2022
MID-ATLANTIC WEED CONTROL GUIDE
Essentials for Agronomic Crops

Produced by Penn State Extension in cooperation with University of Delaware, University of Maryland, Rutgers University, Virginia Tech, and West Virginia University
Cover images courtesy of Dwight Lingenfelter.

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Code AGRS-136 RevS12/21mpc

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About This Guide

*Mid-Atlantic Weed Control Guide: Essentials for Agronomic Crops* is designed to be a condensed, quick-reference manual to highlight basic information about herbicide use recommendations and their effectiveness on common weed species in the region.


## Contents

### Chapter 1. General Herbicide Information

**Table**

2.1-10. Selected generic (or post-patent) alternative herbicides for agronomic use. .................................................2

### Chapter 2. Corn Herbicides

**Tables**

2.2-3. Relative effectiveness of burndown treatments for control of weeds in no-till corn. ...........................................8

2.2-4. Effectiveness of herbicides for control of common cash or cover crops in spring before corn establishment. ..........10

2.2-5. Comments on burndown herbicides for no-till corn. ..........11

2.2-7. Relative effectiveness of soil-applied (preemergence) corn herbicides. ..............................................................14

2.2-8. Comments on preplant or preemergence herbicides for conventional, min-, or no-till corn. ...............................17

2.2-11. Relative effectiveness of postemergence corn herbicides. ..................................................................................23

2.2-12. Effectiveness of postemergence herbicides on perennial broadleaf weeds .........................................................26

2.2-13. Comments on postemergence herbicides for corn. ..........27

2.2-16. Spray additives and rainfastness for burndown and postemergence corn herbicides ...........................................36

### Chapter 3. Sorghum Herbicides

**Tables**

2.3-6. Relative effectiveness of soil-applied herbicides. ..................41

2.3-9. Relative effectiveness of postemergence herbicides ........43

### Chapter 4. Soybean Herbicides

**Tables**

2.4-3. Relative effectiveness of burndown herbicides for control of weeds in no-till full-season soybean.................45

2.4-4. Relative effectiveness of herbicides for control of common cash or cover crops in the spring before planting soybeans. 46

2.4-5. Comments on burndown herbicides for no-till soybeans. 47

2.4-7. Relative effectiveness of soil-applied herbicides. ............50

2.4-8. Comments on preplant or preemergence herbicides for conventional, minimum-till, or no-till soybean. ...............53

2.4-11. Relative effectiveness of postemergence herbicides. 59

2.4-12. Effectiveness of postemergence herbicides on perennial broadleaf weeds in soybean (based on seasonal control) ....62

2.4-14. Comments on postemergence herbicides for soybeans. 63

2.4-15. Spray additives and rainfastness for burndown or postemergence soybean herbicides. 69

### Chapter 5. Small Grain Herbicides

**Figure**

5-1. Growth stages in cereals when herbicides may be applied. 72

**Tables**

2.5-4. Relative effectiveness of burndown treatments for no-till small grains ..............................................................73

2.5-6. Relative effectiveness of fall-planted small grain herbicides for winter annuals .......................................................74

2.5-7. Relative effectiveness of fall-planted small grain herbicides for postemergence perennial weed control ................76

2.5-8. Comments on herbicides for small grains. 77

2.5-9. Spray additives and rainfastness for burndown or postemergence herbicides in small grains. 82

### Chapter 6. Forage, CRP, and Farmstead Herbicides

**Tables**

2.6-5. Relative effectiveness of herbicides on weeds and crop tolerance in legume forages .................................................84

2.6-6. Comments on herbicides for legume forages ..................86

2.6-11. Relative effectiveness of herbicides used in grass pasture, hay, and CRP grassland ..................................92

2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland .........................................................95

2.6-14. Grazing, harvest, haying, and slaughter restrictions for herbicides used in grass pasture, hay, and CRP grassland 102

2.6-17. Optimum time of year for foliar application of systemic herbicides to selected weeds ........................................104
Table 2.2-5. Comments on burndown herbicides for no-till corn.

<table>
<thead>
<tr>
<th>Trade Name*</th>
<th>Common Name</th>
<th>Site of Action Number</th>
<th>Product/A lb ai/A</th>
<th>lb ai/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D LVE 4E</td>
<td>2,4-D ester</td>
<td>4</td>
<td>1–2 qt</td>
<td>1–2</td>
</tr>
</tbody>
</table>

- Apply 7–14 days before planting or 3–5 days after planting for greater crop safety.
- Plant corn at least 1.5 inches deep.
- This product is poor on chickweed, henbit, and red deadnettle, and ineffective on all grasses.
- Add Clarity (dicamba) to increase efficacy on legume sods. A combination of 2,4-D + dicamba controls most annual broadleaf weeds and alfalfa. Emerged perennial broadleaves are partially controlled. This combination is fair on chickweed, henbit, and red deadnettle, and ineffective on all grasses.
- Spray droplet size plays an important role in minimizing off-target movement. Nozzles that produce extremely coarse or ultra-coarse droplets while limiting the amount of driftable fine droplets are necessary to limit spray drift. Comply with guidelines for drift management (see label for details).

### Atrazine 90DF

- Apply 1.6–2 qt atrazine 4L prior to planting.
- Controls small emerged annual broadleaves and some grasses.
- Can be applied in liquid nitrogen as the carrier to improve burndown characteristics.

### Atrazine Use Restrictions

**Preplant or preemergence:**
- On highly erodible soils (as defined by the U.S. Natural Resources Conservation Service):
  - Fields where more than 30% of the soil surface is covered with plant residue at planting, apply a maximum of 2 lb ai/A as a broadcast spray.
  - Fields where less than 30% of the soil surface is covered with plant residue at planting, apply a maximum of 1.6 lb ai/A as a broadcast spray.
- Apply a maximum of 2 lb ai/A as a broadcast spray.

**Postemergence:**
- If no atrazine was applied prior to crop emergence, use a maximum rate of 2 lb ai/A.
- If a soil-applied application was made in the same calendar year, the combined preplant or preemergence and postemergence applications may not exceed 2.5 lb ai/A.

### Safety Precautions for Using Atrazine

- Do not mix, load, or apply within 50 feet of drinking water wells, livestock wells, agricultural drainage wells, irrigation wells, abandoned wells, or sinkholes.
- Do not mix or load within 50 feet of intermittent streams, perennial streams, rivers, lakes, or reservoirs.
- Do not apply within 200 feet of lakes or reservoirs.
- Do not apply within 66 feet of the points where surface water runoff enters intermittent streams, perennial streams, or rivers. The 66-foot buffers should be planted to a crop or seeded with grass on highly erodible land.
- Restricted-use pesticide and water quality advisory.

### Autumn Super 51WDG

- Autumn Super may be applied after fall harvest and up to 30 days prior to corn planting.
- Do not apply to frozen ground. Apply to actively growing weeds.
- Autumn Super will provide short-term residual control of small seeded broadleaves but will not provide season-long PRE control of annual grasses and broadleaf weeds.
- Apply Autumn Super at 0.3–0.5 oz/A plus necessary adjuvants.
- For enhanced burndown activity, tank-mix with 2,4-D, glyphosate, paraquat, simazine, or metribuzin.
- Be cautious of crop rotation restrictions.

### Clarity 4S

- Apply 7–14 days before planting or 3–5 days after planting for greater crop safety.
- Plant corn at least 1.5 inches deep.
- A combination of 2,4-D + dicamba controls most annual broadleaf weeds and alfalfa. Emerged perennial broadleaves are partially controlled. This combination is fair on chickweed, henbit, and red deadnettle, and ineffective on all grasses. Applications should be made while annual weeds are small (4 inches) and actively growing.
- Spray droplet size plays an important role in minimizing off-target movement. Nozzles that produce extremely coarse or ultra-coarse droplets while limiting the amount of driftable fine droplets are necessary to limit spray drift. Comply with guidelines for drift management (see label for details).
- Dicamba can be difficult to completely remove from spray equipment and residue is capable of injuring sensitive plants. Follow label instructions concerning sprayer cleanout.
### Trade Name* | Common Name | Site of Action Number | Product/A | lb ai/A
--- | --- | --- | --- | ---
Enlist Duo 3.3SL | 2,4-D choline + glyphosate | 4 | 3.5–4.75 pt | 0.7–0.95 ae
|  | | | | 0.74–1 ae

- Can be used as a burndown application to corn with or without the Enlist trait to control broadleaves and grasses.
- Apply 7–14 days before planting for greater crop safety.
- Do not apply less than 10 GPA total spray solution and do not use nitrogen solutions as a carrier.
- Comply with guidelines for drift management (see label for details).
- For best results do not apply to light sandy soils as a PRE application.
- Can be tank-mixed with residual herbicides.

Enlist One 3.8SL | 2,4-D choline | 4 | 1.5–2 pt | 0.71–0.95

See comments under 2,4-D LVE and Enlist Duo for more details.

Expert 4.88L | S-metolachlor + atrazine + glyphosate | 15 | 2.5–3.75 qt | 1.09–1.63
| | | | 1.33–2
| | | | 0.63–0.94 ae

- Expert is a premix of metolachlor (Dual II Magnum), atrazine, and glyphosate.
- The 3 qt rate contains 1.3 lb S-metolachlor, 1.6 lb atrazine, and 0.75 lb ae glyphosate.
- Expert can be used as a burndown/PRE program in corn or as an early POST application in Roundup Ready hybrids.
- See Expert label for additional information.
- Restricted-use pesticide and water quality advisory.

Glyphosate** | glyphosate | 9 | See Table 2.1-8

- Fall applications of glyphosate are better than spring applications for control of orchardgrass sods and quackgrass.
- If controlling orchardgrass sod in spring, it is best to spray when sod is 6 to 10 inches tall.
- Use at least 1.13 lb ae glyphosate or higher, especially if tank-mixing with pre-residual herbicide and nitrogen carriers.
- Spring applications may be used for control of annual weeds.
- Using low-volume sprays may allow for a reduced rate.
- For control of small annual weeds or volunteer small grains, glyphosate may be used at reduced rates.
- Can be tank-mixed with residual herbicides such as atrazine. When tank-mixing glyphosate with residual herbicides, apply in 10–20 gal water/A or 10–60 gal liquid fertilizer nitrogen/A.
- Adding 2,4-D or dicamba improves control of large annual broadleaf weeds, dandelion, and alfalfa.
- Glyphosate may be applied in clear liquid nitrogen fertilizers and clear liquid complete-analysis fertilizers, but it may be less effective on certain annual grasses and perennials.
- Do not use glyphosate with suspension-type liquid fertilizers.

Gramoxone SL 2.0 | paraquat | 22 | 2–4 pt | 0.5–1

Gramoxone SL 3.0 | | | 1.3–2.7 pt

- Apply in 20–60 gal/A for control of emerged annual weeds.
- Add 16–32 oz non-ionic surfactant/100 gal of spray.
- Adding 2,4-D or dicamba improves control of large annual broadleaf weeds and alfalfa. Alfalfa control is improved by applying 2,4-D or dicamba separately at least one day ahead of paraquat.
- Can be tank-mixed with residual herbicides; adding atrazine to paraquat can improve control of fescue and certain other perennial sods.
- Phosphate-containing liquid fertilizer solutions diminish paraquat activity if used as a carrier.
- Use appropriate precautions when handling paraquat to minimize exposure to the herbicide.
- Do not use flood jet tips larger than size 20 or spacing greater than 40 inches.
- Other labeled formulations of paraquat are available; see Table 2.1-10 for options.

Paraquat Use Restrictions
- Only certified applicators who successfully complete the paraquat-specific training can mix, load, or apply paraquat.
- Application of paraquat “under the direct supervision” of a certified applicator is no longer allowed; registered technicians cannot apply.
- Required training at http://usparaquattraining.com; certified applicators must repeat training every three years.
- Gramoxone is a restricted-use pesticide.

Harmony Extra SG 50DF | thifensulfuron + tribenuron | 2 | 0.45–0.9 oz | 0.009–0.018
| | | | 0.005–0.009

- Adding Harmony Extra to glyphosate or 2,4-D can improve control of certain winter annual broadleaves and perennials.
- Must be applied in fall or early spring at least 14 days ahead of planting.
- Other products that contain thifensulfuron and tribenuron include FirstShot and Panoflex.
Table 2.2-5. Comments on burndown herbicides for no-till corn (continued).

<table>
<thead>
<tr>
<th>Trade Name*</th>
<th>Common Name</th>
<th>Site of Action Number</th>
<th>Product/A</th>
<th>lb ai/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberty 2.34SL</td>
<td>glufosinate</td>
<td>10</td>
<td>32–43 fl oz</td>
<td>0.59–0.79</td>
</tr>
</tbody>
</table>

- Liberty may be applied as a burndown treatment prior to the planting or emergence of any corn variety.
- However, early season burndown activity may be reduced since warm temperatures, high humidity, and bright sunlight are necessary to improve the performance of Liberty. Weed control may be reduced when applications are made to weeds under stress from drought or cool temperatures.
- Liberty performs better as a POST herbicide as compared to burndown applications in April.
- Apply a minimum of 32 fl oz/A to young, actively growing weeds; burndown and in-crop applications may not exceed 67 fl oz/A per season.
- Applications should be made from dawn until 2 hours prior to sunset to avoid the possibility of reduced weed control.
- Liberty must be applied with ammonium sulfate, and the recommended use rate is 3 lb/A.
- Uniform, thorough spray coverage (20 gal/A is recommended) is necessary to achieve consistent weed control; do not use nozzles that produce large droplets.

| Metribuzin 75DF/4L | metribuzin | 5 | 2–4 oz DF | 0.094–0.19 |

- Include metribuzin as part of an herbicide program for burndown of existing vegetation prior to crop emergence.
- Metribuzin may be tank-mixed with 2,4-D LVE, Gramoxone, or glyphosate.
- Use a maximum of 4 oz DF if applying less than 10 days before planting or on soils with less than 2% organic matter.
- Do not use on coarse soils with less than 1.5% organic matter or on soils having pH 7.0 or greater.
- Plant corn at least 1.5 inches deep to avoid injury.
- Water quality advisory.

| Reviton 2.83SC | tiafenacil | 14 | 1–3 fl oz | 0.022–0.066 |

- Reviton may be applied as an early preplant/burndown treatment through preemergence timings; it will injure emerged corn.
- It is best to apply before weeds are taller than 5 inches, and complete spray coverage is important for adequate weed control.
- Reviton can be applied with glyphosate (or other herbicides) to enhance the speed of burndown and increase weed spectrum.
- Include necessary additives MSO plus nitrogen solution or AMS to the spray mixture.
- Burndown activity may be decreased or slowed under cloudy, foggy, or cooler weather or when weeds are drought stressed.
- Reviton is similar to Sharpen but less active on marestail; however, it has better grass, field pansy/violet, and primrose activity.

| Sharpen 2.85SC | saflufenacil | 14 | 1–3 fl oz | 0.022–0.067 |

- Sharpen may be applied as a preplant/burndown treatment from 14 days early preplant through preemergence timings; do not apply to emerged corn.
- Apply Sharpen in a typical glyphosate burndown herbicide program to enhance the speed of burndown and increase weed spectrum, including glyphosate-resistant horseweed.
- Depending on the rate, Sharpen can provide some short-term residual control of certain annual broadleaf weeds. Include necessary additives MSO plus nitrogen solution or AMS to the spray mixture.
- Do not apply more than 1 fl oz/A where an at planting OP or carbamate insecticides are being used.
- Sharpen is a Group 14 herbicide, and due to concerns for long-term viability of this herbicide mode of action, extension specialists in the Mid-Atlantic region recommend not using it every year.
- This mode of action has greater utility in soybeans than corn, especially for control of glyphosate-resistant horseweed (marestail). As such, we suggest that Sharpen and other saflufenacil-containing products (e.g., Verdict, Optill) be used in soybean first and only in alternate years.
- The use of Sharpen in continuous corn should also be limited to every other year (alternating years with HPPD-containing herbicide [Group 27]) and avoided if Sharpen is used in soybean in a corn-soybean rotation.

| Valor SX 51WDG | flumioxazin | 14 | 1–2 oz | 0.51–1.02 oz |

- Valor may be included in a typical no-till burndown herbicide program to enhance the speed of burndown and increase weed spectrum.
- Corn can be planted seven days after application if there is at least 25% soil residue cover and 1/4 inch of rainfall.
- On coarse-textured soils: stunting is often observed with Valor; corn must be planted between 14 and 30 days after application; and only use where last year’s crop residue has not been incorporated into the soil.
- Fierce 76WDG contains the active ingredients in Valor and Zidua and can be used in burndown programs; see Table 2.2-8 for additional details.
- Valor is a Group 14 herbicide, and due to concerns for long-term viability of this herbicide mode of action, extension specialists in the Mid-Atlantic region recommend not using it every year. This mode of action has greater utility in soybeans than corn, especially for control of glyphosate-resistant horseweed (marestail). As such, we suggest that Valor and other flumioxazin-containing products (e.g., Fierce, Valor XLT, Envive) be used in soybean first and only in alternate years.
- The use of Valor in continuous corn should also be limited to every other year (alternating years with HPPD-containing herbicide [Group 27]) and avoided if Valor is used in soybean in a corn-soybean rotation.

See Table 2.2-3 for relative effectiveness of these treatments. May need to combine with residual treatment or postemergence program (Tables 2.2-8 and 2.2-13) for complete no-till weed control program.

*See Table 2.2-1 for additional formulations or trade names containing some of these same active ingredients.

**Refer to current product label for active ingredient concentration and application rate (e.g., 1 qt/A glyphosate 4S = 22 fl oz/A Roundup WeatherMAX).
Table 2.2-11. Relative effectiveness of postemergence corn herbicides.

<table>
<thead>
<tr>
<th>Trade Name (rate/A)</th>
<th>Site of Action Number</th>
<th>Barnyardgrass</th>
<th>Bermudagrass</th>
<th>Crabgrass</th>
<th>Foxtail spp.</th>
<th>Goosegrass</th>
<th>Johnsongrass (Rhizome)</th>
<th>Johnsongrass (Seedling)</th>
<th>Mulchly, Wistrem</th>
<th>Nutsedge, Yellow</th>
<th>Panicum, Fall</th>
<th>Panicum, Texas</th>
<th>Quackgrass</th>
<th>Shattercane</th>
<th>Signalgrass, Broadleaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accent Q (0.9 oz)</td>
<td>2</td>
<td>8+</td>
<td>N</td>
<td>7</td>
<td>9</td>
<td>N</td>
<td>8+</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>8+</td>
<td>9</td>
<td>9+</td>
<td>N</td>
<td>9+</td>
</tr>
<tr>
<td>Atrazine (1 qt)</td>
<td>5</td>
<td>8</td>
<td>N</td>
<td>6</td>
<td>7+</td>
<td>9</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>7+</td>
</tr>
<tr>
<td>Basagran (1.5 pt)</td>
<td>6</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>8</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Callisto (3 fl oz)</td>
<td>27</td>
<td>N</td>
<td>N</td>
<td>8</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>8</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Glyphosate (0.75 lb ae)</td>
<td>3,4</td>
<td>9</td>
<td>9+</td>
<td>9</td>
<td>9+</td>
<td>9+</td>
<td>9+</td>
<td>9</td>
<td>7</td>
<td>9+</td>
<td>9</td>
<td>9+</td>
<td>9+</td>
<td>9+</td>
<td>10</td>
</tr>
<tr>
<td>Impact/Armezon (0.75 fl oz)/Impact Core</td>
<td>27 (4)</td>
<td>7</td>
<td>N</td>
<td>8</td>
<td>8+</td>
<td>7</td>
<td>N</td>
<td>N</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>N</td>
<td>7+</td>
<td>8</td>
</tr>
<tr>
<td>Laudis (3 fl oz)/DiFlexx Duo (32 fl oz)</td>
<td>27/(4)</td>
<td>8</td>
<td>N</td>
<td>8</td>
<td>8+</td>
<td>7</td>
<td>N</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>N</td>
<td>8</td>
<td>N</td>
<td>7+</td>
<td>8</td>
</tr>
<tr>
<td>Liberty (32 fl oz)</td>
<td>10</td>
<td>8</td>
<td>N</td>
<td>8</td>
<td>9</td>
<td>N</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>7+</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Permit/Sandea (1 oz)</td>
<td>2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>9+</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Shieldex (1 fl oz)</td>
<td>27</td>
<td>7</td>
<td>N</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>N</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>N</td>
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<td>6</td>
<td>N</td>
</tr>
<tr>
<td>Mixtures</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basis Blend (0.83 oz)/Resolve Q (1.25 oz)</td>
<td>2/2</td>
<td>8</td>
<td>N</td>
<td>6</td>
<td>8+</td>
<td>N</td>
<td>7</td>
<td>8+</td>
<td>6</td>
<td>6</td>
<td>8+</td>
<td>7</td>
<td>7+</td>
<td>8+</td>
<td>8</td>
</tr>
<tr>
<td>Capreno (3 fl oz)</td>
<td>2/27</td>
<td>8</td>
<td>N</td>
<td>8</td>
<td>8+</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Halex GT (3.6 pt)/Acuron GT (3.75 pt)</td>
<td>9/15/27</td>
<td>9+</td>
<td>N</td>
<td>9+</td>
<td>9+</td>
<td>10</td>
<td>9</td>
<td>9+</td>
<td>9</td>
<td>8</td>
<td>9+</td>
<td>9</td>
<td>9+</td>
<td>9+</td>
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</tr>
<tr>
<td>Realm Q (4 oz)</td>
<td>2/27</td>
<td>8</td>
<td>N</td>
<td>8</td>
<td>8+</td>
<td>N</td>
<td>7</td>
<td>8+</td>
<td>6</td>
<td>8</td>
<td>8+</td>
<td>7</td>
<td>7+</td>
<td>8+</td>
<td>8</td>
</tr>
<tr>
<td>Revulin Q (4 oz)</td>
<td>2/27</td>
<td>8+</td>
<td>N</td>
<td>8</td>
<td>9</td>
<td>N</td>
<td>8+</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>8</td>
<td>9+</td>
<td>9+</td>
<td>9</td>
</tr>
<tr>
<td>Sinate (28 fl oz)</td>
<td>10/27</td>
<td>8</td>
<td>N</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>8</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Steadfast Q (1.5 oz)</td>
<td>2/2</td>
<td>8+</td>
<td>N</td>
<td>7</td>
<td>9</td>
<td>N</td>
<td>8</td>
<td>9</td>
<td>6+</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>9+</td>
<td>9</td>
<td>9+</td>
</tr>
<tr>
<td>Stout (0.75 oz)</td>
<td>2/2</td>
<td>8+</td>
<td>N</td>
<td>7</td>
<td>9</td>
<td>N</td>
<td>8+</td>
<td>9</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>9+</td>
<td>9</td>
<td>9+</td>
</tr>
<tr>
<td>Yukon (4 oz)/Permit Plus (0.75 oz)</td>
<td>2</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>9+</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

Weed control rating: 10 = 95–100%; 9 = 85–95%; 8 = 75–85%; 7 = 65–75%; 6 = 55–65%; N = less than 55% or no control; — = not applicable or no local data available; + = upper end of rating scale.

Crop tolerance: E = excellent; almost never any crop injury observed; VG = very good; on rare occasion is crop injury observed; G = good (seldom is crop injury observed as long as proper management practices are followed, e.g., seeding depth, seed slit closure, herbicide rate and application timing, adjuvants); FG = fair to good (occasionally crop injury is observed even with proper management practices; injury is often due to herbicide interactions with environmental conditions); F = fair (some crop injury is commonly observed).

1 See Table 2.1-10 and Table 2.2-1 for additional products that contain these active ingredients.
2 Large crabgrass only.
3 For use on Roundup Ready corn varieties only.
4 Glyphosate-containing products include Roundup, Durango, and many others; see Table 2.1-8.
5 For use on LibertyLink or glufosinate-resistant corn varieties only.
6 Herbicide is less effective on yellow foxtail: Balance (8) and Liberty (7).
### Table 2.2-11. Relative effectiveness of postemergence corn herbicides (continued).

#### Broadleaves

<table>
<thead>
<tr>
<th>Trade Name (rate/A)</th>
<th>Site of Action Number</th>
<th>Amaranth, Palmer/ Waterhemp</th>
<th>Anoda, Spurred</th>
<th>Burcucumber</th>
<th>Cocklebur</th>
<th>Jimsonweed</th>
<th>Lambsquarters</th>
<th>Marestail/ Hornweed</th>
<th>Morningglory, Annual</th>
<th>Nightshade, Eastern Black</th>
<th>Pigweed</th>
<th>Ragweed, Common</th>
<th>Ragweed, Giant</th>
<th>Sida, Prickly</th>
<th>Smartweed</th>
<th>Velvetleaf</th>
<th>Corn Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D (1 pt)</td>
<td>4</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>7+</td>
<td>8</td>
<td>7</td>
<td>9</td>
<td>8+</td>
<td>7+</td>
<td>9</td>
<td>7</td>
<td>8</td>
<td>8+ (E)</td>
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<tr>
<td>Accent Q (0.9 oz)</td>
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<td>7</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>N</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>6</td>
<td>N</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>F–G</td>
<td></td>
</tr>
<tr>
<td>Am (0.8 oz)/Cadet (0.9 oz)</td>
<td>14</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>9</td>
<td>N</td>
<td>8+</td>
<td>9</td>
<td>9</td>
<td>N</td>
<td>N</td>
<td>7</td>
<td>N</td>
<td>9</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Atrazine (1 qt)</td>
<td>5</td>
<td>9+</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>N</td>
<td>N</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>N</td>
<td>8</td>
<td>8+</td>
<td>8+</td>
<td>10</td>
<td>8   VG</td>
<td></td>
</tr>
<tr>
<td>Basagran (1.5 pt)</td>
<td>6</td>
<td>N</td>
<td>7</td>
<td>N</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>N</td>
<td>N</td>
<td>6+</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>8+</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Basis Blend (0.83 oz)</td>
<td>2/2</td>
<td>N</td>
<td>N</td>
<td>7</td>
<td>7</td>
<td>8+</td>
<td>N</td>
<td>6</td>
<td>N</td>
<td>73</td>
<td>N</td>
<td>N</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>F–G</td>
<td></td>
</tr>
<tr>
<td>Callisto (3 fl oz)</td>
<td>27</td>
<td>8+</td>
<td>N</td>
<td>7</td>
<td>8+</td>
<td>9</td>
<td>6</td>
<td>7+</td>
<td>9</td>
<td>8+</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Capreno (3 fl oz)</td>
<td>2/27</td>
<td>8+</td>
<td>7</td>
<td>8+</td>
<td>9</td>
<td>6</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Curtail</td>
<td>4/4</td>
<td>9+</td>
<td>6</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>7+</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>8+</td>
<td>9+</td>
<td>9</td>
<td>8+</td>
<td></td>
</tr>
<tr>
<td>Dicamba (0.25 lb ae)</td>
<td>4</td>
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<td>9</td>
<td>9</td>
<td>9</td>
<td>8+</td>
<td>8</td>
<td>9</td>
<td>8+</td>
<td>7+</td>
<td>8</td>
<td>8</td>
<td>9</td>
<td>8+</td>
<td>G</td>
<td>F–G</td>
<td></td>
</tr>
<tr>
<td>DiFlexx (8 fl oz)/DiFlexx Duo (32 fl oz)</td>
<td>4</td>
<td>8+</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>8+</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>8</td>
<td>9+</td>
<td>73</td>
<td>G</td>
<td>F–G</td>
<td></td>
</tr>
<tr>
<td>Glyphosate (0.75 lb ae)</td>
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<td>N</td>
<td>8</td>
<td>8+</td>
<td>9</td>
<td>9</td>
<td>8+</td>
<td>N</td>
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<td>8+</td>
<td>7</td>
<td>8+</td>
<td>8+ (E)</td>
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<tr>
<td>Halex GT (3.6 pt)</td>
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<td>8+</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9+</td>
<td>6</td>
<td>7+</td>
<td>9+</td>
<td>9</td>
<td>8+</td>
<td>8</td>
<td>7</td>
<td>9</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Harmony SG (0.125 oz)</td>
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<td>N</td>
<td>7</td>
<td>7+</td>
<td>7</td>
<td>9</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>9</td>
<td>6</td>
<td>N</td>
<td>N</td>
<td>9</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Impact/Armezon (0.75 fl oz)/Impact Core</td>
<td>27</td>
<td>8+</td>
<td>7+</td>
<td>8+</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>7+</td>
<td>9</td>
<td>8+</td>
<td>8</td>
<td>8+</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>VG</td>
<td></td>
</tr>
<tr>
<td>Laudis (3 fl oz)</td>
<td>27</td>
<td>8+</td>
<td>7</td>
<td>8+</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>7+</td>
<td>9</td>
<td>8+</td>
<td>8</td>
<td>8</td>
<td>9+</td>
<td>8+</td>
<td>9</td>
<td>VG</td>
<td></td>
</tr>
<tr>
<td>Liberty (32 fl oz)</td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>8+</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>8+</td>
<td>9</td>
<td>9+</td>
<td>8+</td>
<td>8+</td>
<td>9</td>
<td>VG</td>
<td></td>
</tr>
<tr>
<td>Maestro/Moxy (1 pt)</td>
<td>6</td>
<td>N</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>7</td>
<td>7+</td>
<td>8+</td>
<td>8</td>
<td>9</td>
<td>8+</td>
<td>F–G</td>
<td></td>
</tr>
<tr>
<td>Peak (0.5 oz)</td>
<td>2</td>
<td>N</td>
<td>8+</td>
<td>8+</td>
<td>8</td>
<td>8</td>
<td>N</td>
<td>7</td>
<td>N</td>
<td>8+</td>
<td>9</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>8+</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Permit/Sandea (1 oz)</td>
<td>2</td>
<td>N</td>
<td>6</td>
<td>9</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>6</td>
<td>6</td>
<td>9+</td>
<td>9</td>
<td>82</td>
<td>7</td>
<td>8+</td>
<td>G</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Realm Q (4 oz)</td>
<td>2/27</td>
<td>8+</td>
<td>8</td>
<td>7+</td>
<td>8+</td>
<td>9</td>
<td>6</td>
<td>7+</td>
<td>9</td>
<td>9+</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Resolve Q (1.25 oz)</td>
<td>2/2</td>
<td>N</td>
<td>N</td>
<td>7</td>
<td>7</td>
<td>8+</td>
<td>N</td>
<td>6</td>
<td>N</td>
<td>73</td>
<td>N</td>
<td>N</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Resourcs (6 fl oz)/ Perpetuo</td>
<td>14</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>N</td>
<td>N</td>
<td>8</td>
<td>7+</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>9+</td>
<td>G</td>
<td></td>
</tr>
</tbody>
</table>
Table 2.2-11. Relative effectiveness of postemergence corn herbicides (continued).

<table>
<thead>
<tr>
<th>Trade Name (rate/A)</th>
<th>Site of Action</th>
<th>Corn Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revulin Q (4 oz)</td>
<td>2/27 8+</td>
<td>G</td>
</tr>
<tr>
<td>Shieldex (1 fl oz)</td>
<td>27 8+</td>
<td>VG</td>
</tr>
<tr>
<td>Sinate (28 fl oz)</td>
<td>10/27 9</td>
<td>VG</td>
</tr>
<tr>
<td>Status (5-8 oz)</td>
<td>4/19 8+</td>
<td>G</td>
</tr>
<tr>
<td>Steadfast Q (1.5 oz)</td>
<td>2/2 N</td>
<td>G</td>
</tr>
<tr>
<td>Stringer (0.5 pt)</td>
<td>4 N 9</td>
<td>G</td>
</tr>
<tr>
<td>Stout (0.5 oz)</td>
<td>2/2 N</td>
<td>G</td>
</tr>
<tr>
<td>Tough 5EC (24 fl oz)</td>
<td>6 8+</td>
<td>F-G</td>
</tr>
<tr>
<td>Yukon (4-8 oz)</td>
<td>2/4 9</td>
<td>F-G</td>
</tr>
</tbody>
</table>

1 Weed control rating: 10 = 95–100%; 9 = 85–95%; 8 = 75–85%; 7 = 65–75%; 6 = 55–65%; N = less than 55% or no control; + = upper end of rating scale.
2 Crop tolerance: E = excellent; almost never any crop injury observed; VG = very good; on rare occasion is crop injury observed; G = good (seldom is crop injury observed as long as proper management practices are followed, e.g., seedling depth, seed slit closure, herbicide rate and application timing, adjuvants); F-G = fair to good (occasionally crop injury is observed even with proper management practices; injury is often due to herbicide interactions with environmental conditions); F = fair (some crop injury is commonly observed).
3 Glyphosate resistance has been confirmed for this species and is widespread in the region.
4 Group 2 (ALS) resistance is confirmed for this species and is widespread in the region.
5 Triazine-resistant (TR) biotypes of common lambsquarters and redroot/smooth pigweed are widespread in the region and thus triazine (Group 5) herbicides are not effective against these populations.
6 Most marestail populations in the region are resistant to glyphosate (Group 9); some populations are also resistant to ALS (Group 2) herbicides. For best management of marestail, control in the fall or with an effective burndown program before planting. There are several herbicides that provide effective residual activity. However, in-crop control of marestail can be challenging since there are only a few herbicides that are effective postemergence. Make sure to apply herbicide before marestail reaches 6 inches tall.
7 See remarks in Table 2.2-8 and the herbicide label for specific management guidelines to maximize crop tolerance.
8 For use on Roundup Ready corn varieties only.
9 Glyphosate-containing products include Roundup, Durango, and many others; see Table 2.1-8.
10 For use on glufosinate-resistant or LibertyLink corn varieties only.

Control of Roundup Ready Corn—Volunteers or Replanting: There are times when corn has to be removed from a field with the intention of replanting a corn crop. Tillage is one effective method, but it is not appropriate in no-tillage situations. Use of glyphosate is highly effective for non-Roundup Ready corn, but the challenge is in removing Roundup Ready hybrids. There are limited herbicides to consistently kill small corn plants. Gramoxone SL, Liberty, and Select are three products that have shown the most activity. Research conducted in this region with Gramoxone and Select demonstrated that Select was the most effective for corn 2 to 3 inches tall. For taller corn (4 to 6 inches tall), Gramoxone in combination with a photosystem II-inhibiting herbicide (metribuzin, Lorox, or atrazine) was the most effective. Liberty is a third option, but it will not control LibertyLink hybrids.

Select Max/clethodim: up to 6 fl oz of Select Max or 3 fl oz clethodim 2EC with a non-ionic surfactant at 0.25% v/v plus AMS at 2.5 to 4 lb/A. Do not use a COC or MSO. Wait a minimum of 6 days from time of application until planting corn due to risk of crop injury. (Select Max/clethodim will also control corn hybrids containing Roundup Ready and LibertyLink stacked traits.)

Gramoxone SL 2.0: 3 to 4.5 pt/A (2 to 2.7 pints of 3.0 SL formulation) in combination with metribuzin (4 to 6 oz/A), Lorox (1 pt/A), or atrazine (1 lb/A). These photosystem II inhibitors are not added to control the corn but used to slow down the Gramoxone activity, which helps provide more consistent control.

Liberty 280: 22 to 29 oz Liberty has not been as consistent for control of corn as Gramoxone and will not control varieties with LibertyLink traits.
### Table 2.2-12. Effectiveness of postemergence herbicides on perennial broadleaf weeds.

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Site of Action Number</th>
<th>Artichoke, Jerusalem</th>
<th>Bindweed, Hedge</th>
<th>Daisy</th>
<th>Dewberry spp.</th>
<th>Dock spp.</th>
<th>Dogbane, Hemp</th>
<th>Horsemint</th>
<th>Ivy, Poison</th>
<th>Milkweed</th>
<th>Mugwort</th>
<th>Pokeweed</th>
<th>Thistle, Canada</th>
<th>Corn Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D</td>
<td>4</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>7+</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>7+</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Accent Q</td>
<td>2</td>
<td>6</td>
<td>7</td>
<td>N</td>
<td>8</td>
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<td>6</td>
<td>N</td>
<td>7</td>
<td>6</td>
<td>F–G</td>
</tr>
<tr>
<td>Atrazine</td>
<td>5</td>
<td>N</td>
<td>7+</td>
<td>6</td>
<td>6</td>
<td>7</td>
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<td>6</td>
<td>N</td>
<td>N</td>
<td>6</td>
<td>6</td>
<td>VG</td>
</tr>
<tr>
<td>Callisto</td>
<td>27</td>
<td>—</td>
<td>7+</td>
<td>N</td>
<td>—</td>
<td>7</td>
<td>7+</td>
<td>—</td>
<td>—</td>
<td>7</td>
<td>—</td>
<td>7</td>
<td>8</td>
<td>G</td>
</tr>
<tr>
<td>Clarity/DiFlexx</td>
<td>4</td>
<td>8</td>
<td>8+</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>7+</td>
<td>6</td>
<td>7+</td>
<td>6</td>
<td>8</td>
<td>F–G</td>
</tr>
<tr>
<td>Glyphosate²</td>
<td>9</td>
<td>8</td>
<td>7+</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>8+</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Liberty (36 fl oz)³</td>
<td>10</td>
<td>—</td>
<td>N</td>
<td>7</td>
<td>—</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>—</td>
<td>6</td>
<td>—</td>
<td>6</td>
<td>6</td>
<td>E</td>
</tr>
<tr>
<td>Starane Ultra</td>
<td>4</td>
<td>N</td>
<td>8</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>8+</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>VG</td>
<td></td>
</tr>
<tr>
<td>Stinger</td>
<td>4</td>
<td>9</td>
<td>N</td>
<td>7</td>
<td>N</td>
<td>8+</td>
<td>N</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>VG</td>
<td></td>
</tr>
<tr>
<td>Mixtures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curtail</td>
<td>4/4</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>8+</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>9</td>
<td>F</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>4/19</td>
<td>8</td>
<td>8+</td>
<td>8+</td>
<td>6</td>
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<td>7+</td>
<td>7+</td>
<td>7</td>
<td>8</td>
<td>8+</td>
<td>F–G</td>
</tr>
<tr>
<td>Yukon</td>
<td>2/4</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td>6</td>
<td>7</td>
<td>7</td>
<td>7+</td>
<td>—</td>
<td>8</td>
<td>7+</td>
<td>8</td>
<td>8+</td>
<td>F–G</td>
</tr>
</tbody>
</table>

Weed control rating: 10 = 95–100%; 9 = 85–95%; 8 = 75–85%; 7 = 65–75%; 6 = 55–65%; N = less than 55% or no control; — = not applicable or no local data available; + = upper end of rating scale. Performance ratings are based on seasonal control from early season application in corn. Crop tolerance: E = excellent (almost never any crop injury observed); VG = very good (on rare occasion is crop injury observed); G = good (seldom is crop injury observed as long as proper management practices are followed, e.g., seedling depth, seed slit closure, herbicide rate and application timing, adjuvants); F–G = fair to good (occasionally crop injury is observed even with proper management practices; injury is often due to herbicide interactions with environmental conditions); F = fair (some crop injury is commonly observed).

¹ Ratings based on 1.6–2 lb/A rate.

² For use on Roundup Ready corn varieties only. Glyphosate-containing products include Roundup, Durango, and many others; see Table 2.1-8.

³ For use on glufosinate-tolerant or LibertyLink corn varieties only.
Chapter 5. Small Grain Herbicides

Figure 5-1. Growth stages in cereals when herbicides may be applied.

<table>
<thead>
<tr>
<th>SEEDLING</th>
<th>TILLERING</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE 1</td>
<td>one shoot</td>
</tr>
<tr>
<td>STAGE 2</td>
<td>tillering begins</td>
</tr>
<tr>
<td>STAGE 3</td>
<td>tillers formed</td>
</tr>
<tr>
<td>STAGE 4</td>
<td>leaf-sheaths lengthen</td>
</tr>
<tr>
<td>STAGE 5</td>
<td>leaf-sheaths strongly erected</td>
</tr>
<tr>
<td>STAGE 6</td>
<td>first node of stem visible</td>
</tr>
<tr>
<td>STAGE 7</td>
<td>last leaf just visible</td>
</tr>
<tr>
<td>STAGE 8</td>
<td>ligule of last leaf</td>
</tr>
<tr>
<td>STAGE 9</td>
<td>“boot”</td>
</tr>
<tr>
<td>STAGE 10</td>
<td>flowering</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STEM EXTENSION</th>
<th>HEADING</th>
<th>RIPENING</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE 10.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAGE 10.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAGE 11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Harmony Extra SG, Finesse (1–7) Barley/Wheat
Metricor/TriCor (1–5)
Axiom (1)
Harmony Extra SG, Finesse (1–7) Barley/Wheat
Huskie, Prowl H2O, Zidua (1–7)
Maestro/Moxy (1–9)
Axial XL (1–9) Barley/Wheat
Harmony Extra SG (2–5) Spring Oats
Peak (2–6)
Quelex (2–8)
Stinger, Starane Ultra, Talinor (2–9)
2,4-D ± Dicamba (3–6)
Clarity/Dicamba (3–6)
MCPA (3–6)
PowerFlex (3–6)

1Local research has demonstrated that Metricor/TriCor should be applied during greenup in early spring to reduce risk of crop injury.
2Local research has found fall applications of PowerFlex to be the best timing to reduce risk of crop injury.
### Table 2.6-5. Relative effectiveness of herbicides on weeds and crop tolerance in legume forages.

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Site of Action Number</th>
<th>Preemergence</th>
<th>Postemergence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Balan</td>
<td>Chateau</td>
</tr>
<tr>
<td>Site of Action Number</td>
<td></td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Crop Tolerance*</td>
<td></td>
<td>VG</td>
<td>F</td>
</tr>
<tr>
<td>Winter Annuals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bluegrass, annual</td>
<td></td>
<td>8+</td>
<td>7+</td>
</tr>
<tr>
<td>Brome, downy</td>
<td></td>
<td>9</td>
<td>N</td>
</tr>
<tr>
<td>Chickweed, common</td>
<td></td>
<td>8</td>
<td>8+</td>
</tr>
<tr>
<td>Fleabane, annual</td>
<td></td>
<td>N</td>
<td>7</td>
</tr>
<tr>
<td>Henbit/deadnettle</td>
<td></td>
<td>6</td>
<td>8+</td>
</tr>
<tr>
<td>Horseweed/marestail</td>
<td></td>
<td>N</td>
<td>8+</td>
</tr>
<tr>
<td>Mustard, wild</td>
<td></td>
<td>N</td>
<td>7</td>
</tr>
<tr>
<td>Pennycress, field</td>
<td></td>
<td>N</td>
<td>6</td>
</tr>
<tr>
<td>Pepperweed spp.</td>
<td></td>
<td>N</td>
<td>7</td>
</tr>
<tr>
<td>Radish, wild</td>
<td></td>
<td>N</td>
<td>7</td>
</tr>
<tr>
<td>Rocket, yellow</td>
<td></td>
<td>N</td>
<td>6</td>
</tr>
<tr>
<td>Ryegrass, annual</td>
<td></td>
<td>8+</td>
<td>N</td>
</tr>
<tr>
<td>Shepherdspurse</td>
<td></td>
<td>N</td>
<td>6</td>
</tr>
<tr>
<td>Summer Annuals</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amaranth, spiny</td>
<td></td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Barnyardgrass</td>
<td></td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Crabgrass</td>
<td></td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Foxtails (annual spp.)</td>
<td></td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Goosegrass</td>
<td></td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Lambquarters</td>
<td></td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Nightshade, eastern black</td>
<td></td>
<td>6</td>
<td>8+</td>
</tr>
<tr>
<td>Panicum, fall</td>
<td></td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Pigweed spp.</td>
<td></td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Ragweed, common</td>
<td></td>
<td>N</td>
<td>7</td>
</tr>
<tr>
<td>Smartweed spp.</td>
<td></td>
<td>N</td>
<td>7</td>
</tr>
<tr>
<td>Velvetleaf</td>
<td></td>
<td>N</td>
<td>7</td>
</tr>
<tr>
<td>Biennials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrot, wild</td>
<td></td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Perennials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aster spp.</td>
<td></td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
### Table 2.6-5. Relative effectiveness of herbicides on weeds and crop tolerance in legume forages (continued).

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Balan</th>
<th>Chateau</th>
<th>Eptam</th>
<th>Kemtiz</th>
<th>Prowl H2O</th>
<th>Sitar</th>
<th>Aim</th>
<th>Butyrac/2,4-DB</th>
<th>Gramoxone</th>
<th>Maestro</th>
<th>Poast</th>
<th>Pursuit</th>
<th>Raptor</th>
<th>Roundup/Glyphosate</th>
<th>Select/Clethodim</th>
<th>Velpar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bedstraw, smooth</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Bermudagrass</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Bluegrass, roughstalk</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N+</td>
<td>N</td>
<td>N</td>
<td>6+</td>
<td>N</td>
<td>8</td>
<td>6+</td>
<td>8</td>
</tr>
<tr>
<td>Cockle, white</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>7</td>
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<td>6</td>
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</tr>
<tr>
<td>Dandelion</td>
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<td>7</td>
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<td>6</td>
<td>7</td>
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<td>7</td>
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<td>8</td>
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</tr>
<tr>
<td>Dock spp.</td>
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<td>N</td>
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<td>7</td>
<td>7+</td>
<td>8</td>
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<tr>
<td>Dogbane, hemp</td>
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<td>N</td>
<td>N</td>
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<td>N</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>8+</td>
<td>N</td>
<td>6</td>
</tr>
<tr>
<td>Fescue, tall</td>
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<td>N</td>
<td>N</td>
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</tr>
<tr>
<td>Horsenettle</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>7</td>
<td>7+</td>
<td>N</td>
</tr>
<tr>
<td>Johnsongrass</td>
<td>6</td>
<td>N</td>
<td>7</td>
<td>N</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
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<td>9</td>
</tr>
<tr>
<td>Milkweed, common</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
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</tr>
<tr>
<td>Nutsedge, yellow</td>
<td>N</td>
<td>N</td>
<td>8</td>
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<td>N</td>
<td>6</td>
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<td>N</td>
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</tr>
<tr>
<td>Orchardgrass</td>
<td>N</td>
<td>N</td>
<td>6</td>
<td>7</td>
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<td>N</td>
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<td>N</td>
<td>N</td>
<td>N</td>
<td>6</td>
<td>N</td>
<td>8</td>
<td>7+</td>
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</tr>
<tr>
<td>Plantain spp.</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>7</td>
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</tr>
<tr>
<td>Quackgrass</td>
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<td>8</td>
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<td>N</td>
<td>N</td>
<td>6</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>7</td>
<td>6</td>
<td>N</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Thistle, Canada</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>6</td>
<td>N</td>
</tr>
</tbody>
</table>

This table compares the relative effectiveness of herbicides on individual weeds. Ratings are based on labeled application rates and weed size or growth stage. Results may differ with variations in weed size, temperature, rainfall, soil moisture, soil type, and soil pH. Crop tolerance rating of VG or less is rarely significant. Weed control rating: 10 = 95–100%; 9 = 85–95%; 8 = 75–85%; 7 = 65–75%; 6 = 55–65%; N = less than 55% or no control. Crop tolerance rating: E = excellent (almost never any crop injury observed); VG = very good (on rare occasion is crop injury observed); G = good (crop injury is seldom observed or is transient); FG = fair to good (occasionally is crop injury observed); F = fair (transient crop injury can be expected). *Crop tolerance ratings are for forage crops listed under each herbicide in Table 2.6-6. **Triazine-resistant biotypes exist in the region and are not controlled by metribuzin.
Table 2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland.

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A</th>
<th>lb ai/A</th>
<th>Apply in Liquid Fertilizer as a Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,4-D LVE 3.8L or 2,4-D</td>
<td>established: POST</td>
<td>1.5–3 qt</td>
<td>1.4–2.8 ae</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>2,4-D amine 3.8L</td>
<td>1–2 qt</td>
<td>0.95–1.9 ae</td>
<td>yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- 2,4-D is marketed by various companies with various trade names. Refer to the label provided with the product for specific recommendations and restrictions.
- Make application when grasses are well established, usually 4 to 5 inches tall with a good root system and tiller development.
- Make applications by ground in a minimum of 10 gal/A or by air in a minimum of 2 gal/A of water or liquid fertilizer.
- Do not make applications when the temperature is expected to exceed 80°F that day as drift is more likely to occur.
- Treat susceptible woody perennials in the spring after leaves are fully expanded.
- Ester formulations are slightly more effective (more leaf-absorbed) than amine formulations, but also slightly more volatile.
- 2,4-D labels vary concerning overseeding or crop rotation restrictions. Unless specified on the label, most crops can be safely planted 3 months after application under normal environmental conditions.
- Water quality advisory.

### Aim 2EC
- carfentrazone
- seedling: POST
- established: POST
- 1–2 fl oz
- 0.016–0.032
- yes

- For new seedings apply to grasses that have at least 3 or 4 leaves.
- Aim is safe to legumes and clovers, but temporary injury may occur.
- Significant crop response may occur, but is temporary.
- Apply in a minimum of 10 gal/A of water or liquid fertilizer. Applying Aim in liquid fertilizer may increase the level of crop response.
- Applications made within 8 hours of rainfall or irrigation or when heavy dew is present may cause significant crop response.
- Aim has a relatively narrow spectrum of weed control and is primarily used for control of winter or summer annual broadleaf weeds up to 4 inches tall (emerged weeds only).
- Aim has activity on Star-of-Bethlehem, dayflower species, and speedwell species. Star-of-Bethlehem may require additional application at least 10 days after the first.
- Three applications per season are allowed, but do not make applications less than 7 days apart.
- There are no crop rotation or overseeding restrictions for labeled crops; see label.

### Arsenal 2AS
- imazapyr
- grazed fencerows
- 1–3 pt
- 0.25–0.75
- no

- Arsenal is labeled for spot treatment in grass pasture. However, due to its length of residual activity on cool-season grass species, bare spots in the pasture could persist for several months. Therefore, it is only recommended for use along permanent or long-term fencerows.
- This use falls under the spot treatment part of the label, so grazed fencerows can be treated so long as the total area to be treated is no more than 10% of the total pasture and fencerow areas combined.
- Arsenal provides postemergence and 3 to 6 months of soil residual control of many annual, biennial, and perennial grass and broadleaf weeds as well as several vine and brush species.
- Make applications with handheld equipment.
- Refer to weed rate tables of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Rotation crops can be planted 12 months after application and completion of a successful field bioassay.

### Chaparral 71.6WG (PA, VA, WV only)
- aminopyralid + methylsulfuron
- established: POST
- 2–3.3 oz
- 0.078–0.128 + 0.012–0.019
- yes

- seed head suppression
- 2–2.5 oz
- 0.078–0.098 + 0.012–0.015

- spot treatment
- 0.025–0.033 oz/gal
- 0.02–0.026% w/v solution

- Chaparral provides postemergence control and 2 to 3 months of soil residual control of on many annual, biennial, and perennial weed species and suppression of blackberry and multiflora rose in permanent grass pasture.
- Apply by ground in a minimum of 10 gal/A or by air in a minimum of 2 gal/A of water or liquid fertilizer.
- High-volume foliar applications for brush control (volume not specified) are allowed; consult herbicide label for details.
- In general, Chaparral may be applied in the spring or early summer, depending on the target weed species, as a broadcast application over grass that was planted at least 4 months prior to the application and growing under favorable conditions for establishment. Grasses should have well-established root systems and be tillering.
- Smooth bromegrass may be more sensitive to applications of Chaparral than other perennial grasses, and temporary growth suppression may occur.
- Special precautions are provided on the label for applications to tall fescue to minimize injury and stunting. Make application later in spring after new growth is 5 to 6 inches tall or in the fall. Do not use more than 2 oz/A of Chaparral and tank-mix with 2,4-D. Use only a non-ionic surfactant (0.5 to 1 pt/100 gal) when mixing with water; do not use any adjuvant when mixing with liquid fertilizer. Adhere strictly to these precautions, or severe injury may occur. Even when these precautions are followed, some stunting, yellowing, or seed head suppression of fescue may occur.
- Do not use Chaparral on timothy, annual (Italian) ryegrass, or perennial ryegrass, or severe injury will occur.
Table 2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland (continued).

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A</th>
<th>lb ai/A</th>
<th>Apply in Liquid Fertilizer as a Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarity 4S or dicamba</td>
<td>dicamba</td>
<td>seedling: POST</td>
<td>0.5–1 pt</td>
<td>0.25–0.5 ae</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>established: POST</td>
<td>0.5–2 pt</td>
<td>0.25–1 ae</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.2–1.6 fl oz/gal</td>
<td>0.16–1.25% v/v solution</td>
<td></td>
</tr>
<tr>
<td>Crossbow 3E</td>
<td>triclopyr + 2,4-D</td>
<td>established: POST</td>
<td>1–6 qt</td>
<td>0.25–1.5 ae + 0.5–3 ae</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>1.5–2 fl oz/gal</td>
<td>1.2–1.6% v/v solution</td>
<td></td>
</tr>
<tr>
<td>DuraCor SC</td>
<td>aminopyralid + florpyrauxifen-benzyl</td>
<td>seedling: POST; established: POST</td>
<td>12–20 fl oz</td>
<td>0.063–0.104 ae + 0.006–0.0105 ae</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>40 fl oz</td>
<td>1.46 v/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- With fall applications, do not plant grasses the following spring; do not overseed ryegrass for 4 months after application.
- Do not rotate to any crop within 1 year following treatment, or to any broadleaf crop until an adequately sensitive field bioassay shows that the aminopyralid level in soil will not adversely affect that broadleaf crop. Cereals and corn can be planted 1 year after treatment; most broadleaf crops require at least a 2-year wait until planting.
- The Chaparral label has restrictions concerning the use and management of plant residues (hay, straw, mulch, compost) and manure that may contain aminopyralid residues. These include important restrictions concerning the movement and sale of hay products treated with aminopyralid. Be certain you understand and are able to follow these label restrictions before using this product.
- For tall fescue seed head suppression and broadleaf weed control, Chaparral may be used to reduce the number of seed heads of tall fescue when applied prior to flower emergence. For best results apply 2 to 2.5 oz/A after initial greenup when grass height is approximately 6 inches. Later applications may still be effective; however, the seed head suppression will be less effective and the number of seed heads could be noticeably higher. Many weed species can be controlled with this application timing in addition to the suppression of seed head development.
- Make spot applications with hand-held equipment. Refer to weed rate tables of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Spot treatments may be applied at equivalent broadcast rates of up to 6.6 oz/A (0.066 oz/gal), but no more than 50% of the acreage may be treated, and the total amount of Chaparral applied from all applications must not exceed 3.3 oz per acre per year.
- A non-ionic surfactant should be added.
- Repeat treatments may be made, but the total amount of Chaparral applied from all applications must not exceed 3.3 oz per acre per year.
- Water quality advisory.

- Application to seedling grasses should not exceed 1 pt/A, and grasses should be actively growing, unstressed, and have attained the 3- to 4-leaf stage and 6 inches tall. For higher rates delay application until grasses are well established, usually 4–5 inches tall with a good root system and tiller development.
- Apply in a minimum of 10 gal/A of water or liquid fertilizer, or by air in 2 to 40 gal/A of water.
- High-volume foliar applications for brush control (up to 600 gal/A) are allowed; consult herbicide label for details.
- Do not make applications when the temperature is expected to exceed 80°F that day as drift is more likely to occur.
- Forage grasses or small grains can be overseeded after 30 days per pint of dicamba applied.
- Legumes and other broadleaf crops may be planted 4 months after application.
- Make spot applications with hand-held equipment. Do not treat more than one-tenth of the total area at any one time.
- Refer to weed rate tables of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Clarity is also labeled for wiper applications. Consult the herbicide label for specific recommendations.
- Water quality advisory.

- Application to seedling grasses should not exceed 1 pt/A, and grasses should be actively growing, unstressed, and have attained the 3- to 4-leaf stage and 6 inches tall. For higher rates delay application until grasses are well established, usually 4–5 inches tall with a good root system and tiller development.
- Apply in a minimum of 10 gal/A of water or liquid fertilizer, or by air in 2 to 40 gal/A of water.
- High-volume foliar applications for brush control (up to 600 gal/A) are allowed; consult herbicide label for details.
- Do not make applications when the temperature is expected to exceed 80°F that day as drift is more likely to occur.
- Forage grasses or small grains can be overseeded after 30 days per pint of dicamba applied.
- Legumes and other broadleaf crops may be planted 4 months after application.
- Make spot applications with hand-held equipment. Do not treat more than one-tenth of the total area at any one time.
- Refer to weed rate tables of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Clarity is also labeled for wiper applications. Consult the herbicide label for specific recommendations.
- Water quality advisory.

- Spot treatments may be applied at an equivalent broadcast rate of up to 40 fl oz of DuraCor (0.208 lb aminopyralid and 0.0209 lb florpyrauxifen-benzyl) per acre per annual growing season; however, not more than 50% of an acre may be treated at this rate.
- Repeat treatments may be made, but the total amount of DuraCor applied must not exceed 20 fl oz per acre per year.
- DuraCor can be applied at 12 fl oz of product per acre in early to mid-spring when weeds are less than 2 inches tall. Applications in this range are most effective when conditions are favorable to plant growth.
**Table 2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland (continued).**

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A</th>
<th>lb ai/A</th>
<th>Apply in Liquid Fertilizer as a Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facet L 1.5SL</td>
<td>quinclorac</td>
<td>established: POST</td>
<td>12-64 fl oz</td>
<td>0.14-0.75 ae</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.55-1.6 fl oz/gal</td>
<td>0.4-1.25% v/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- Facet L (formerly Paramount 75WDG) provides postemergence control and 1 to 2 months of soil residual control or suppression of several annual grass weeds, a few annual broadleaf weeds, and field or hedge bindweed.
- Facet L is the only herbicide labeled for postemergence control of grass weeds in grass forage crops. Labeled grass weeds are barnyardgrass, large crabgrass, giant, green, and yellow foxtails, junglerice, and broadleaf signalgrass.
- Rates greater than 32 fl oz/A and less than 22 fl oz/A are for leafy spurge control and bindweed maintenance, respectively. For broadleaf control apply 22 to 32 fl oz/A. For grass control apply at 32 fl oz/A with MSO at 1% v/v.
- Use only on labeled established grasses (timothy and reed canarygrass not included) that have developed a good root system and are tillering.
- Local experience indicates that Facet may cause more injury to orchardgrass than to the other labeled cool-season grasses.
- Apply to actively growing plants by ground in a minimum of 5 gal/A of water. Aerial applications are not allowed in the Northeast region.
- For best results apply to labeled grass and broadleaf weeds up to 2 inches tall and prior to grass tiller development.
- Do not apply Facet when air temperature is more than 90°F.
- Forage grasses can be overseeded 10 months after application.
- Legume crops can be planted 24 months after application and completion of a successful field bioassay.
- For spot applications, do not exceed the maximum per-area rates for broadcast application. Refer to weed rate tables of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Water quality advisory.

<table>
<thead>
<tr>
<th>GrazonNext HL 3.74E</th>
<th>aminopyralid + 2,4-D</th>
<th>established: POST</th>
<th>1.2-2.1 pt</th>
<th>0.062-0.108 + 0.5-0.9</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(PA, VA, WV only)</td>
<td></td>
<td>spot treatment</td>
<td>0.5-0.9 fl oz/gal</td>
<td>0.4-0.7% v/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- GrazonNext provides postemergence control and 2 to 3 months of soil residual control of many annual, biennial, and perennial weed species in permanent grass pasture.
- In general, it is best to wait 45 to 60 days after grass planting before applying GrazonNext.
- Smooth bromegrass may be more sensitive to applications of GrazonNext than other perennial grasses, and temporary growth suppression may occur.
- Apply by ground in a minimum of 10 gal/A or by air in a minimum of 2 gal/A of water or liquid fertilizer.
- High-volume foliar applications for brush control (volume not specified) are allowed; consult herbicide label for details.
- Grass can be overseeded in the fall after a spring or early summer application.
- Do not rotate to any crop within 1 year following treatment or to any broadleaf crop until an adequately sensitive field bioassay shows that the aminopyralid level in soil will not adversely affect that broadleaf crop. Cereals and corn can be planted 1 year after treatment; most broadleaf crops require at least a 2-year wait until planting.
- The GrazonNext label has restrictions concerning the use and management of plant residues (hay, straw, mulch, compost) and manure that may contain aminopyralid residues. These include important restrictions concerning the movement and sale of hay products treated with aminopyralid. Be certain you understand and are able to follow these label restrictions before using this product.
- Make spot applications with hand-held equipment. Refer to weed rate tables of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Spot treatments may be applied at equivalent broadcast rates of up to 4.2 pt/A (1.7 fl oz/gal), but no more than 50% of the acreage may be treated, and the total amount of GrazonNext applied from all applications must not exceed 2.1 pints per acre per year.
- A non-ionic surfactant should be added.
- Repeat treatments may be made, but the total amount of GrazonNext applied from all applications must not exceed 2.1 pints per acre per year.
- Water quality advisory.

<table>
<thead>
<tr>
<th>Grazon P+D 2.54SL</th>
<th>picloram + 2,4-D</th>
<th>established: POST</th>
<th>2-8 pt</th>
<th>0.14-0.54 + 0.5-2</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>(VA and WV only)</td>
<td></td>
<td>spot treatment</td>
<td>0.5-1.6 fl oz/gal</td>
<td>0.4-1.25% v/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- Grazon P+D provides postemergence control and 2 to 3 months of soil residual control of many annual, biennial, and perennial weed species in permanent grass pasture.
- The distribution of Grazon P+D may be further restricted within Virginia and West Virginia due to the picloram content of the product and sensitivity of certain broadleaf crops.
- Apply to grasses that are well established as indicated by tilling, development of secondary root system, and vigorous growth.
- Smooth bromegrass may be more sensitive to applications of Grazon P+D than other perennial grasses, and temporary growth suppression may occur.
- Apply by ground in 10 to 40 gal/A or by air in a minimum of 2 gal/A of water, an oil-water emulsion, or liquid fertilizer.
- High-volume foliar applications for brush control (100 gal/A) are allowed; consult herbicide label for details.
- Cool-season grasses can be seeded a minimum of 21 days after application (60 days for smooth bromegrass).
- Do not rotate to food or feed crops on treated land if they are not registered for use with picloram until an adequately sensitive field bioassay or chemical test shows that no detectable picloram is present in soil.
Table 2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland (continued).

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A</th>
<th>lb ai/A</th>
<th>Apply in Liquid Fertilizer as a Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metsulfuron 60DF</td>
<td>metsulfuron</td>
<td>established: POST</td>
<td>0.1–0.4 oz</td>
<td>0.004–0.015</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>seed head suppression</td>
<td>0.3–0.4 oz</td>
<td>0.011–0.015</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.01 oz/gal</td>
<td>0.008% w/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- Metsulfuron provides both postemergence control and 2 to 3 months of soil residual control of many annual, biennial, and perennial weed species, and suppression of blackberry and multiflora rose in permanent grass pasture.
- Apply by ground in a minimum of 10 gal/A or by air in 2 to 5 gal/A of water or liquid fertilizer.
- Postemergence applications are rainfast in 4 hours, after which rainfall or overhead irrigation is required to activate the herbicide in the soil.
- Applications up to 0.4 oz/A may be made to grasses that have been established for a minimum amount of time as follows: bermudagrass (2 months); bluegrass, bromegrass, and orchardgrass (6 months); timothy (12 months); and fescue (24 months).
- Special precautions are provided on the label for applications to fescue or timothy. Apply to fescue in late spring or fall or to timothy in late summer or fall. Either species should be at least 6 inches tall and actively growing. Use the lowest recommended rate of metsulfuron (up to 0.4 oz/A) for the target weeds and tank-mix with 2,4-D for added safety. Use only a non-ionic surfactant at 0.5 pt/100 gal when mixing with water; do not use any adjuvant when mixing with liquid fertilizer. Adhere strictly to these precautions, or severe injury may occur. Even when these precautions are followed, some stunting or yellowing of timothy or fescue may occur.
- Do not use metsulfuron on annual (Italian) or perennial ryegrass, or severe injury will occur.
- Overseeding intervals for grasses are specific to region, soil pH, metsulfuron rate, and grass species. In our region with soils of pH 7.5 or less, the interval range is from 6 to 36 months (see label).
- Metsulfuron is persistent in soil; rotation to most broadleaf crops is 34 months or completion of a successful field bioassay.
- Cimarron Max is a co-pack that contains the active ingredients of metsulfuron and 2,4-D plus dicamba.
- Cimarron Plus is a premix with the active ingredients metsulfuron and chlorsulfuron (Glean or Telar).
- For tall fescue seed head suppression and broadleaf weed control: Metsulfuron may be used to reduce the number of seed heads of tall fescue when applied prior to flower emergence. For best results apply 0.3 to 0.4 oz/A after initial greenup when grass height is approximately 6 inches. Later applications may still be effective; however, the seed head suppression will be less effective and the number of seed heads could be noticeably higher.
- Spot treatment with metsulfuron is effective for suppression or control of multiflora rose, blackberry, and Canada thistle. Make applications with handheld equipment. Apply 1 oz/100 gal (0.28 gr/gal) on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff, but dense stands of brush may need to be treated from both sides to achieve adequate coverage.
- A non-ionic surfactant at 2 to 4 pt/100 gal should be added.
- Make applications after plants are fully leafed in the spring up through late summer.

Milestone 2E (PA, VA, WV only) aminopyralid

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A</th>
<th>lb ai/A</th>
<th>Apply in Liquid Fertilizer as a Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milestone 2E</td>
<td>aminopyralid</td>
<td>established: POST</td>
<td>3–7 fl oz</td>
<td>0.047–0.109 ae</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.13–0.36 fl oz/gal</td>
<td>0.1–0.3% v/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- Milestone provides postemergence control and 2 to 3 months of soil residual control of on many annual, biennial, and perennial weed species in permanent grass pasture.
- In general, it is best to wait 45 to 60 days after grass planting before applying Milestone.
- Smooth bromegrass may be more sensitive to applications of Milestone than other perennial grasses, and temporary growth suppression may occur.
- Apply by ground in a minimum of 10 gal/A or by air in a minimum of 2 gal/A of water or liquid fertilizer.
- High-volume foliar applications for brush control (volume not specified) are allowed; consult herbicide label for details.
- Grass can be overseeded the fall after a spring treatment.
- Do not rotate to any crop within 1 year following treatment or to any broadleaf crop until an adequately sensitive field bioassay shows that the aminopyralid level in soil will not adversely affect that broadleaf crop. Cereals and corn can be planted 1 year after treatment; most broadleaf crops require at least a 2-year wait until planting.
- The Milestone label has restrictions concerning the use and management of plant residues (hay, straw, mulch, compost) and manure that may contain aminopyralid residues. Follow the label restrictions carefully.
- Make spot applications with handheld equipment. Refer to weed rate tables of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Spot treatments may be applied at equivalent broadcast rates of up to 14 fl oz/A (0.32 fl oz/gal), but no more than 50% of the acreage may be treated, and the total amount of Milestone applied from all applications must not exceed 7 fl oz per acre per year.
- A non-ionic surfactant should be added.
- Repeat treatments may be made, but the total amount of Milestone applied from all applications must not exceed 7 fl oz per acre per year.
- Water quality advisory.
### Table 2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland (continued).

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A</th>
<th>lb ai/A</th>
<th>Apply in Liquid Fertilizer as a Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>PastureGard HL 4L</td>
<td>triclopyr + fluroxypyr</td>
<td>established: POST</td>
<td>0.75–4 pt</td>
<td>0.28–1.5 ae +</td>
<td>not recommended</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.094–0.5 ae</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.2–1.5 fl oz/gal</td>
<td>0.16–1.2% v/v solution</td>
<td></td>
</tr>
<tr>
<td>Permit/Sandea 75WDG</td>
<td>halosulfuron</td>
<td>established: POST</td>
<td>0.67–1.3 oz</td>
<td>0.031–0.063</td>
<td>no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.019 oz/gal</td>
<td>0.016% w/v solution</td>
<td></td>
</tr>
<tr>
<td>Prowl H2O 3.8AS</td>
<td>pendimethalin</td>
<td>established POST</td>
<td>1.1–4.2 qt</td>
<td>1–4</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(fall, winter, spring);</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>between cuttings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remedy Ultra 4L</td>
<td>triclopyr</td>
<td>established: POST</td>
<td>0.5–4 pt</td>
<td>0.25–2 ae</td>
<td>yes</td>
</tr>
</tbody>
</table>

- PastureGard provides postemergence control and 1 to 2 months of soil residual control of many annual, biennial, and perennial weeds as well as many woody plants.
- Apply to actively growing weeds or brush by ground in a minimum of 5 gal/A or by air in a minimum of 3 gal/A (nonwoody broadleaf weeds) or 4 gal/A (woody plants) of water.
- For brush control, high-volume foliar applications (50 to 100 gal/A), basal methods, and cut stump methods are allowed; consult herbicide label for details.
- For best results treat blackberry either before first flower or after fruit drop.
- Some hard-to-control woody species may require retreatment.
- Apply only to grasses with well-established root systems that are tillering.
- Forage grasses or small grains can be overseeded 21 days after application.
- Other crops can be planted 4 months after application.
- For spot treatments apply at rates equivalent to broadcast application rates. Refer to weed rate tables of the herbicide label and apply the recommended per gallon concentration above on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- Water quality advisory.

- Sandea provides excellent postemergence control of yellow nutsedge and has both preemergence (3 to 4 weeks soil residual) and/or postemergence activity on several annual broadleaf weeds.
- Apply by ground in a minimum of 10 gal/A water or by air in 3–15 gal/A water.
- For best results, spray actively growing nutsedge plants at the 3- to 5-leaf stage and susceptible broadleaf plants that are 1 to 3 inches tall.
- Heavy nutsedge infestations may require additional applications.
- Wait at least 48 hours after application before irrigation.
- Yukon is a premix of Sandea and dicamba.
- Forage grasses, small grains, sorghum, and corn can be overseeded 2 months after application.
- Legume forages can be planted 9 months after application; see label for other broadleaf crops.
- Apply Sandea as a postemergence spot treatment only to those areas of emerged nutsedge. Do not exceed a rate of 0.75 oz/A (0.019 oz/gal). Apply on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff. A second postemergence spot application at 0.75 oz/A is allowed where nutsedge has emerged or regrown. Follow the same procedures as first application. The potential for injury to desirable broadleaf and grass plants is increased with a second application.
- Water quality advisory.

- Prowl H2O will not control any weeds that have already emerged at the time of application.
- Provides 1 to 2 months of residual control of most annual grass weeds and a few broadleaf weeds as they germinate (refer to label for weeds controlled).
- An early April application may be required to control annual grasses such as foxtails (annual species only), jointhead arthraxon, crabgrass, and others as well as suppression of Japanese stiltgrass.
- Applications may be made in fall after last cutting/grazing, in winter, spring, or between cuttings (but before weed emergence).
- Apply to solid (established) stands of perennial forage grasses with a minimum of 6 tillers.
- Apply by ground in a minimum of 10 gal/A or by air in a minimum of 5 gal/A of water or liquid fertilizer.
- Adequate rainfall or overhead irrigation is required to activate Prowl H2O.
- Multiple applications are allowed; however, maximum use rate of Prowl H2O is 4.2 qt/A per year with 30 days between sequential applications.
- Adverse environmental conditions or weak stands of grass may cause temporarily injury.
- Do not apply to mixed stands with forage legumes other than alfalfa.
- Crop rotation restrictions are based on Prowl rate used, precipitation, and application timing; see label.

- Remedy Ultra provides postemergence control and 1 to 2 months of soil residual control of many annual, biennial, and perennial weeds as well as many woody plants.
- Apply to actively growing weeds or brush by ground in a minimum of 10 gal/A or by air in a minimum of 2 gal/A (non-woody broadleaf weeds) or 4 gal/A (woody plants) of water or liquid fertilizer.
- Do not use liquid fertilizer as the carrier when treating woody plants (brush).
For brush control, high-volume foliar applications (100 to 200 gal/A), basal methods, and cut stump methods are allowed; consult herbicide label for details.

Biennial or winter annual weeds are most susceptible while in the rosette stage.

For best results treat blackberry during or after bloom.

Some hard-to-control woody species may require retreatment.

Apply only to grasses with well-established root systems that are tillering.

Forage grasses can be overseeded 21 days after application.

Other crops can be planted the next season after application.

Water quality advisory.

- Glyphosate controls emerged weeds only (no residual activity).
- Make applications with hand-held equipment or wiper applicators. Avoid contact with desirable vegetation. Consult the herbicide label for specific wiper applicator recommendations.
- At rates up to 2 qt/A, any portion up to the entire field may be treated. For rates above 2 qt/A, apply only to weed-infested areas of the field, and do not treat more than one-tenth of the total area at any one time.
- Subsequent applications to the same areas can be made at 30-day intervals.
- Refer to weed rate tables of the herbicide label for the recommended herbicide concentration.
- For spot treatment, apply on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- There are no overseeding restrictions for spot treatment with glyphosate.

Table 2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland (continued).

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A lb ai/A</th>
<th>Application Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roundup 3S or Roundup Weather-MAX4.5S</td>
<td>glyphosate</td>
<td>spot treatment</td>
<td>2.5 fl oz/gal</td>
<td>2% v/v solution</td>
</tr>
<tr>
<td>Sharpen 2.85SC</td>
<td>saflufenacil</td>
<td>established: dormant; established: POST</td>
<td>1–2 fl oz</td>
<td>0.022–0.044</td>
</tr>
<tr>
<td>Spike 20P</td>
<td>tebuthiuron</td>
<td>established: POST</td>
<td>10–20 lb</td>
<td>2–4</td>
</tr>
</tbody>
</table>

**Roundup 3S or Roundup Weather-MAX4.5S**

- Glyphosate controls emerged weeds only (no residual activity).
- Make applications with hand-held equipment or wiper applicators. Avoid contact with desirable vegetation. Consult the herbicide label for specific wiper applicator recommendations.
- At rates up to 2 qt/A, any portion up to the entire field may be treated. For rates above 2 qt/A, apply only to weed-infested areas of the field, and do not treat more than one-tenth of the total area at any one time.
- Subsequent applications to the same areas can be made at 30-day intervals.
- Refer to weed rate tables of the herbicide label for the recommended herbicide concentration.
- For spot treatment, apply on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- There are no overseeding restrictions for spot treatment with glyphosate.

**Sharpen 2.85SC**

- Sharpen has a relatively narrow spectrum of weed control and is primarily used for control of winter or summer annual broadleaf weeds up to 6 inches tall. It primarily controls emerged weeds but has some very short (1 to 2 weeks at the labeled rates) residual activity.
- Apply by ground in a minimum of 5 gal/A water or 20 gal/A liquid fertilizer, or by air in a minimum of 3 gal/A water.
- Make dormant applications in the fall, during the winter, or in early spring before greenup.
- Make in-season applications before weeds reach the maximum size (usually 3 to 6 inches) listed on the weed table of the label.
- Sharpen may cause transitory injury to forage grasses.
- There are no replant restrictions for forage grasses, small grains, or sorghum at the 2 fl oz/A rate.
- For other crops, rotation restrictions are up to 5 months at the 2 fl oz/A rate; see label.
- Water quality advisory.

**Spike 20P**

- Spike 20P is a pelleted formulation for control of woody plants (trees, shrubs, etc.) and vines.
- Apply by hand evenly over the area occupied by individual plants, multistem clumps, or small stands of woody vegetation.
- For multiflora rose control, apply Spike in early spring after ground thaw and before multiflora rose growth.
- Requires rainfall to move herbicide to root zone.
- Make only one application per year.
- Desirable grasses or legumes in the treated area may be injured or killed. Dormant season application is recommended to minimize herbicidal activity on forage grasses.
- For best results, do not disturb treated plants by wood cutting or removal for 2 years after application.
- Poor or erratic results are likely to occur in soils containing more than 5% organic matter or more than 30% clay, and in areas where woody plants are rooted directly in a shallow water table.
- Spike can persist in the soil for several years, and should therefore only be used on land dedicated to long-term grass forage production unless severe herbicide injury to legumes, row crops, shrubs, or trees can be tolerated in treated areas for several years. A field bioassay is required before planting sensitive crops.
- Do not apply Spike 20P in the vicinity of desirable plants. Exposure of even a small part of a plant root system to Spike may cause severe plant injury or death. Treatment setback distance from desirable plants should be one to two times the height or width of adjacent non-target vegetation, whichever is greater. Avoid applications on slopes where surface water or groundwater flow toward desirable vegetation.
- Do not apply more than 10 lb/A on “vulnerable sites” as described on the herbicide label under “Use Restrictions for Groundwater Protection.” Do not apply in areas where the water table is predominately shallow (5 feet or less), to interior ditch banks, or to ditches used to transport irrigation water or potable water. Do not apply within areas identified by state or local authorities as protected groundwater recharge zones.
- Water quality advisory.
Table 2.6-12. Comments on herbicides used in grass pasture, hay, and CRP grassland (continued).

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Common Name</th>
<th>Application Timing</th>
<th>Product/A</th>
<th>lb ai/A</th>
<th>Apply in Liquid Fertilizer as a Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weedmaster 3.87L</td>
<td>dicamba + 2,4-D</td>
<td>seedling: POST</td>
<td>0.5–2 pt</td>
<td>0.06–0.25 + 0.18–0.72</td>
<td>yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>established: POST</td>
<td>1–4 pt</td>
<td>0.125–0.5 + 0.36–1.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.4–1.6 fl oz/gal</td>
<td>0.3–1.25% v/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- **Stinger** provides postemergence control and 1 to 3 months of soil residual control of many annual, biennial, and perennial broadleaf weeds, but it is primarily used for Canada thistle control.
- Apply to actively growing weeds by ground in a minimum of 10 gal/A of water. Do not apply by aircraft.
- For Canada thistle, apply in rosette stage or after thistle is at least 4 inches tall, but before the bud stage.
- Multiple treatments are allowed as long as all treatments do not exceed 1.33 pt/A during a growing season.
- Apply only to actively growing well-established grasses that are tillering and have developed secondary roots.
- The Stinger label has restrictions concerning the use and management of plant residues (hay, straw, mulch, compost) and manure that may contain herbicide residues. Follow the label recommendations carefully.
- There are no overseeding restrictions for forage grasses, small grains, or field corn.
- Most broadleaf crops can be planted 10.5 to 18 months after application; see label.
- Spot treatment with Stinger is primarily for Canada thistle control. Refer to weed rate table of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- **Water quality advisory.**

<table>
<thead>
<tr>
<th>Surmount 1.33L (VA and WV only)</th>
<th>picloram + fluroxypyr</th>
<th>established: POST</th>
<th>3–6 pt</th>
<th>0.25–0.5 + 0.25–0.5</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>spot treatment</td>
<td>0.6–1.1 fl oz/gal</td>
<td>0.5–0.85% v/v solution</td>
<td></td>
</tr>
</tbody>
</table>

- **Surmount** provides postemergence control and 2 to 3 months of soil residual control of many annual, biennial, and perennial weed species in permanent grass pasture. It may provide improved control of hemp dogbane, milkweed, dewberry, or sumac species over Grazon P+D.
- The distribution of Surmount may be further restricted within Virginia and West Virginia due to the picloram content of the product and sensitivity of certain broadleaf crops.
- Apply to grasses that are well established as indicated by tillering, development of secondary root system, and vigorous growth.
- Apply by ground in a minimum of 10 gal/A or by air in a minimum of 5 gal/A of water, an oil-water emulsion, or liquid fertilizer.
- High-volume foliar applications for brush control (100 gal/A) are allowed; consult herbicide label for details.
- Cool-season grasses can be seeded a minimum of 21 days after application.
- Do not rotate to any crop within 1 year following treatment other than range or pasture grasses, grasses for hay or silage, barley, oats, rye, or grain sorghum. Thereafter, other crops may be planted after an adequately sensitive field bioassay shows that the risk of crop injury is within acceptable limits.
- The Surmount label has restrictions concerning the use and management of plant residues (hay, straw, mulch, compost) and manure that may contain picloram residues. Be certain you understand and are able to follow these label restrictions before using this product.
- Spot treatment with hand-held sprayers should be applied at a rate equivalent to a broadcast application. Refer to weed rate table of the herbicide label and apply the recommended concentration on a spray-to-wet basis (1 gal/1,000 sq ft) to provide thorough coverage. Do not spray to the point of runoff.
- **Water quality advisory.**
- **Restricted-use pesticide.**

The following comments apply to all herbicides, unless otherwise noted in the table: Apply postemergence to actively growing broadleaf weeds. Treat biennials in the rosette stage of growth. Higher rates or repeat treatments may be required for less susceptible species, perennial weeds, and woody plants. For maximum efficacy, do not mow, graze, hay, or disturb the treated area for 7 days after application. Make applications at least 7 days before a killing frost. These herbicides will severely injure alfalfa, clover, and other legumes. Do not use if loss of desirable legume species cannot be tolerated. Follow label recommendations to reduce the potential for spray drift or volatility to sensitive plants.