- Spartan
- Assert
- Glyphosate

% acres treated

- 2000
- 1996
- 1992
Sunflower acreage treated with herbicides

Glyt R kochia, waterhemp, ragweed, horseweed

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tref/Son/Prowl</td>
<td>- GR waterhemp, ~kochia</td>
</tr>
<tr>
<td>Post grass</td>
<td>- none</td>
</tr>
<tr>
<td>Spartan</td>
<td>- GR wahe, koch</td>
</tr>
<tr>
<td>Beyond</td>
<td>- none</td>
</tr>
<tr>
<td>Express</td>
<td>- none</td>
</tr>
<tr>
<td>Glyphosate</td>
<td>- none</td>
</tr>
</tbody>
</table>

% acres treated

2008

0 10 20 30 40 50
Kochia Biology

Length of seed viability:

% seeds viable after 1 yr = 5%
% seeds viable after 2 yr = 1%

Implications – ?????
Bury the seed
Handweeding
Build a fence on SD/ND border
Build a fence around field
Fundamentals of Weed Management

#1 - Don't forget the PRE herbicide!
ND crop acres that received a soil-applied herbicide?

<table>
<thead>
<tr>
<th>Crop</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canola</td>
<td>0%</td>
</tr>
<tr>
<td>Flax</td>
<td>3%</td>
</tr>
<tr>
<td>Wheat</td>
<td>3%</td>
</tr>
<tr>
<td>Soybean</td>
<td>4%</td>
</tr>
<tr>
<td>Corn</td>
<td>8%</td>
</tr>
<tr>
<td>Sugarbeet</td>
<td>13%</td>
</tr>
<tr>
<td>Lentil</td>
<td>13%</td>
</tr>
<tr>
<td>Field pea</td>
<td>16%</td>
</tr>
<tr>
<td>Dry beans</td>
<td>37%</td>
</tr>
<tr>
<td>Sunflower</td>
<td>66%</td>
</tr>
</tbody>
</table>

2008 ND Pesticide Use Survey
PRE herbicide preference – 1978 to 2008

Corn Soybean Total

% acres

What % of ND acres received a soil-applied herbicide?

<table>
<thead>
<tr>
<th></th>
<th>Corn</th>
<th>Soybean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>2012</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
What % of ND acres receives a soil-applied herbicide?

<table>
<thead>
<tr>
<th>Year</th>
<th>Corn (ND acreage)</th>
<th>Soybean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>8%</td>
<td>4%</td>
</tr>
<tr>
<td>2012</td>
<td>11%</td>
<td>4%</td>
</tr>
</tbody>
</table>

Data from the ND Pesticide Use Surveys
Glyphosate resistant weeds?
Then next glyphosate resistant weed in ND?
Weed of the Year – 2008-2014

2009 = Dandelion

2010 = Lambsquarters

2011 = Common ragweed

2012 = Waterhemp

2013 = Foxtail barley

2014 = ?
Weed of the Year - 2014

2014 =
Weed of the Year – 2014

2014 = “Satan”
Dr Aaron Hagar, U of IL
Weed of the Year – 2014

Palmer amaranth

The ‘baddest’ relative of redroot pigweed
Distribution of Palmer amaranth – 2009
Pigweed identification

Deception in appearance – looks like “pigweed”

Waterhemp / RR pigweed

Palmer amaranth
Palmer amaranth ID

6 ft 6 in.

Dr Bill Johnson - Weed Scientist Purdue University
Labor – hand-weed
2010 – 110 hrs
2011 – 5 hrs
2012 – 2 hrs

ZERO TOLERANCE
Successful Farming 2013-2014 Marketing Issue

What's next in weed control technology?

Roundup Ready 2 Xtend Soybeans
An advanced soybean product with tolerance to dicamba and glyphosate. Xtend Your Control

Enlist
What keeps farming strong is what carries it forward.
Introducing Enlist™ – an advanced herbicide and trait system
that will build on glyphosate for exceptional performance.
Protecting what's important to move farming ahead. Enlist.com
Emerging Weed Mngt Traits

Projected launch

Enlist (Dow)
  DHT-1 = 2,4-D and ‘fop’ resistant corn  2015
  DHT-2 = 2,4-D resistant  soybean  2015

Roundup 2 Xtend (Monsanto)
  Dicamba resistant soybean  2015

HPPD resistant soybean (Bayer/Syngenta)  2015-16
  - FG72 – Balance (isoxaflutole) resistant soybean
  - MGI – Callisto+Liberty+Balance resistant soybean
Enlist and RU Xtend = New Technology
Cant use sloppy application

- Particle drift (including inversions)
- Volatilization
- Sprayer cleanout - contamination
- Misapplication
Emerging Weed Mngt Traits

Enlist Duo herbicide = 2,4-D-choline salt = quaternary NH$_3$ salt

Engenia (BASF) = dicamba-BAPMA salt (Bis(3-amonopropyl)methylamine)

Volutatility potential:
- Banvel (dicamba-dma) = Base line comp.
- Clarity (dicamba-dga) = Low
- Engenia (dicamba-BAPMA) = Very low
Soybean Injury and Yield Loss from Dicamba

Estimated dicamba dose (ED) that caused soybean yield loss.

<table>
<thead>
<tr>
<th>Soybean growth stage</th>
<th>MRC 2009 &amp; TAPC 2010</th>
<th>TPAC 2009</th>
<th>TPAC 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED %</td>
<td>V2</td>
<td>V5</td>
<td>R2</td>
</tr>
<tr>
<td>ED&lt;sub&gt;10&lt;/sub&gt;</td>
<td>0.02</td>
<td>0.31</td>
<td>0.02</td>
</tr>
<tr>
<td>ED&lt;sub&gt;20&lt;/sub&gt;</td>
<td>-</td>
<td>0.07</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Dicamba
- 20% soybean injury = 0.1 to 0.3% of 16 fl oz/A solution drift.
- 10% soybean yield reduction = 0.03 to 1.9% of 16 fl oz/A drift.
Tank Contamination

• Dicamba concentration to cause soybean injury
  – 0.01% of 8 fl oz/A dicamba
  – 0.01% = 0.05 oz or 1.5 mL Clarity in 500 gal tank
Tank Contamination

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  - 0.01% of 8 fl oz/A dicamba
  - 0.01% = 0.05 oz or 1.5 mL Clarity in 500 gal tank

- Incomplete clean-out
  - 0.01% = ~3/4 cup left after 1 pt/A Clarity in 500 gal tank
  - 0.1% = 2 qts left after 1 pt/A Clarity in 500 gal tank
Emerging Weed Mngt Traits

Dicamba resistant soybean (Monsanto/BASF)

- Follow Best Management Practices (BMPs)
  - Do not add AMS
  - Nozzles = extreme-ultra coarse droplets (>450 microns)
  - <15 mph travel speed
  - 3-10 wind speed
  - <24 inch boom height
  - Observe buffer zones
  - Add drift reducing agent
  - Sprayer clean out using triple rinse + alkaline agent + detergent.
NDSU PLANT SCIENCES

Agriculture is in our roots