7. BEANS (ADZUKI, DRY COMMON, LIMA & SNAP)

**NOTE:** Weed control ratings are given as 0–9 where 0 indicates no control and 9 indicates 90%–100% control under ideal conditions. Ratings are subjective values based on best available information and give general comparisons based on use as described in this guide. Under unfavourable conditions (e.g., too dry, too wet, too cold or poor application), the herbicides may not be as effective as indicated. Ratings may vary with weed and crop stage and with the timing and rates of the product(s) being used. Always refer to the product label for more information on registered weed species, product uses and precautions.

| **TABLE 7-1. Herbicide Weed Control Ratings for Beans (Adzuki, Dry, Lima and Snap)*** |
|---------------------------------|----------|----------------|----------------|----------------|----------------|
| **Legend:** | **Crop Registrations** | **Annual Grasses** | **Annual Broadleaves** | **Perennials** |
| **Trade Name** | **WSSA GROUP** | **Annual Grasses** | **Annual Broadleaves** | **Perennials** | **Crop Tolerance** |
| **Preplant Incorporated Grass Herbicides** | | | | | |
| DUAL II MAGNUM | 15 | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 9 | 9 | 8 | 8 | 9 | 9 | 4 | 9 | 2 | − | − | 0 | 2 | 7 | 2 | 8 | 8 | 7 | 4 | 3 | 2 | 6 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | G |
| EPTAM | 8 | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 9 | 9 | 8 | 9 | 9 | 9 | 7 | 9 | 4 | − | − | 0 | 7 | 7 | 5 | 7 | 7 | 5 | 3 | 5 | − | − | 0 | 8 | 5 | − | − | E |
| FRONTIER MAX | 15 | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 9 | 9 | 8 | 8 | 9 | 9 | 4 | 9 | 2 | − | − | 0 | 2 | 7 | 2 | 8 | 8 | 7 | 4 | 3 | 2 | 6 | 0 | 0 | 8 | 0 | 0 | 0 | G |
| PROWL H20 | 3 | ✓ | x | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 9 | 9 | 9 | 8 | 8 | 8 | 5 | − | − | 9 | − | − | 7 | − | − | 8 | − | − | − | − | 7 | − | − | − | − | − | − | E |
| TREFLAN, BONANZA 480, RIVAL EC or TRIFLUREX 40 EC | 3 | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 9 | 9 | 9 | 9 | 9 | 7 | 9 | 5 | 9 | − | 0 | 2 | 8 | 2 | 2 | 8 | 2 | 1 | 2 | 8 | 2 | 2 | 2 | 2 | 2 | 2 | E |
| **Preplant Incorporated Grass and Broadleaf Herbicides** | | | | | |
| PURSUIT, PHANTOM or NU-IMAGE | 2 | ✓ | ✓ | ✓ | ✓ | x | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | 8 | 7 | 7 | 9 | 8 | 9 | 7 | 8 | 8 | 9 | 7 | 2 | 9 | 9 | 9 | 9 | 9 | 9 | 7 | 6 | 9 | 2 | 2 | 2 | 7 | 6 | 2 | 2 | G |

1 Indicates a Phaseolus vulgaris dry common bean.
2 Use the high rate of herbicide for optimum control.
3 Use PRE timing for optimum control.
4 Use PPI timing for optimum control.
5 Weeds cannot be emerged at the time of application to achieve this level of control.
* Numerous equivalents to this product exist, refer to Table 4-1. *Herbicides Used in Ontario* for a complete list of products.
### TABLE 7–1. Herbicide Weed Control Ratings for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

**Legend:** Numbers (0–9) = weed control ratings  
Crop tolerance ratings: **E** = Excellent, **G** = Good, **F** = Fair, **P** = Poor  
✓ = can be used on this crop  
✗ = not indicated for use on this crop  
– = insufficient information available to make a rating  
R = populations resistant to this herbicide treatment exist in Ontario and won't be adequately controlled if present.

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>WSSA GROUP</th>
<th>Crop Registrations</th>
<th>Annual Grasses</th>
<th>Annual Broadleaves</th>
<th>Perennials</th>
<th>Crop Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preplant Incorporated Tank-Mixes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DUAL II MAGNUM + PURSUIT (imazethapyr*)</td>
<td>15+2</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>EPTAM + TREFLAN (trifluralin*)</td>
<td>8+3</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>EPTAM + PERMIT</td>
<td>8+2</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>FRONTIER MAX + PURSUIT</td>
<td>15+2</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>PERMIT + TREFLAN (trifluralin*)</td>
<td>2+3</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
<tr>
<td>PURSUIT (imazethapyr*) + TREFLAN (trifluralin*)</td>
<td>2+3</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
<td>✓ ✓ ✓ ✓ ✓ ✓ ✓</td>
</tr>
</tbody>
</table>

**Preemergence Grass Herbicides**

| **DUAL II MAGNUM** | 15 | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ |

**Preemergence Broadleaf Herbicides**

| **PERMIT** | 2 | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ |

**Preemergence Grass and Broadleaf Herbicides**

| PURSUIT, PHANTOM or NU-IMAGE | 2 | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ | ✓ ✓ ✓ ✓ ✓ ✓ ✓ |

1 Indicates a *Phaseolus vulgaris* dry common bean.  
2 Use the high rate of herbicide for optimum control.  
3 Use PRE timing for optimum control.  
4 Use PPI timing for optimum control.  
5 Weeds cannot be emerged at the time of application to achieve this level of control.  
* Numerous equivalents to this product exist, refer to Table 4–1. *Herbicides Used in Ontario* for a complete list of products.
TABLE 7-1. Herbicide Weed Control Ratings for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

Legend: Numbers (0–9) = weed control ratings
Crop tolerance ratings: E = Excellent, G = Good, F = Fair, P = Poor
✓ = can be used on this crop
x = not indicated for use on this crop
R = populations resistant to this herbicide treatment exist in Ontario and won’t be adequately controlled if present.

<table>
<thead>
<tr>
<th>Crop Registrations</th>
<th>Annual Grasses</th>
<th>Annual Broadleaves</th>
<th>Perennials</th>
<th>Crop Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Trade Name</strong></td>
<td><strong>WSSA GROUP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preemergence Tank-Mixes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DUAL II MAGNUM + PURSUIT (imazethapyr*)</td>
<td>15 + 2</td>
<td>x x ✓ x x x x x x x</td>
<td>9 9 8 9 9 9 7 9 8 9 7 9 2 9 9 7 9 6 9</td>
<td>– – – 8 4 7 – – E</td>
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</table>

Postemergence Grass Herbicides

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>WSSA GROUP</th>
<th>Crop Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASSURE II, CONTENDER or YUMA GL</td>
<td>1 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 9 8 9 9 9 8 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 9 0 0 E</td>
<td></td>
</tr>
<tr>
<td>POAST ULTRA</td>
<td>1 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 9 8 9 9 9 9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 6 0 0 E</td>
<td></td>
</tr>
<tr>
<td>SELECT, STATUE, ANTLER or ARROW ALL-IN</td>
<td>1 x ✓ ✓ ✓ x ✓ ✓ ✓ ✓ 9 8 9 9 9 9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 7 0 0 E</td>
<td></td>
</tr>
<tr>
<td>VENTURE L</td>
<td>1 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 9 8 9 8 9 9 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 8 0 0 E</td>
<td></td>
</tr>
</tbody>
</table>

Postemergence Broadleaf Herbicides

<table>
<thead>
<tr>
<th>Trade Name</th>
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<th>Crop Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASAGRAN</td>
<td>6 x ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 0 0 0 0 0 0 0 0 7 – 9 5 9 7 9 7 8 6 9 1 6 2 8 0 5 7 G</td>
<td></td>
</tr>
<tr>
<td>BASAGRAN FORTÉ</td>
<td>6 x ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 0 0 0 0 0 0 0 0 7 – 9 5 9 7 9 7 8 6 9 1 6 2 8 0 5 7 G</td>
<td></td>
</tr>
<tr>
<td>PERMIT</td>
<td>2 x ✓ ✓ ✓ x ✓ ✓ ✓ ✓ 0 0 0 0 0 0 0 0 8 – 8 8 8 8 8 8 8 8 8 8 8 8 8 8 6 7 9 5 – – E</td>
<td></td>
</tr>
<tr>
<td>REFLEX</td>
<td>14 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 0 0 0 0 0 0 0 0 8 – 7 2 8 6 9 8 9 9 7 6 8 3 6 2 – 0 5 3 F</td>
<td></td>
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</tbody>
</table>

Postemergence Tank-Mixes

<table>
<thead>
<tr>
<th>Trade Name</th>
<th>WSSA GROUP</th>
<th>Crop Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASAGRAN + REFLEX</td>
<td>6+14 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 0 0 0 0 0 0 0 0 8 – 9 5 9 7 9 8 9 9 7 9 8 5 2 2 8 1 5 7 F</td>
<td></td>
</tr>
<tr>
<td>REFLEX + VENTURE</td>
<td>14+1 ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ 9 8 9 8 8 9 9 9 8 – 7 2 8 6 9 8 9 9 7 6 8 3 6 2 – 0 5 3 F</td>
<td></td>
</tr>
</tbody>
</table>

1 Indicates a Phaseolus vulgaris dry common bean.
2 Use the high rate of herbicide for optimum control.
3 Use PRE timing for optimum control.
4 Use PPI timing for optimum control.
5 Weeds cannot be emerged at the time of application to achieve this level of control.
* Numerous equivalents to this product exist, refer to Table 4-1. Herbicides Used in Ontario for a complete list of products.
Beans
(Adzuki, Dry, Lima and Snap)

Dry beans (Phaseolus vulgaris) include black, cranberry, kidney, otebo, pinto, snap, small red Mexican and white bean market classes.

To minimize the risk of crop injury from herbicides applied in edible beans, the University of Guelph (Ridgetown campus) has found that:

- Dual II Magnum and Frontier when applied pre-plant incorporated offer better crop safety than when applied pre-emergence.

- There is a range in sensitivity to imazethapyr among the edible bean market classes grown in Ontario. The following rates of imazethapyr have been shown in field trials to minimize crop injury while maximizing yield and weed control when tank mixed with other herbicides (e.g., Prowl, Treflan, Dual, Frontier or Eptam):

  - Adzuki beans — (Pursuit: 126 mL/acre)
  - Large seeded edible beans (e.g., cranberry, kidney, yellow-eye) — (Pursuit: 100 mL/acre)
  - Small seeded edible beans (e.g., white, black, pinto) — (Pursuit: 75 mL/acre)

You will note that the rate of imazethapyr provided in this chapter is the labeled rate of 126 mL/acre when tank mixed with other herbicides. When rates are used which are lower than what is on the label, the manufacturer is not responsible for any reduced weed control or any crop loss that may occur as a result. Therefore, it is recommended that you discuss herbicide programs with the organization you have contracted your edible bean crop with, as they will have the most experience with the best regional weed control strategy.

High speed (10–20 km/h), shallow (2.5–3 cm) cultivation with a rotary hoe when beans are in the 1–2-leaf stage helps control small weed seedlings. This technique does not reduce herbicide action and may, in some years, enhance chemical weed control and improve crop safety.

Inter-row cultivation may be needed when weeds escape herbicide treatment. Consider weeds “escapes” when they are 5–7 cm high. Shallow cultivation will control the escaped weeds and prevents newly germinated ones from surviving.

Band treatment of chemical over the row reduces costs by one-half to two-thirds, depending on row spacing and width of band. Shallow inter-row cultivation will be required to control weeds between the bands.

Cultivation will give some control of established perennial weeds but may also help spread them to previously uninfested areas. Machinery sanitation is important when moving from one field to another.

Imazethapyr (e.g., Pursuit) and halosulfuron (Permit) are considered foundational soil applied herbicides in edible beans because they control a wide range of grass and/or broadleaf weeds. However, in the last 20 years, populations of weeds that are resistant to both of these “Group 2” herbicides have become more prominent, requiring other herbicides be tank mixed, or post-emergence broadleaf herbicides be applied to pick up any deficiencies in weed control.

Research by the University of Guelph (Ridgetown campus) has demonstrated that weed control is maximized in edible beans when a soil-applied herbicide program is used that targets the most prominent weeds in a field, followed by regular scouting commencing 10–14 days after application to look for new weed seedling emergence, so that herbicides can be applied to those weeds between the 4–8 leaf stage of growth when they are most susceptible.

Yield losses typically reach around 55% when weeds are not properly managed in edible beans. To minimize any yield losses from weed competition in edible beans they should be kept weed free from emergence to first flower.

When developing a weed control program, consider cultivation, rotation and other cultural practices along with herbicide treatments. Any single method of weed control, or the continuous use of the same chemical, can lead to the build-up of weeds resistant or tolerant to that control method. Rotating crops and/or other control methods reduce the chance of developing new or unique weed infestations.

Please refer to Table 7–1. Herbicide Weed Control Ratings for Beans (Adzuki, Dry, Lima and Snap), to determine which market classes of edible beans are registered for the herbicide treatments listed.
Herbicide Application Timings

- **Preplant (PP)** – Also see Chapter 6 Preplant & Postharvest Weed Control, for details of products, rates and remarks.
- **Preplant Incorporated (PPI)** – Unless stated otherwise, two incorporations at right angles operating at a depth of 10 cm using a double disk (7–10 km/h) or vibrating shank S-tine cultivator (10–13 km/h) are required. Cultivation equipment used for herbicide incorporation is known to spread perennial weeds to previously uninfested areas. Pay special attention to machinery cleanliness and/or treating fields with perennial weeds last.
- **Preemergence (PRE)** – Rainfall of 15–20 mm within 10 days after application is necessary to activate preemergence treatments. Shallow cultivation, rotary hoeing or harrowing will control weed escapes and improve herbicide activity in the absence of rainfall.
- **Postemergence (POST)** – Leaf stage of the weeds is critical for good weed control. Smaller weeds are usually more sensitive to herbicide injury. Apply according to labelled leaf stages. Crop stage is important to optimize crop safety. Adjuvants will frequently improve the weed control when used as directed. Weather or other conditions may influence the optimum rate of adjuvant. See the product label for more details. Always use appropriate drift management technology.
- **Preharvest** – It is important to follow the correct pre harvest interval (PHI), use rates and appropriate crop staging provided on the product label of pre harvest treatments so as to ensure a quality, marketable dry bean crop that is easy to harvest.

<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
<th>TRADE NAME (concentration)</th>
<th>PRODUCT RATE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil-Applied Grass Herbicides</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| s-metolachlor/benoxacor (1.05–1.6 kg/ha) | DUAL II MAGNUM (915 g/L) | 1.15–1.75 L/ha (0.46–0.7 L/acre) | • Apply PPI or PRE on all dry common bean (*Phaseolus vulgaris*) market classes.  
• Dual II MAGNUM must be applied PPI to lima beans. **Do NOT** apply PRE to lima beans.  
• Apply PPI to minimize the potential for crop injury.  
• **Do NOT** use on adzuki beans.  
• **Do NOT** use on muck, peat or high organic matter soils.  
• Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days.  
• Temporary injury can occur in the emerging crop.  
• Use the low rate for the control of nightshade. |
|                           | KOMODO/UPI-S MET (915 g/L) | 1.1–1.67 L/ha (0.44–0.67 L/acre) |             |
| EPTC (3.4–4.4 kg/ha) | EPTAM (800 g/L) | 4.25–5.5 L/ha (1.7–2.2 L/acre) | • Apply PPI. Incorporate immediately.  
• **Do NOT** use on adzuki, lima, otebo and small red Mexican beans.  
• If dry weather has preceded the application of EPTC, delay seeding 7–10 days.  
• Temporary injury can occur in the emerging crop.  
• Use the high rate for the control of nutsedge control. |
| dimethenamid-P (544–693 g/ha) | FRONTIER MAX (720 g/L) | 756–963 mL/ha (305–390 mL/acre) | • Apply PPI on all dry common bean (*Phaseolus vulgaris*) market classes.  
• Minimum PPI rate is 860 mL/ha (348 mL/acre).  
• **Do NOT** use on adzuki and lima beans.  
• **Do NOT** use on muck, peat or high organic matter soils.  
• Use the low rate on coarse-textured soils low in organic matter.  
• Use the higher rate of FRONTIER MAX for the control of nightshade and pigweed.  
• Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days. |
### TABLE 7–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
<th>TRADE NAME (concentration)</th>
<th>PRODUCT RATE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil-Applied Grass Herbicides (cont’d)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| pendimethalin (1.08 kg/ha) | PROWL H2O (455 g/L) | 2.37 L/ha (0.95 L/acre) | • PPI ONLY.  
• Do NOT harvest adzuki beans within 90 days of application, snap beans within 50 days of application and lima beans within 80 days of application. |
| trifluralin (0.6–1.155 kg/ha) | TREFLAN EC (480 g/L) | 1.25–2.4 L/ha (0.5–0.96 L/acre) | • Apply PPI. Incorporate as soon as possible, within 24 hr.  
• Do NOT use on adzuki, Dutch brown, cranberry, otebo, pinto, small red Mexican, snap and yellow-eye beans.  
• Do NOT exceed 1.25 L/ha (0.5 L/acre) of trifluralin (480 g/L) on medium-textured soils and 1.7 L/ha (0.68 L/acre) on heavy-textured soils for lima beans. |
| trifluralin (0.075 kg/ha) | PURSUIT (240 g/L) | 0.312 L/ha (0.126 L/acre) | • Apply PPI or PRE to adzuki and all dry bean (*Phaseolus vulgaris*) market classes.  
• Must be applied PRE to lima beans. Do NOT apply PPI to lima beans.  
• Delayed maturity or stunting may occur if cold and/or wet conditions are experienced within first week after application.  
• There is a range in sensitivity to imazethapyr among the edible bean market classes grown in Ontario. The following rates of imazethapyr have been shown in field trials to minimize crop injury while maximizing yield and weed control when tank mixed with other herbicides (e.g., Prowl, Treflan, Dual, Frontier or Eptam): Adzuki beans — (Pursuit: 126 mL/acre); Large seeded edible beans (e.g., cranberry, kidney) — (Pursuit: 100 mL/acre); Small seeded edible beans (e.g., white, black, pinto) — (Pursuit: 75 mL/acre)  
• Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days.  
• Do NOT harvest within 100 days of application.  
• Some rotational cropping restrictions apply (see Table 4–4. Herbicide Crop Rotation and Soil pH Restrictions – Field Crops). |
| Soil-Applied Tank-Mixes |
| s-metolachlor/benoxacor (1.05–1.60 kg/ha) + imazethapyr (0.075 kg/ha) | DUAL II MAGNUM (915 EC) + PURSUIT (240 g/L) | 1.15–1.75 L/ha (0.46–0.7 L/acre) + 0.312 L/ha (0.126 L/acre) | • Apply PRE ONLY to cranberry or kidney beans.  
• Apply PPI to all dry common bean (*Phaseolus vulgaris*) market classes.  
• Do NOT use on adzuki and lima beans.  
• Do NOT use on muck, peat or high organic matter soils.  
• Use the low rate on coarse-textured soils low in organic matter.  
• Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days.  
• Do NOT harvest within 100 days of application.  
• Some rotational cropping restrictions apply (see Table 4–4. Herbicide Crop Rotation and Soil pH Restrictions – Field Crops). |
### TABLE 7-2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
<th>TRADE NAME (concentration)</th>
<th>PRODUCT RATE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soil-Applied Tank-Mixes (cont’d)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| EPTC (2.4 kg/ha) + trifluralin (0.6 kg/ha) | EPTAM (800 g/L) + TREFLAN EC (480 g/L) | 3 L/ha (1.2 L/acre) + 1.25 L/ha (0.5 L/acre) | • Apply PPI, Incorporate immediately.  
• Use ONLY on white bean and red kidney bean.  
• If dry weather has preceded the application of EPTC, delay seeding 7–10 days. |
| EPTC (800 g/L) + RIVAL (500 g/L) | EPTAM (800 g/L) + BONANZA 480 (480 g/L) | 3 L/ha (1.2 L/acre) + 1.25 L/ha (0.5 L/acre) | |
| EPTAM (800 g/L) + TRIFLUREX 40 EC (412 g/L) | EPTAM (800 g/L) + RIVAL (500 g/L) + BONANZA 480 (480 g/L) | 3 L/ha (1.2 L/acre) + 1.45 L/ha (0.58 L/acre) | |
| EPTC (3.4–4.2 kg/ha) + halosulfuron (26.25–35.25 g/ha) | EPTAM (800 g/L) + PERMIT (72.6%) | 4.25–5.25 L/ha (1.7–2.1 L/acre) + 35–47 g/ha (14–19 g/acre) | • Apply PPI to a depth of approximately 5 cm just before planting.  
• Use lower rate on lighter textured soils with low organic matter.  
• Refer to EPTAM 8-E label for specific incorporation directions.  
• Rotary hoe lightly during or shortly after emergence of the beans to break any crust which occurs. |
| dimethenamid-P (544–693 g/ha) + imazethapyr (0.075 kg/ha) | FRONTIER MAX (720 g/L) + PURSUIT (240 g/L) | 756–963 mL/ha (305–390 mL/acre) + 0.312 L/ha (0.126 L/acre) | • Apply PPI on all dry common bean (*Phaseolus vulgaris*) market classes.  
• Do NOT use on adzuki and lima beans.  
• Do NOT use on muck, peat or high organic matter soils.  
• Use the low rate on coarse-textured soils low in organic matter.  
• Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days.  
• Do NOT harvest within 100 days of application.  
• Some rotational cropping restrictions apply (see Table 4–4. Herbicide Crop Rotation and Soil pH Restrictions – Field Crops). |
| halosulfuron (37.5 g/ha) + trifluralin (0.84 kg/ha) | PERMIT (72.6%) + TREFLAN EC (480 g/L) | 52.5 g/ha (21 g/acre) + 1.75 L/ha (0.7 L/acre) | • Apply PPI and incorporate as soon as possible within 24 hr.  
• Use ONLY on white beans.  
• This tank-mix provides broad spectrum control of both grassy and broadleaf weeds in white beans. |
### TABLE 7–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
<th>TRADE NAME (concentration)</th>
<th>PRODUCT RATE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil-Applied Tank-Mixes (cont’d)</td>
<td></td>
<td></td>
<td>For more information, see Notes on Herbicides.</td>
</tr>
</tbody>
</table>
| imazethapyr (0.075 kg/ha) + trifluralin (0.6–1.15 kg/ha) | PURSUIT (240 g/L) or PHANTOM (240 g/L) or NU-IMAGE (240 g/L) + TREFLAN EC (480 g/L) | 0.312 L/ha (0.126 L/acre) + 1.25–2.4 L/ha (0.5–0.96 L/acre) | • Apply PPI and incorporate as soon as possible within 24 hr.  
• Use ONLY on white beans.  
• Do NOT harvest within 100 days of application.  
• Some rotational cropping restrictions apply (see Table 4–4. Herbicide Crop Rotation and Soil pH Restrictions – Field Crops). |
| | PURSUIT (240 g/L) or PHANTOM (240 g/L) or NU-IMAGE (240 g/L) + RIVAL (500 g/L) | 0.312 L/ha (0.126 L/acre) + 1.2–2.3 L/ha (0.48–0.92 L/acre) |  
| | PURSUIT (240 g/L) or PHANTOM (240 g/L) or NU-IMAGE (240 g/L) + BONANZA 480 (480 g/L) | 0.312 L/ha (0.126 L/acre) + 1.25–2.4 L/ha (0.5–0.96 L/acre) |  
| | PURSUIT (240 g/L) or PHANTOM (240 g/L) or NU-IMAGE (240 g/L) + TRIFLUREX 40 EC (412 g/L) | 0.312 L/ha (0.126 L/acre) + 1.45 L/ha (0.58 L/acre) |  
| Postemergence Grass Herbicides | | | |
| quizalofop-p-ethyl (0.036–0.07 kg/ha) + oil concentrate (0.5% v/v) | ASSURE II (96 g/L) + SURE-MIX | 0.38–0.75 L/ha (0.15–0.3 L/acre) + 5 L/1,000 L | • Apply to emerged annual grasses and volunteer cereals in 2-leaf to tillering stage and volunteer corn and quackgrass in the 2–6-leaf stage.  
• For use on adzuki, lima and all dry common bean (Phaseolus vulgaris) market classes.  
• Use the 0.38 L/ha (0.15 L/acre) rate for control of volunteer corn, volunteer cereals and green foxtail.  
• The 0.5 L/ha (0.2 L/acre) rate will suppress quackgrass and also control barnyard grass.  
• Use the 0.75 L/ha (0.3 L/acre) rate for control of quackgrass. |
| | CONTENDER (96 g/L) + CONTENDER MSO  
YUMA GL (96 g/L) + surfactant | | |
| sethoxydim (0.15–0.5 kg/ha) + surfactant (1–2 L/ha) | POAST ULTRA (450 g/L) + MERGE | 0.32–1.1 L/ha (0.13–0.45 L/acre) + 1–2 L/ha (0.4–0.8 L/acre) | • Apply POST when annual grasses and volunteer cereals are in the 1–6-leaf stage and quackgrass is in the 1–3-leaf stage.  
• Apply POST to adzuki, lima and all dry common bean (Phaseolus vulgaris) market classes.  
• Use the intermediate rate of 0.47 L/ha (0.19 L/acre) for volunteer spring cereals.  
• Use the high rate of 1.1 L/ha (0.45 L/acre) for quackgrass.  
• Thorough preplant tillage will ensure more uniform quackgrass emergence. Follow with a cultivation 7 days after treatment in wide row crops.  
• Do NOT apply if rain is expected within 1 hour after application. |
### TABLE 7–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
<th>TRADE NAME (concentration)</th>
<th>PRODUCT RATE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
</table>
| clethodim (45-90 g/ha) + surfactant (0.5% v/v) | SELECT (240 g/L) + AMIGO | 188–375 mL/ha (75-150 mL/acre) + 5 L/1,000 L | • Apply POST to all dry common bean (*Phaseolus vulgaris*) market classes and when annual grasses and volunteer cereals are in the 1–6-leaf stage.  
• Do NOT apply if rain is expected within 1 hr after application.  
• Do NOT use on adzuki and lima beans.  
• Do NOT harvest within 60 days of application.  
• For control of quackgrass, apply at 375 mL/ha (150 L/acre) with the appropriate surfactant at 10 L/1,000 L water.  
• ARROW ALL-IN has an adjuvant included in its formulation, therefore does not require the addition of an adjuvant that is required when using SELECT or STATUE. |
| fluazifop-P-butyl (0.075–0.25 kg/ha) | VENTURE L (125 g/L) + CARRIER ANTLER (240 g/L) + X-ACT or ADAMA ADJUVANT 80 | 0.6–2 L/ha (0.243–0.8 L/acre) | • Apply POST to adzuki and all dry common bean (*Phaseolus vulgaris*) market classes.  
• Do NOT apply to adzuki or dry common beans past the third trifoliate leaf stage.  
• Do NOT use on lima beans.  
• The 0.6 L/ha (0.243 L/acre) rate is for the control of volunteer corn at the 2–5-leaf stage.  
• The 1 L/ha (0.4 L/acre) rate is for the control of annual grasses at the 2–4-leaf stage.  
• The 2 L/ha (0.8 L/acre) rate is for the control of quackgrass or wirestem muhly at the 3–5-leaf stage.  
• Do NOT harvest adzuki and dry beans within 75 days of application. |

### Postemergence Grass Herbicides (cont’d)

<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
<th>TRADE NAME (concentration)</th>
<th>PRODUCT RATE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
</table>
| bentazon (0.84–1.08 kg/ha) + adjuvant (2 L/ha) | BASAGRAN FORTÉ (480 g/L) BROADLOOM (480 g/L) BASAGRAN (480 g/L) + ASSIST | 1.75–2.25 L/ha (0.7–0.9 L/acre) + 2 L/ha (0.8 L/acre) | • Apply POST when beans are in the unifoliate to 4-trifoliate leaf stage.  
• Apply POST to all dry common bean (*Phaseolus vulgaris*) market classes.  
• Do NOT use on adzuki beans.  
• Apply when weeds are small and actively growing.  
• Two applications of 1.75 L/ha (0.7 L/acre) 10 days apart may be required to control the perennial weeds.  
• No adjuvant is required with BASAGRAN FORTÉ.  
• BROADLOOM: The addition of ammonium sulphate at 1.5% v/v will result in more consistent weed control. The addition of ammonium sulphate may cause some leaf burn, but new growth is normal and yield is not reduced. The potential for leaf burn is increased when relative humidity and temperature are high. Use with ASSIST Oil Concentrate.  
• Do NOT apply if rain is expected within 6 hr after application. |
| halosulfuron (26.25–50.82 g/ha) | PERMIT (72.6%) | 35–70 g/ha (14–28 g/acre) | • Apply as a directed spray when plants have 2–4 trifoliate leaves and before flowering. Make one broadcast application. Directed sprays are recommended to limit crop injury.  
• Use a nonionic surfactant (NIS).  
• Use 35–46.7 g/ha for broadleaved weeds. Where nutsedge is present, use up to 70 g/ha.  
• Following the final application allow 30 days before harvesting.  
• Make ONLY one PERMIT Herbicide application per crop cycle. Apply either Pre-Emergence or Post-Emergence, but not both.  
• PERMIT Herbicide will not control ALS resistant weeds.  
• Do NOT apply more than 70 g of PERMIT Herbicide per hectare per season. |
<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
<th>TRADE NAME (concentration)</th>
<th>PRODUCT RATE</th>
<th>PRECAUTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>fomesafen (0.24 kg/ha) + adjuvant (0.25% v/v)</td>
<td>REFLEX (240 g/L) + TURBOCHARGE</td>
<td>1 L/ha (0.4 L/acre) + 5 L/1,000 L</td>
<td>• Apply POST when beans are in the 1–2 trifoliate leaf stage. • Apply when weeds are small and actively growing. • Apply in 200–350 L water/ha (80–140 L/acre water). • Do NOT apply if rain is expected within 4 hr after application. • Do NOT apply REFLEX to any field more often than once every 2 years. • Do NOT apply to crop under stress. • Some rotational cropping restrictions apply. • Do NOT harvest adzuki and dry beans within 84 days of application. • Do NOT harvest snap beans within 30 days of application.</td>
</tr>
<tr>
<td>bentazon (0.84 kg/ha) + fomesafen (0.21–0.24 kg/ha) + oil concentrate (2 L/ha)</td>
<td>BASAGRAN (480 g/L) + REFLEX (240 g/L) + ASSIST</td>
<td>1.75 L/ha (0.7 L/acre) + 0.875–1 L/ha (0.35–0.4 L/acre) + 2 L/ha (0.8 L/acre)</td>
<td>• Apply POST when beans are in the 1–2 trifoliate leaf stage. • Use ONLY on white and kidney beans. • Refer to the BASAGRAN label and the REFLEX label for information on specific weed stage and height. • Do NOT apply if rain is expected within 6 hr after application.</td>
</tr>
<tr>
<td>fomesafen (0.24 kg/ha) + fluazifop-p-butyl (6 g/ha) + surfactant (0.5% v/v)</td>
<td>REFLEX (240 g/L) + VENTURE L (125 g/L) + TURBOCHARGE</td>
<td>1 L/ha (0.4 L/acre) + 0.6–2.0 L/ha (0.243–0.8 L/acre) + 5 L/1,000 L</td>
<td>• Apply POST to adzuki and all dry common bean (<em>Phaseolus vulgaris</em>) market classes when in the 1–2 trifoliate leaf stage. • Do NOT apply to adzuki or dry common beans past the third trifoliate leaf stage. • Do NOT use on lima beans. • Apply in 200 L/ha (80 L/acre) water. • The 0.6 L/ha (0.243 L/acre) rate is for the control of volunteer corn at the 2–5-leaf stage. • The 1 L/ha (0.4 L/acre) rate is for the control of annual grasses at the 2–4-leaf stage. • The 2 L/ha (0.8 L/acre) rate is for the control of quackgrass or wirestem muhly at the 3–5-leaf stage. • Do NOT harvest adzuki and dry beans within 84 days of application.</td>
</tr>
<tr>
<td>carfentrazone-ethyl (0.0175–0.028 kg/ha) + non-ionic surfactant (0.25% v/v)</td>
<td>AIM EC (240 g/L) + non-ionic surfactant</td>
<td>73–117 mL/ha (30–47 mL/acre) + 2.5 L/1,000 L</td>
<td>• Apply to actively growing weeds, up to 10 cm. • Coverage of weed and crop foliage is essential for control. • Do NOT harvest within 1 day of application.</td>
</tr>
<tr>
<td>carfentrazone-ethyl (0.0175–0.028 kg/ha) + MERGE (0.1% v/v)</td>
<td>AIM EC (240 g/L) + MERGE</td>
<td>73–117 mL/ha (30–47 mL/acre) + 10 L/1,000 L</td>
<td>• Apply to actively growing weeds, up to 10 cm. • Coverage of weed and crop foliage is essential for control. • Do NOT harvest within 1 day of application.</td>
</tr>
</tbody>
</table>
### TABLE 7–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

<table>
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<tr>
<td></td>
<td></td>
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<td>For more information, see Notes on Herbicides.</td>
</tr>
<tr>
<td>Preharvest (cont’d)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| saflufenacil (25–50 g/ha) + adjuvant (0.5% v/v) | ERAGON LQ (342 g/L) + MERGE | 73–146 mL/ha (29.5–59 mL/acre) + 1 L/ha (0.4 L/acre) | - Apply when the stems are green to brown in colour and pods are mature (yellow-brown) and 80%–90% of the original leaves have dropped.  
- Apply in 200 L/ha (80 L/acre) of water.  
- **Do NOT** harvest within 3 days of application.  
- Tips to improve performance: 1) Increase carrier volume to 250 L/ha (100 L/acre) of water; 2) Apply during the warmest part of the day and ideally when humid and sunny, 3) Avoid applications during cloudy, overcast conditions and 4) Use nozzles that deliver a medium to coarse droplets. |
| saflufenacil (25–50 g/ha) + glyphosate (900 g/ha) + adjuvant (0.5% v/v) | ERAGON LQ (342 g/L) + glyphosate (540 g/L)* + MERGE | 73–146 mL/ha (29.5–59 mL/acre) + 1.67 L/ha (0.67 L/acre) + 1 L/ha (0.4 L/acre) | - Apply when the stems are green to brown in colour and pods are mature (yellow-brown) and 80%–90% of the original leaves have dropped.  
- Apply in 200 L/ha (80 L/acre) of water.  
- **Do NOT** harvest within 7 days of application.  
- Refer to preharvest precautions for glyphosate. |
| glyphosate (0.9 kg/ha) | glyphosate (360 g/L) | 2.5 L/ha (1 L/acre) | - Apply Preharvest when the crop is 30% grain moisture or less (yellow to brown pod colour, 80%–90% leaf drop) and at least 7 days prior to harvest.  
- **Do NOT** use on snap beans.  
- **Do NOT** apply to crops grown for seed.  
- **Do NOT** apply by air.  
- Apply in 50–100 L/ha of water.  
- **Do NOT** apply if rain is expected shortly after application. |
|                       | glyphosate (480 g/L)     | 1.86 L/ha (0.75 L/acre) |             |
|                       | glyphosate (540 g/L)     | 1.67 L/ha (0.67 L/acre) |             |
| glufosinate ammonium (0.37–0.45 kg/ha) | IGNITE (150 g/L) | 2.5–3 L/ha (1–1.2 L/acre) | - Apply Preharvest when approximately 50%–75% of the bean pods have naturally changed colour from green to yellow or brown and at least 9 days before harvest.  
- **Do NOT** use on snap beans.  
- **Do NOT** apply to dry beans grown for seed.  
- Use the higher rate when the crop canopy is dense and/or there are high populations of weeds present at application.  
- Apply in a minimum of 110 L/ha (44 L/acre) of water at a pressure of 275 kPa (40 psi). Where crop canopy is dense, or weed growth is heavy, apply 170–220 L/ha (68–88 L/acre) of water.  
- **Do NOT** apply by air.  
- **Do NOT** apply if rain is expected within 4 hours after application. |
### TABLE 7-2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont’d)

<table>
<thead>
<tr>
<th>Active Ingredient (rate)</th>
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</tr>
</thead>
</table>
| diquat (0.3–0.55 kg/ha) + surfactant (0.1% v/v) | REGLONE DESICCANT (240 g/L) + AGRAL 90 | 1.25–2.3 L/ha (0.5–0.92 L/acre) + 1 L/1,000 L | • Apply Preharvest when 80% natural leaf defoliation and 80% of the pods have turned yellow.  
• Do NOT use on lima or snap beans.  
• Avoid regrowth by targeting spray within 7 days of bean variety maturity date and harvest 5–7 days after application.  
• Use 1.25–1.7 L/ha (0.5 - 0.7 L/acre) by ground and 1.7–2.3 L/ha (0.7 - 0.92 L/acre) for aerial applications.  
• Use a minimum of 225 L/ha of spray volume.  
• Use the higher rate for heavy canopy of crop or weeds.  
• Do NOT apply if rain is expected within 15 minutes after application. |
| | BOLSTER DESICCANT (240 g/L) + AGRAL 90 | | |
| | ARMORY DESICCANT (240 g/L) + AGRAL 90 | | |
| flumioxazin (53.7 g/ha) + methylated seed oil (2.5 L/ha) | VALTERA (51.1% DF) + MSO Concentrate | 105 g/ha (42 g/acre) + 2.5 L/ha (1 L/acre) | • Apply in 140–280 L/ha (56–112 L/acre) of water.  
• Do NOT harvest within 5 days of application.  
• Tips to improve performance: 1) Increase carrier volume to 250 L/ha (100 L/acre) of water; 2) Apply during the warmest part of the day and ideally when humid and sunny, 3) Avoid applications during cloudy, overcast conditions and 4) Use nozzles that deliver a medium to coarse droplets. |
| | VALTERA EZ (480 g/L) + MSO Concentrate | 112 mL/ha (45 mL/acre) + 2.5 L/ha (1 L/acre) | |
| flumioxazin (53.7 g/ha) + glyphosate (900 g/ha) + methylated seed oil (2.5 L/ha) | VALTERA (51.1% DF) + glyphosate (540 g/L)* + MSO Concentrate | 105 g/ha (42 g/acre) + 1.67 L/ha (0.67 L/acre) + 2.5 L/ha (1 L/acre) | • Apply in 140–280 L/ha (56–112 L/acre) of water.  
• Do NOT harvest within 7 days of application.  
• Refer to preharvest precautions for glyphosate, on this page.  
* See Table 4–1. *Herbicides Used in Ontario* for formulations available. See label for specific uses and rates. |
| | VALTERA EZ (480) + glyphosate (540 g/L)* + MSO Concentrate | 112 mL/ha (45 mL/acre) + 1.67 L/ha (0.67 L/acre) + 2.5 L/ha (1 L/acre) | |