ROLLING WITH THE PUNCHES
Weed Management in 2022
Sarah Lancaster
Assistant Professor and Extension Specialist

Dicamba

- Status update issued 12/15/21
- Stakeholders suggested additional restrictions as well as cancellation
  - Potentially state-specific
- Changes not likely to be fully implemented in 2022
  - 24(a) likely to be approved
  - 24(c) not likely to be approved
- ESA is playing a role here...
  - "EPA is reviewing whether over-the-top dicamba can be used in a manner that does not pose unreasonable risks to non-target crops and other plants, or to listed species and their designated critical habitats"

Enlist

- 7-year labels approved January 11, 2022
- Additional application requirements
- ESA counties in KS
  - Chautauqua
  - Cherokee
  - Cowley
  - Elk
  - Greenwood
  - Labette
  - Montgomery
  - Neosho
  - Wilson
  - Woodson

HERBICIDE SHORTAGES THAT SURFACED IN 2021 MAY NOT BE RESOLVED IN 2022

By Gil Gullickson
11/3/2021

MANAGING WEEDS WITHOUT KEY HERBICIDES

November 30, 2021 By Julie Harker  Filed Under: Crops, Missouri. News

AGWEB

Crop Production
Will Fertilizer and Herbicide Prices Fall Before Spring? Why Experts Say It's Highly Unlikely
Start with the basics

Start clean
Apply full rates
Apply in ideal conditions
Apply to small, actively growing weeds

What portion of your herbicides have you (or your clients) purchased?

<table>
<thead>
<tr>
<th>None</th>
<th>A little bit - less that 25% of needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A fair amount - 25 to 50% of needed</td>
<td>Most - 75 to 90%</td>
</tr>
<tr>
<td>Nearly all - more than 90%</td>
<td></td>
</tr>
</tbody>
</table>

Weed Management 101

Which herbicide(s) are you most concerned about being available during 2022? You can respond up to 6 times.
Take delivery ASAP

• Be realistic about what you will need
• Make sure you have adequate storage
  • Take precautions to prevent spills
  • “Cool dry place”
    • Ideal temperature is between 40 and 90 °F

Herbicide storage temperatures

<table>
<thead>
<tr>
<th>Condition</th>
<th>Selected Herbicides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above 32 F</td>
<td>Authority Assist, Beyond, Flexstar, Gramoxone 2.0,</td>
</tr>
<tr>
<td></td>
<td>Poast Plus, Pursuit, Raptor, Reflex, Ultra Blazer</td>
</tr>
<tr>
<td>Above 14 F</td>
<td>Balance Flexx, Huskie, Huskie Complete, Huskie 2.0,</td>
</tr>
<tr>
<td></td>
<td>Starane NXT*</td>
</tr>
<tr>
<td>Above 10 F</td>
<td>Flexstar GT, Starane Ultra*</td>
</tr>
<tr>
<td>Above -10 F</td>
<td>Callisto GT, Halex GT, Lumax</td>
</tr>
<tr>
<td>Above -20 F</td>
<td>Callisto, Callisto Xtra</td>
</tr>
<tr>
<td>Above -30 F</td>
<td>Dual formulations</td>
</tr>
<tr>
<td>Below freezing but thaw</td>
<td>Liberty*, Flexstar</td>
</tr>
<tr>
<td>Below freezing but thaw and recirculate before use</td>
<td>2,4-D amine and ester, Aatrex 4L, Prowl H2O, Impact, Impact Z, Widematch</td>
</tr>
</tbody>
</table>

No restrictions

- Dry formulations, Aim, Armezon PRO, Assure II, Authority Edge, Authority Elite, Authority MTZ, Authority Supreme, Bicep formulations, Capreno, Engenia, Enlist One, Fusilade DX, Gramoxone 3.0, Harness formulations, Impact Core, Laudis, Lexar EZ, Outlook, Resource, Roundup PowerMax formulations, Roundup Ultra, SelectMax, Spartan 4F, Valor, Verdict, XtendiMax

• Warm and agitate before using

Recirculating over-wintered herbicides

• Air sparge to mix product and incorporate settled solids
  • Use an air wand to blow air into the bottom of the tank
    • A smaller orifice will provide more directed airflow to lift solids
    • Within a couple seconds, you should begin to see and hear air bubbling
    • Air sparge for at least 5 minutes
    • Move the air wand around the bottom of the tank to lift settled solids
  • Provide adequate venting
    • Mini-bulk tanks are not pressure rated
  • Do not use high pressure
    • A steady flow of about 10-20 psi is sufficient
    • Product surface should look homogeneous with no layers
  • Following air sparging, complete recirculation of the tank contents

Be flexible

• Consider looking for premixes that contain the active ingredient
Alternate formulations: Corn

- Glyphosate
  - Sequence – with S-metolachlor
  - Acuron GT – with S-metolachlor, mesotrione, bicyclopyrone
  - Callisto GT – with mesotrione
  - Expert – with S-metolachlor and atrazine
  - Halex GT – with mesotrione and S-metolachlor

- Glufosinate
  - Sinate – with topramezone

Alternate formulations: Soybean

- Glyphosate:
  - Enlist Duo – with 2,4-D
  - Sequence – with S-metolachlor
  - Thunder Master – with imazethapyr
  - Flexstar GT – with fomesafen

- Glufosinate
  - Intermoc – with S-metolachlor

Weed control 4 WAT Sinate

Be flexible

- Consider looking for premixes that contain the active ingredient
- Consider alternative active ingredients
Alternate products: Burndown

- Paraquat (Gramoxone, others)
  - 2 to 4 pt/A
  - N fertilizer + NIS or atrazine/metribuzin + COC

Paraquat

- Registration review interim decision announced 8/2021
- Limited aerial applications
- Required residential buffers
- Required enclosed cabs or respirators for groundboom applications.
- Increasing the Restricted Entry Interval (REI) for several crops
- Restricted use to certified pesticide applicators only
- Specialized training for certified applicators
- Closed-system packaging

- "EPA has not found a clear link between paraquat exposure from labeled uses and adverse health outcomes such as Parkinson’s disease and cancer."
- ESA review pending

Link for paraquat training: https://npsec.us/paraquat

Volunteer Clearfield-wheat control 2WAT

<table>
<thead>
<tr>
<th>Control</th>
<th>Glyphosate</th>
<th>Paraquat</th>
<th>Glufosinate</th>
<th>Quizalofop</th>
<th>Clethodim</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>a</td>
<td>a</td>
</tr>
</tbody>
</table>

Blackshaw et al. 2006

Alternate products: Burndown

- Paraquat (Gramoxone, others)
  - 2 to 4 pt/A
  - N fertilizer + NIS or atrazine/metribuzin + COC

- Sharpen
  - 1 to 3.5 fl oz/A
    - Based on soil texture
    - MSO plus AMS
    - Not with carbamate or OP insecticides

- Verdict

- Reviton
  - 1-2 fl oz/A
  - MSO

- Group 4 plus Group 1
Volunteer wheat control

![Graph showing biomass reduction with and without 2,4-D amine and ester with bromoxynil](image)

Blackshaw et al. 2006

Alternate products:
**Grass control in corn**

- Nicosulfuron (Accent, Revulin Q, Steadfast, etc)
- Rimsulfuron (Resolve, Basis, Basis Blend, Realm Q, Steadfast)
- Topramezone (Impact, Armezon, Armezon PRO)
- Tembotrione (Laudis)

Alternate products:
**Broadleaf control in soybean**

- Group 4
  - Dicamba
  - 2,4-D

- Group 14
  - Acifluorfen (Blazer)
  - Fomesafen (Flexstar)
    - Rotation restrictions – corn, sorghum, wheat
    - Additional restrictions west of Hwy 281
  - Lactofen (Cobra)

Be flexible

- Consider looking for premixes that contain the active ingredient
- Consider alternative active ingredients
- Increase residual herbicide use
Residual herbicides

- Multiple, effective herbicides that provide extended control

<table>
<thead>
<tr>
<th>Residual Herbicides</th>
<th>Solubility (mg/L)</th>
<th>Sorption (mL/g)</th>
<th>Half-life (d)</th>
<th>Crops</th>
<th>Pigweeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetochlor</td>
<td>282</td>
<td>156</td>
<td>12</td>
<td>Cn</td>
<td>Sg</td>
</tr>
<tr>
<td>S-metolachlor</td>
<td>480</td>
<td>200</td>
<td>23</td>
<td>Cn</td>
<td>Sg</td>
</tr>
<tr>
<td>Dimethenamid</td>
<td>1499</td>
<td>227</td>
<td>16</td>
<td>Cn</td>
<td>Sg</td>
</tr>
<tr>
<td>Pyroxasulfone</td>
<td>3.5</td>
<td>223</td>
<td>22</td>
<td>Cn</td>
<td>Sg</td>
</tr>
<tr>
<td>Isoxaflutole</td>
<td>6.2 L</td>
<td>145</td>
<td>1.3</td>
<td>Cn</td>
<td>E</td>
</tr>
<tr>
<td>Mesotrione</td>
<td>1500</td>
<td>122</td>
<td>5</td>
<td>Cn</td>
<td>Sg</td>
</tr>
<tr>
<td>Flumioxazin</td>
<td>0.8</td>
<td>889</td>
<td>18</td>
<td>Cn</td>
<td>Sg</td>
</tr>
<tr>
<td>Sulfentrazone</td>
<td>780</td>
<td>43</td>
<td>547</td>
<td>Sy</td>
<td>E</td>
</tr>
<tr>
<td>Metribuzin</td>
<td>10,700</td>
<td>48</td>
<td>19</td>
<td>Sy</td>
<td>G</td>
</tr>
</tbody>
</table>

- Consider layered residuals

What portion of your POST applications include a residual herbicide?

- None
- A few - Less than 25%
- Some about 50%
- Most - More than 75%
- Nearly all - more than 90%

Weed control 60 DAP

Warrant (2.5 qts/A)
Ensure efficacy

- Use the right adjuvants
- Especially if water quality is a concern

Palmer amaranth biomass 3 WAT with Liberty
Devkota and Johnson 2016

What spray volume do you use for POST herbicide applications? Up to 3 responses

Ensure efficacy

- Consider increasing spray volume

Grain amaranth
Corn

Creech et al. 2015

Means within species and herbicide followed by the same letter are similar (P < 0.05)

Tank-mix partners affect coverage

Liberty + Roundup PowerMax II
Liberty + Enlist One
Roundup PowerMax II + Enlist
Three-way mix
Tank-mix partners affect coverage

Area covered (%)

- 10 GPA
- 15 GPA
- 20 GPA

Liberty + RoundUp
Liberty + Enlist
RoundUp + Enlist
Liberty + RoundUp + Enlist

Large crabgrass control

Large crabgrass control (%)

- 2 in
- 4 in
- 8 in

10 GPA
15 GPA
20 GPA

Ensure efficacy

- Equipment maintenance

How often do you replace spray nozzles?

Once a year
When I notice a change in spray pattern
When I notice a problem with a previous application
You’re supposed to do that?

When poll is active, respond at pollev.com/sarahlanca648
Text SARAHLANCA648 to 37607 once to join

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Be a good agronomist

- Crop rotation
- Fertility
- Planting date
- Plant population
- Row spacing

Soybeans planted at 15” and 30” row spacing 6 weeks after planting
Photos by Chad Lammers

Consider non-chemical alternatives

- Strategic tillage
- Cover crops
- Electrocution, flaming

Weed suppression by cover crops
0-4 WAT

Lower response ratio indicates greater weed suppression
Osipitan et al., 2019

Cover crop biomass slows Palmer amaranth growth

Cover crops associated with 3-13 day delay in Palmer amaranth reaching 4 inches
Wiggins et al., 2017
Cereal rye termination

What about roller-crimpers?

Plant available water following cover crops
4 growing seasons, Garden City KS

Holman et al., 2018