

6. 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 6–1. Herbicide Weed Control Ratings for Beans (Adzuki, Dry, Lima and Snap)

LEGEND: Numbers (0–9) = weed control ratings Crop tolerance ratings: E = Excellent, G = Good, F = Fair, P = Poor – = insufficient information available to make a rating
 ✓ = 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.

Trade Name	WSSA GROUP	Crop Registrations										Annual Grasses						Annual Broadleaves										Perennials					Crop Tolerance															
		adzuki beans	black beans ¹	cranberry beans ¹	kidney beans ¹	lima beans	otoho beans ¹	pinto beans ¹	small red Mexican ¹	snap beans ¹	white beans ¹	barnyard grass	crabgrass	fall panicum	foxtail, giant	foxtail, green	foxtail, yellow	proso millet	witchgrass	buckwheat, wild	chickweed	cocklebur	fleabane, Canada	lady's-thumb	lamb's-quarters	mustards	nightshades, annual	pigweeds	ragweed, common	ragweed, giant	velvetleaf	waterhemp		bindweed, field	horsetail	milkweed	nut-sedge	quackgrass	sow-thistle	thistle, Canada								
Preplant Incorporated Grass Herbicides																																																
DUAL II MAGNUM, KOMODO	15	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	9	8 ²	8	9	9	4	9	2	–	–	0	2	7	2	8 ³	7	4	3	2	6	0	0	0	8	0	0	0	G	
EPTAM	8	x	✓	✓	✓	x	x	✓	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	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	9	8 ²	8	9	9	4	9	2	–	–	0	2	7	2	8 ³	7	4	3	2	6	0	0	0	8	0	0	0	G	
PROWL H2O	3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	9	9	9	8	8	8	5	–	–	9	–	–	7	–	–	8	–	–	–	7	–	–	–	–	–	–	–	–	E	
TREFLAN, BONANZA 480, RIVAL EC or TRIFLUREX 40 EC	3	x	✓	x	✓	✓	x	x	x	x	✓	✓	✓	✓	✓	✓	✓	✓	9	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	2	2	E
Preplant Incorporated Grass and Broadleaf Herbicides																																																
PURSUIT, PHANTOM or NU-IMAGE	2	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	8	7	7	9 ^R	9 ^R	9	7	8	8	9	7 ^R	2	9	9 ^R	9	9 ^R	9 ^R	7 ^R	6 ^R	9	2 ^R	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 3–1. *Herbicides Used in Ontario* for a complete list of products.

TABLE 6-1. 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 - = insufficient information available to make a rating
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Trade Name	WSSA GROUP	Crop Registrations										Annual Grasses							Annual Broadleaves										Perennials						Crop Tolerance					
		adzuki beans	black beans ¹	cranberry beans ¹	kidney beans ¹	lima beans	otoe beans ¹	pinto beans ¹	small red Mexican ¹	snap beans ¹	white beans ¹	barnyard grass	crabgrass	fall panicum	foxtail, giant	foxtail, green	foxtail, yellow	proso millet	witchgrass	buckwheat, wild	chickweed	cocklebur	fleabane, Canada	lady's-thumb	lamb's-quarters	mustards	nightsades, annual	pigweeds	ragweed, common	ragweed, giant	velvetleaf	waterhemp	bindweed, field	horsetail		milkweed	nutssedge	quackgrass	sow-thistle	thistle, Canada
Preplant Incorporated Tank-Mixes																																								
DUAL II MAGNUM* + PURSUIT (imazethapyr*)	15+2	x	✓	✓	✓	x	✓	✓	✓	✓	✓	9	9	8 ²	9	9	9	7	9	8	9	7 ^R	2	9	9 ^R	9	9	7 ^R	6 ^R	9	6	-	-	-	8	7	-	-	E	
EPTAM + TREFLAN (trifluralin*)	8+3	x	x	x	✓	x	x	x	x	✓	9	9	9	9	9	9	7	9	5	9	-	5	7	8	5	7	8	5	3	5	8	-	-	-	8	7	-	-	E	
EPTAM + PERMIT	8+2	x	x	x	✓	x	x	x	x	✓	9	9	8	9	9	9	7	9	5	8 ²	8 ^R	8 ^R	8	8 ^R	8	7	8 ^R	8 ^R	8 ^R	8 ^R	-	6	6	7	9	-	-	-	E	
FRONTIER MAX + PURSUIT	15+2	x	✓	✓	✓	x	✓	✓	✓	✓	9	9	8 ²	9	9	9	7	9	8	9	7 ^R	2	9	9 ^R	9	9	9	7 ^R	6 ^R	9	6	-	-	-	8	7	-	-	E	
PERMIT + TREFLAN (trifluralin*)	2+3	x	x	x	x	x	x	x	x	✓	9	9	9	9	9	9	7	9	5	8 ²	8 ^R	8 ^R	8	8	8	2	8 ^R	8 ^R	8 ^R	8 ^R		6	6	7	9	-	-	-	E	
PURSUIT (imazethapyr*) + TREFLAN (trifluralin*)	2+3	x	x	x	x	x	x	x	x	✓	9	9	9	9	9	9	7	9	8	9	7 ^R	5	9	9	9	9 ^R	9	7 ^R	6 ^R	9	8	2	2	2	7	6	2	2	G	
Preemergence Grass Herbicides																																								
DUAL II MAGNUM, KOMODO	15	x	✓	✓	✓	x	✓	✓	✓	x	✓	9	9	8 ²	8	9	9	4	9	2	0	0	0	2	7	2	8	7	4	3	2	6	0	0	0	7 ⁴	0	0	0	G
Preemergence Broadleaf Herbicides																																								
PERMIT	2	x	✓	✓	✓	x	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	8 ²	8 ^R	8 ^R	8	8 ^R	8	2	8 ^R	8 ^R	8 ^R	8 ^R	-	6	6	7	9	-	-	-	E	
Preemergence Grass and Broadleaf Herbicides																																								
PURSUIT, PHANTOM or NU-IMAGE	2	✓	✓	✓	✓	✓	✓	✓	✓	✓	8	7	7	9 ^R	9 ^R	9	7	8	8	9	7 ^R	2	9	9 ^R	9	9 ^R	9 ^R	7 ^R	6 ^R	9	2 ^R	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.

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* Numerous equivalents to this product exist, refer to Table 3-1. *Herbicides Used in Ontario* for a complete list of products.

TABLE 6-1. 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 - = insufficient information available to make a rating
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Trade Name	WSSA GROUP	Crop Registrations											Annual Grasses						Annual Broadleaves										Perennials						Crop Tolerance							
		adzuki beans	black beans ¹	cranberry beans ¹	kidney beans ¹	lima beans	otoebo beans ¹	pinto beans ¹	small red Mexican ¹	snap beans ¹	white beans ¹	barnyard grass	crabgrass	fall panicum	foxtail, giant	foxtail, green	foxtail, yellow	proso millet	witchgrass	buckwheat, wild	chickweed	cocklebur	fleabane, Canada	lady's-thumb	lamb's-quarters	mustards	nightsades, annual	pigweeds	ragweed, common	ragweed, giant	velvetleaf	waterhemp	bindweed, field	horsetail		milkweed	nutseidge	quackgrass	sow-thistle	thistle, Canada		
Preemergence Tank-Mixes																																										
DUAL II MAGNUM + PURSUIT (imazethapyr*)	15 + 2	x	x	✓	✓	x	x	x	x	x	x	9	9	8 ²	9	9	9	7	9	8	9	7 ^R	2	9	9 ^R	9	9	9	7 ^R	6 ^R	9	6	-	-	-	8 ⁴	7	-	-	E		
Postemergence Grass Herbicides																																										
ASSURE II, CONTENDER or YUMA GL	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	9	0	0	E	
POAST ULTRA	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
SELECT, STATUE, ANTLER, ARROW ALL-IN or CLETHODIM 240	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	7	0	0	E
VENTURE L	1	✓	✓	✓	✓	x	✓	✓	✓	x	✓	9	8	9	8	8	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	E	
Postemergence Broadleaf Herbicides																																										
BASAGRAN, BROADLOOM or BENTA SUPER	6	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	0	0	0	0	0	0	0	7	-	9	5	9	7	9	7	7	8	6	9	1	6	2	2	8	0	5	7	G			
BASAGRAN FORTÉ	6	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	0	0	0	0	0	0	0	7	-	9	5	9	7	9	7	7	8	6	9	1	6	2	2	8	0	5	7	G			
PERMIT	2	x	✓	✓	✓	x	✓	✓	✓	✓	✓	0	0	0	0	0	0	0	-	-	8 ^R	-	8	-	8	7	8 ^R	8 ^R	8 ^R	8 ^R	-	6	6	7	9	5	6	-	E			
REFLEX	14	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	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			
Postemergence Tank-Mixes																																										
BASAGRAN* + REFLEX	6+14	x	x	x	✓	x	x	x	x	x	✓	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			
REFLEX + VENTURE	14+1	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	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		

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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.

**Apply all treatments in 150–300 L/ha
(60–120 L/acre) water,
unless otherwise specified.**

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.

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.

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.

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)

Please 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.

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.

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.

Please refer to Table 6–1. *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 5 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 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
Soil-Applied Grass Herbicides			
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)	<ul style="list-style-type: none"> • Apply PPI or PRE on all dry common bean (<i>Phaseolus vulgaris</i>) 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. • 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. • Improved yellow nutsedge control is obtained when DUAL MAGNUM is applied PPI. • Use the higher rate for the control of nightshade.
	KOMODO (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)	<ul style="list-style-type: none"> • 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 nutsedge control.
dimethenamid-P (544–693 g/ha)	FRONTIER MAX (720 g/L)	756–963 mL/ha (305–390 mL/acre)	<ul style="list-style-type: none"> • Apply PPI on all dry common bean (<i>Phaseolus vulgaris</i>) 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 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont'd)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
Soil-Applied Grass Herbicides (cont'd)			
pendimethalin (1.08 kg/ha)	PROWL H2O (455 g/L)	2.37 L/ha (0.95 L/acre)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Apply PPI. Incorporate as soon as possible, within 24 hr.
	RIVAL (500 g/L)	1.2–2.3 L/ha (0.48–0.92 L/acre)	<ul style="list-style-type: none"> • Do NOT use on adzuki, Dutch brown, cranberry, otebo, pinto, small red Mexican, snap and yellow-eye beans.
	BONANZA 480 (480g/L)	1.25–2.4 L/ha (0.5–0.96 L/acre)	<ul style="list-style-type: none"> • 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.
	TRIFLUREX 40 EC (412 g/L)	1.45–2.8 L/ha (0.58–1.12 L/acre)	
Soil-Applied Broadleaf Herbicides			
halosulfuron (26.25–35.25 g/ha)	PERMIT (72.6%)	35–47 g/ha (14–19 g/acre)	<ul style="list-style-type: none"> • Apply PRE after seeding but prior to soil cracking. Use the lower rate on lighter textured soils with low organic matter.
Soil-Applied Grass and Broadleaf Herbicides			
imazethapyr (0.075 kg/ha)	PURSUIT (240 g/L)	0.312 L/ha (0.126 L/acre)	<ul style="list-style-type: none"> • Apply PPI or PRE to adzuki and all dry bean (<i>Phaseolus vulgaris</i>) 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. • 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 3–3. <i>Herbicide Crop Rotation and Soil pH Restrictions – Field Crops</i>).
	PHANTOM (240 g/L)		
	NU-IMAGE (240 g/L)		
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)	<ul style="list-style-type: none"> • Apply PRE ONLY to cranberry or kidney beans. • Apply PPI to all dry common bean (<i>Phaseolus vulgaris</i>) 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 3–3. <i>Herbicide Crop Rotation and Soil pH Restrictions – Field Crops</i>).
	DUAL II MAGNUM (915 EC) + PHANTOM (240 g/L)		
	DUAL II MAGNUM (915 EC) + NU-IMAGE (240 g/L)		
	KOMODO (915 g/L) + PURSUIT (240 g/L)	1.1–1.67 L/ha (0.44–0.67 L/acre) + 0.312 L/ha (0.126 L/acre)	
EPTC (2.4 kg/ha) + trifluralin (0.6 kg/ha)	EPTAM (800 g/L)	3 L/ha (1.2 L/acre)	<ul style="list-style-type: none"> • 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.
	+ TREFLAN EC (480 g/L)	+ 1.25 L/ha (0.5 L/acre)	
	EPTAM (800 g/L)	3 L/ha (1.2 L/acre)	
	+ RIVAL (500 g/L)	+ 1.2 L/ha (0.48 L/acre)	
	EPTAM (800 g/L)	3 L/ha (1.2 L/acre)	
+ BONANZA 480 (480 g/L)	+ 1.25 L/ha (0.5 L/acre)		
EPTAM (800 g/L)	3 L/ha (1.2 L/acre)		
+ TRIFLUREX 40 EC (412 g/L)	+ 1.45 L/ha (0.58 L/acre)		

TABLE 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont'd)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
Soil-Applied Tank-Mixes (cont'd)			
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)	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Apply PPI on all dry common bean (<i>Phaseolus vulgaris</i>) 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 3–3. <i>Herbicide Crop Rotation and Soil pH Restrictions – Field Crops</i>).
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)	<ul style="list-style-type: none"> • 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.
	PERMIT (72.6%) + RIVAL (500 g/L)	52.5 g/ha (21 g/acre) + 1.68 L/ha (0.67 L/acre)	
	PERMIT (72.6%) + BONANZA 480 (480 g/L)	52.5 g/ha (21 g/acre) + 1.75 L/ha (0.7 L/acre)	
	PERMIT (72.6%) + TRIFLUREX 40 EC (412 g/L)	52.5 g/ha (21 g/acre) + 2.05 L/ha (0.82 L/acre)	
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)	<ul style="list-style-type: none"> • 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 3–3. <i>Herbicide Crop Rotation and Soil pH Restrictions – Field Crops</i>).
	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)	

TABLE 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont'd)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
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	<ul style="list-style-type: none"> • 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 (<i>Phaseolus vulgaris</i>) 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)	<ul style="list-style-type: none"> • 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 (<i>Phaseolus vulgaris</i>) 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.
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	<ul style="list-style-type: none"> • Apply POST to all dry common bean (<i>Phaseolus vulgaris</i>) 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, STATUE, ANTLER or CLETHODIM 240.
	STATUE (240 g/L) + CARRIER		
	ANTLER (240 g/L) + X-ACT or ADAMA ADJUVANT 80		
	CLETHODIM 240 (240 g/L) + SURF-ACT		
	ARROW ALL-IN (120 g/L)		
fluazifop-P-butyl (0.075–0.25 kg/ha)	VENTURE L (125 g/L)	0.6–2 L/ha (0.243–0.8 L/acre)	<ul style="list-style-type: none"> • Apply POST to adzuki and all dry common bean (<i>Phaseolus vulgaris</i>) market classes. • Do NOT apply to adzuki or dry common beans past the third trifoliolate 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.

TABLE 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont'd)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
Postemergence Broadleaf Herbicides			
bentazon (0.84–1.08 kg/ha) + adjuvant (2 L/ha)	BASAGRAN FORTÉ (480 g/L) BROADLOOM (480 g/L) + ASSIST BASAGRAN (480 g/L) + ASSIST BENTA SUPER (480 g/L) + ASSIST	1.75–2.25 L/ha (0.7–0.9 L/acre) 1.75–2.25 L/ha (0.7–0.9 L/acre) + 2 L/ha (0.8 L/acre)	<ul style="list-style-type: none"> • Apply POST when beans are in the unifoliate to 4-trifoliate leaf stage. • Apply POST to all dry common bean (<i>Phaseolus vulgaris</i>) 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 or BENTA SUPER: The addition of ammonium sulphate at 1.5% v/v will result in more consistent weed control, but may cause some leaf burn, but however new growth is normal and there is no negative affect on grain yield. 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)	<ul style="list-style-type: none"> • 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.
fomesafen (0.24 kg/ha) + adjuvant (0.25% v/v)	REFLEX (240 g/L) + TURBOCHARGE	1 L/ha (0.4 L/acre) + 5 L/1,000 L	<ul style="list-style-type: none"> • 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.

TABLE 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont'd)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
Postemergence Tank-Mixes			
bentazon (0.84 kg/ha) + fomesafen (0.21–0.24 kg/ha) + oil concentrate (2 L/ha)	BASAGRAN (480 g/L) + REFLEX (240 g/L) + ASSIST BROADLOOM (480 g/L) + REFLEX (240 g/L) + ASSIST BENTA SUPER (480 g/L) + REFLEX (240 g/L) + ASSIST	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)	<ul style="list-style-type: none"> • Apply POST when beans are in the 1–2 trifoliolate leaf stage. • Use ONLY on white and kidney beans. • Most susceptible weeds should be at the 4-6 leaf stage at the time of application. • Do NOT apply if rain is expected within 6 hr after application.
fomesafen (0.24 kg/ha) + fluazifop-p-butyl (6 g/ha) + surfactant (0.5% v/v)	REFLEX (240 g/L) + VENTURE L (125 g/L) + TURBOCHARGE	1 L/ha (0.4 L/acre) + 0.6–2.0 L/ha (0.243–0.8 L/acre) + 5 L/1,000 L	<ul style="list-style-type: none"> • Apply POST to adzuki and all dry common bean (<i>Phaseolus vulgaris</i>) market classes when in the 1–2 trifoliolate leaf stage. • Do NOT apply to adzuki or dry common beans past the third trifoliolate 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.
Preharvest			
carfentrazone-ethyl (0.0175–0.028 kg/ha) + non-ionic surfactant (0.25% v/v)	AIM EC (240 g/L) + non-ionic surfactant	73–117 mL/ha (30–47 mL/acre) + 2.5 L/1,000 L	<ul style="list-style-type: none"> • 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.
carfentrazone-ethyl (0.0175–0.028 kg/ha) + MERGE (0.1% v/v)	AIM EC (240 g/L) + MERGE	73–117 mL/ha (30–47 mL/acre) + 10 L/1,000 L	

TABLE 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont'd)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
Preharvest (cont'd)			
saflufenacil (25–50 g/ha) + adjuvant (0.5% v/v)	ERAGON LQ (342 g/L) + MERGE	146 mL/ha (59 mL/acre) + 1 L/ha (0.4 L/acre)	<ul style="list-style-type: none"> • 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. Harvest will typically commence within 7 to 10 days depending on environmental conditions. • 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 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 mL/ha (29.5 mL/acre) + 1.67 L/ha (0.67 L/acre) + 1 L/ha (0.4 L/acre)	<ul style="list-style-type: none"> • ONLY for use on Adzuki beans. Contact the end use purchaser of the crop to confirm. • 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. <p>* See Table 3–1. <i>Herbicides Used in Ontario</i> for formulations available. See label for specific uses and rates.</p>
glufosinate ammonium (0.37–0.45 kg/ha)	IGNITE (150 g/L)	2.5–3 L/ha (1–1.2 L/acre)	<ul style="list-style-type: none"> • Market class restrictions apply. Contact the end use purchaser of the crop to confirm which market class of dry beans that they allow IGNITE to be used on. • 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. • PHI is 9 days. • 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.
	INTERLINE (150 g/L)		

TABLE 6–2. Herbicide Treatment Rates for Beans (Adzuki, Dry, Lima and Snap) (cont'd)

Active Ingredient (rate)	TRADE NAME (concentration)	PRODUCT RATE	PRECAUTIONS For more information, see <i>Notes on Herbicides</i> .
Preharvest (cont'd)			
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	<ul style="list-style-type: none"> • Market class and end use restrictions apply. Contact the end use purchaser of the crop to confirm which market class of dry beans that they allow diquat to be used on. • 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		
	DESSICASH DESICCANT (240 g/L) + AGRAL 90		
flumioxazin (53.7 g/ha) + methylated seed oil (2.5 L/ha)	VALTERA EZ (480 g/L) + MSO Concentrate	112 mL/ha (45 mL/acre) + 2,5 L/ha (1 L/acre)	<ul style="list-style-type: none"> • 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.
flumioxazin (53.7 g/ha) + glyphosate (900 g/ha) + methylated seed oil (2.5 L/ha)	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)	<ul style="list-style-type: none"> • 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. <p>* See Table 3–1. <i>Herbicides Used in Ontario</i> for formulations available. See label for specific uses and rates.</p>