Weed Control

Rich Zollinger,
NDSU Extension Weed Specialist

The weed control suggestions in this production guide are based on the assumption that all herbicides mentioned will have a registered label with the Environmental Protection Agency. Herbicides that no longer are registered or have not received registration for dry edible bean should not be used. Dry beans treated with a nonregistered herbicide may have an illegal residue that, if detected, could cause condemnation of the crop. Nonregistered herbicide use is illegal, and a user could be subject to a heavy fine even without detectable residue. For additional information, see the "North Dakota Weed Control Guide" at *www.ag.ndsu.edu/weeds/weed-control-guides/nd-weed-control-guide-1.*

Figures 4 to 33 at the end of this booklet provide photographs to identify the most common weeds.

Table 11. Chemical weed control guide for dry edible beans.

Herbicide	Product/A (ai/A)	Weeds	When to Apply	Remarks and Paragraphs
Soil-applied and some post-applied herbicides				
Eptam (EPTC)	**3.5 to 4.5 pt** **15 to 20 lb G** (3 to 4 lb)	Grass and some broadleaf weeds.	PPI.	PPI immediately after application. Consult label for rate range for specific tank mix.
Prowl **Prowl H2O** (pendimethalin)	**2.4 to 3.6 pt 3.3EC** **2.1 to 3 pt 3.8ACS** (1 to 1.5 lb)	Poor wild oat and no wild mustard control.	PPI. Fall or spring.	PPI within 24 hours after application. Apply fall applications when soil temperature is less than 45 F. Adjust rate for soil type. Use EC formulation in spring and 10G formulation in fall. Refer to label for tank mixtures.
Treflan/ generic trifluralin	**1 to 2 pt EC** **5 to 10 lb 10G** (0.5 to 1 lb)			
Sonalan (ethalfluralin)	**1.5 to 4.5 pt EC** (0.55 to 1.69 lb) **5.5 to 11.5 lb 10G** (0.55 to 1.15 lb)			
Dual/generic metolachlor	**1 to 2 pt** (0.95 to 1.9 lb)	Grass and some broadleaf weeds.	Shallow PPI or PRE.	Shallow PPI improves consistency of weed control. PRE requires precipitation for herbicide activation. Adjust rate for soil type and OM. Outlook: provides greater nightshade control. • allow 70 day PHI. • may apply EPOST up to third trifoliolate
Outlook/ generic dimethenamid	**16 to 21 fl oz** (0.75 to 1 lb)		Shallow PPI, PRE or EPOST.	
IntRRo (alachlor) **(RUP)**	**4 to 6 pt** (2 to 3 lb)		Shallow PPI or PRE.	

Herbicide	Product/A (ai/A)	Weeds	When to Apply	Remarks and Paragraphs
BroadAxe s-metolachlor + sulfentrazone	**19 to 26 fl oz** (0.94 to 1.28 + 0.1 to 0.14)	Grass and some broadleaf weeds.	Shallow PPI or PRE.	Do not use on coarse-textured soil or soil with less than 1.5% OM. Adjust rate for soil type and soil pH. Rainfall required for activation. User assumes all risk of crop injury.
Spartan Charge (sulfentrazone and carfentrazone)	**3.75 to 5.75 fl oz** (1.28 oz to 2.25 oz and 0.16 to 0.25 oz)	Small-seeded broadleaf weeds.	Shallow PPI or PRE.	Do not use on coarse-textured soils. Adjust rate for soil type. Rainfall required for activation. User assumes all risk of crop injury.
Permit (halosulfuron)	**0.5 to 0.67 oz DF** (0.38 to 0.5 oz)	Large-seeded broadleaf weeds including nutsedge.	Shallow PPI, PRE or POST **up to dry bean flowering.**	PRE requires precipitation for herbicide activation. POST: apply with NIS at 0.25 to 0.5% v/v. Refer to label when tank mixing with other herbicides. Will not control ALS-resistant weeds. **Do not apply Permit by plane.**
Pursuit (imazethapyr)	**2 fl oz** (0.5 oz)	Broadleaf weeds.		

Herbicide	Product/A (ai/A)	Weeds	When to Apply	Remarks and Paragraphs
POST-applied Herbicides				
Raptor (imazamox)	**4 fl oz** (0.5 oz)	Annual grass and broadleaf weeds. No control of ALS-resistant kochia.	POST. Dry bean: first trifoliolate but **prior to flowering**	Add NIS at 0.25% v/v or oil additive at 0.5 to 1% v/v plus 28% UAN at 2 qt/A (except during high humidity).
Reflex (fomesafen)	**0.75 pt** (0.188 lb)	Annual broadleaf weeds including ragweed, kochia and nightshade.	Weeds: 1 to 4 inches tall. PHI: 45 days.	Add NIS at 0.125 to 0.25% v/v or oil adjuvant at 0.5 to 1% v/v. Oil adjuvant may increase risk of crop injury. Most active in hot and sunny conditions. Refer to label for risk of crop injury.
Basagran/ generic bentazon	**0.5 to 2 pt applied** 1 to 4 times. (0.25 to 1 lb)	Some broadleaf weeds and suppression of Canada thistle.	POST. Dry bean: After emergence. Broadleaf weeds: **Small.**	Nonresidual, contact herbicide requiring thorough coverage. Most active in hot and sunny conditions. Add oil adjuvant at 1 to 2 pt/A. Allow a 30-day PHI.
Rezult + MSO adjuvant (bentazon and sethoxydim)	**1.6 + 1.6 pt** or **0.8 + 0.8 pt 2X** or **0.56 + 0.56 pt 3X** or **0.4 + 0.4 pt 4X + 1 to 1.5 pt/A** (1 + 0.2 lb or 0.5 + 0.1 lb or 0.38 + 0.075 lb or 0.25 + 0.05 lb)	Small grass and broadleaf weeds including pigweed, ragweed, kochia, lambsquarters, wild buckwheat, biennial wormwood and Canada thistle	First application: Weeds: 1 inch tall or less. **Weeds must be small.** Make consecutive applications 7 to 10 days later.	MSO adjuvant is required. Sequential applications at seven- to 10-day intervals improve overall weed control. Tank mix with Raptor, Reflex and a POST grass herbicide for improved weed control – see NDSU micro-rate below. Allow a 30-day PHI.

Herbicide	Product/A (ai/A)	Weeds	When to Apply	Remarks and Paragraphs
Assure II Targa than(quizalofop)	**7 to 12 fl oz** (0.77 to 1.32 oz)	Annual grasses and quackgrass.	POST. Dry bean: PHI for Assure II, Poast, Select Max = 30 days. Fusilade DX = 60 days.	Add oil adjuvant at 1% v/v but not less 1.25 pt/A. Refer to label for tank-mix options. Grass control is reduced by tank mixtures or close interval application of POST broadleaf control herbicides. Antagonism generally can be avoided by applying a higher rate of grass herbicide or apply the grass control herbicide one or more days before or seven days after the broadleaf control herbicide. Do not cultivate prior to five days before or seven days after application.
Fusilade DX (fluazifop)	**5 to 12 fl oz** 1.25 to 3 oz)			
Poast (sethoxydim)	**0.5 to 1.5 pt** (0.1 to 0.3 lb)	Annual grasses.		
Select/ generic clethodim	**4 to 8 fl oz** (1 to 2 oz)	Annual grasses and quackgrass.		
Select Max (clethodim)	**9 to 16 fl oz** (1.125 to 2 oz)			

NDSU Dry Bean Micro-rate

Rezult B and Rezult G + Raptor + Reflex + Select/clethodim + MSO adjuvant	**0.5 to 0.6 pt and 0.5 to 0.6 pt + 1 fl oz + 2 to 4 fl oz + 2 fl oz (optional) + 1 to 1.5 pt/A**	Grass and broadleaf weeds, including kochia, pigweed and nightshade. May not control wild buckwheat.	POST. Weeds. Small. Must be less than 1 to 2 inches tall.	**User assumes all risk of inadequate weed control when using this reduced-rate treatment.** MSO adjuvants is required. Select/clethodim can be excluded if grass infestation is low. Refer to Rezult section above.

Herbicide	Product/A (ai/A)	Weeds	When to Apply	Remarks and Paragraphs
Preharvest Application				
Roundup/ generic glyphosate	Up to 0.75 lb ae	Harvest aid/ weed control.	After pods are yellow and leather texture. After seed is hard dough stage with less than 30% seed moisture. PHI = seven days.	**Do not apply to dry bean grown for seed because reduced germination/vigor may occur.** Use only labeled formulations. Add AMS at 8.5 lb/100 gal. Nonselective, nonresidual, translocated, foliar herbicide.
paraquat **(RUP)**	**1.5 to 2 pt 2SL** **1 to 1.3 pt 3SL** (0.375 to 0.5 lb)	Dry bean and weed desiccant.	After greater than 80% of pods are yellow/brown. After more than 70% leaves have lost green color. PHI: Paraquat = seven days. Valor = five days. Sharpen = two days.	Contact herbicides requiring thorough coverage. Most active in hot and sunny conditions. Apply Valor with paraquat + MSO adjuvant for weed desiccation. Apply Sharpen with MSO at 1 to 1.5 pt/A plus AMS at 8.5 to 17 lb/100 gal water or UAN at 1.25 to 2.5% v/v. Apply Sharpen with more than 10 gpa for ground and more than 5 gpa for airial application. **Do not apply Sharpen to dry bean grown for seed because reduced germination/vigor may occur.**
Valor + MSO adjuvant (flumioxazin)	**1.5 to 3 fl oz +** **1 qt/A** (0.77 to 1.53 oz)			
Sharpen + MSO adjuvant (saflufenacil)	**1 to 2 fl oz +** **1 to 1.5 pt/A** (0.36 to 0.72 oz)			

Table 12. Chemical names, formulations and manufacturers.

Trade Name	Common Name	Conc.	Manufacturer
Assure II/others	quizalofop	0.88 EC	DuPont
Basagran/others	bentazon	4 SL	Arysta
BroadAxe	s-metolachlor + sulfentrazone	6.3 + 0.7 EC	FMC
Dual, Magnum/others	s-metolachlor	7.62 EC	Syngenta
Eptam	EPTC	7EC	Gowan
Fusilade DX	fluazifop	2 EC	Syngenta
Glyphosate[1]	glyphosate	Several	Several
Gramoxone/others[1]	paraquat	2SL, 3SL	Syngenta
IntRRo/others	alachlor	4EC	Monsanto
Outlook/others	Dimethenamid-P	6 EC	BASF
Permit	halosulfuron	75 DF	Gowan
Poast	sethoxydim	1.5 EC	BASF
Prowl/others	pendimethalin	3.3 EC, 3.8ACS	BASF
Pursuit	imazethapyr	2 AS	BASF
Raptor	imazamox	1 SL	BASF
Reflex/others	fomesafen	2 EC	Syngenta
Rezult	bentazon + sethoxydim	5 SL / 1 EC	BASF
Select/others	clethodim	1 EC, 2EC	Valent
Sharpen[1]	saflufenacil	2.85 SC	BASF
Sonalan/others	ethalfuralin	3 EC	Dow
Spartan Charge	carfentrazone + sulfentrazone	0.35 + 3.15 SE	FMC
Trifluralin/others	trifluralin	4 EC	Several
Valor[1]	flumioxazin	51 WDG	Valent

[1] Preharvest treatments.

Navy bean generally is less tolerant to herbicides than other dry bean classes or soybean. Rotary hoe before or soon after weed emergence and before crook stage or after emergence up to first trifoliolate leaf stage.

Eptam (EPTC) plus Prowl, Sonalan or Treflan (or generic equivalent) controls many grass and broadleaf weeds. Incorporate 4 to 6 inches deep immediately after application.

IntRRo/Lasso (alachlor), **Dual** (S/metolachlor), **Outlook** (dimethenamid) {or generic equivalents of these products} applied PPI (preplant incorporated) or PRE (pre-emergence) controls annual grasses and some broadleaf weeds. PPI may provide more consistent weed control because PRE requires rainfall for activation. Outlook can be applied in sequential treatments for improved nightshade control. Outlook PPI or PRE provides greater nightshade control than Dual or Lasso but may degrade in soil before nightshade emergence ceases. Apply Outlook EPOST (early postemergence) up to third trifoliolate dry bean stage to reduce late nightshade emergence.

Pursuit (imazethapyr) applied PPI, PRE or POST controls many broadleaf weeds. Pursuit can be applied only PPI within one week of planting or PRE up to three days following planting. **Do not** apply POST (postemergence) to 'Domino' black bean. Do not apply after crop begins to flower or when cold and/or wet weather are present or predicted to occur within one week of application. Do not use oil

additives or liquid fertilizer. Apply with NIS (nonionic surfactant) at 0.25% v/v to dry beans with at least one trifoliolate leaf. Refer to label for additional information on application use and restrictions, including crop rotation restrictions. **User assumes all risk of liability for injury.**

Reflex (fomesafen) applied POST with NIS at 0.25 to 0.5% v/v or oil adjuvant at 0.5 to 1% v/v controls many broadleaf weeds. Oil adjuvant may increase weed control but also increases risk of dry bean injury. NDSU research has shown good to excellent kochia control when applied at high spray volumes (>17 gpa), with oil adjuvants (especially MSO type), at labeled rates, and to kochia less than 2 inches tall.

Basagran (bentazon) at 0.5 to 1 qt/A applied POST controls many annual broadleaf weeds and suppresses Canada thistle. NDSU research has shown greater broadleaf weed control, especially for kochia, lambsquarters, redroot pigweed and wild buckwheat, by applying Basagran as split treatments twice each at 1 pt/A, three times each at 0.67 pt/A or four times each at 0.5 pt/A, compared with one application at 2 pt/A. Make applications seven to 10 days apart depending on weed growth rate, growing conditions, size of weeds at application, degree of weed control from first application and sequential flushes. The first application must be made to small weeds (1 inch).

For Canada thistle suppression, apply Basagran at 1 qt/A when plants are 8 inches tall to bud stage

and make a second application at 1 qt/A seven to 10 days later.

Sequential micro-rate applications will provide greater broadleaf weed control than from a single application at full rates and can be used in all crops where Basagran is labeled. Apply with oil additive at 1 qt/A (1 pt/A by air). Do not reduce the amount of oil adjuvant with the micro-rate. MSO (methylated seed oil) adjuvant has shown greater enhancement of Basagran than petroleum oil (COC) adjuvants but the cost of MSO is higher. Basagran is safe to dry bean at all stages. The total maximum seasonal use rate is 4 pt/A, so the micro-rate can be increased if weeds are large at application or if sequential applications are delayed due to rain or wind.

Table 13. Weed control from Basagran applied one to four times (NDSU data).

Basagran +	Rate	Common lambs-quarters	Kochia	Redroot pigweed
	(pt/A)	% control		
Petroleum oil at 1 qt/A	2 pt x 1 application	8	38	51
	1 pt x 2	31	64	90
	0.67 pt x 3	34	79	95
	0.5 pt x 4	76	98	99
	2 pt x 1 application	35	86	92
MSO at 1.5 pt/A	1 pt x 2	76	98	95
	0.67 pt x 3	79	98	98
	0.5 pt x 4	99	99	99

Basagran commonly is combined with fertilizer micronutrients that may cause incompatibility problems resulting in zinc precipitation. Chelated zinc materials have greater incompatibility problems than unchelated material. Recommendations to prevent precipitation are to fill the sprayer with water, add Basagran and thoroughly agitate, then add zinc fertilizer material.

Rezult B and Rezult G (bentazon and sethoxydim) applied POST at equal product amounts control some grass and broadleaf weeds. Apply with oil adjuvants (MSO is most effective) at 1 to 2 pt/A. Refer to label for tank-mix options. Rezult is priced economically compared with other POST herbicide programs. Rezult may be more economical than Basagran for grass and broadleaf weed control. If so, use Table 14.

Table 14. Active ingredient and amount of product to be used.

Bentazon	Basagran	Rezult B
(lb ai/A)	(Product/A)	(Product/A)
0.25	0.5 pt	0.4 pt
0.33	0.67 pt	0.56 pt
0.5	1 pt	0.8 pt
1	2 pt	1.6 pt

The NDSU dry bean micro-rate concept is based on the sugarbeet micro-rate and substitutes additional weed management for reduced herbicide rates. Application to small weeds is essential for success. The micro-rate can be applied more than once in dry bean to control emerging weed flushes, but applying a foundation herbicide treatment (DNA or acetanilide) may require only one POST application. MSO adjuvant is required for optimum weed control. The POST grass herbicide can be excluded if grass populations are low.

Preliminary data show weed control can be improved by increasing spray volume. The first application can be made at 10 gpa when weeds are small and less than 3 inches tall. Increase the spray volume by 10 gpa for every 3 inches in weed height. Addition of AMS (ammonium sulfate) at 1 lb/A also increases weed control.

Weed control from the micro-rate is best when the temperature plus humidity is greater than 140. Increasing spray volume and using AMS may help improve weed control when the value is below 140. Research also has shown control of wild mustard, nightshade, buckwheat, ragweed and cocklebur from the micro-rate.

Table 15. Grazing restriction for dry bean.

Herbicide	Restrictions
Assure II, Prowl, Reflex, Select, Sonalan, trifluralin	Do not graze or feed
Basagran, Eptam, IntRRo, Poast, Raptor, glyphosate (PRE)	No restrictions
Gramoxone, Pursuit, Reflex	Do not graze or feed until seven days after application
Dual products	Do not cut for hay until 120 days after application

Herbicide Carryover

The persistence of phytotoxic levels of an herbicide for more than one year can be a problem with some of the herbicides used in North Dakota. Herbicide residues are most likely to occur following years with unusually low rainfall because the chemical and microbial activity needed to degrade herbicides is limited in dry soil.

Crop damage from herbicide residues can be minimized by applying the lowest herbicide rates required for good weed control, using band rather than broadcast applications and mold-board plowing before planting the next crop. Mold-board plowing reduces the phytotoxicity of some herbicides by diluting the herbicide residue in a large volume of soil. Mold-board plowing is effective in reducing the residual effects of trifluralin, Sonalan, Prowl, Nortron SC, atrazine and Lexone/Sencor.

Table 16. Rotation restrictions for planting dry bean.

Herbicide	Months After Application	Herbicide	Months After Application
Anthem	18	Matrix	10
Armazon	18	Metribuzin	12
Atrazine (0.38 lb ai/A)	NCS	Permit	9
Atrazine (>0.38 lb ai/A)	2CS	PowerFlex	9
Balance Flexx	18	PrePare	9
Banvel (<1.5 pt)	4	Prequel	18
Boundary	12	Pulsar	9
Capreno	18	Raze	9
Callisto	18	Realm Q	18
Curtail / M	10.5[a]	Require Q/Resolve Q	10
Everest	9	Rimsulfuron	10
Fierce	18	Sharpen (1 fl oz/A)	4
FirstRate	9	Sharpen (2 fl oz/A)	5
Gangster	9	Sharpen (3 fl oz/A)	6
GoldSky	9	Starane Flex	9
Halex GT	18	Status	4
Huskie	9	Stinger	10.5a
Huskie Complete	10	SureStart/TripleFlex	12/18
Impact	18	WideMatch	10.5
Instigate	18	Wolverine	9
Laudis	18	Zemax	18
Lumax EZ	18	Zidua	18

NCS = Next cropping season.

2CS = Second cropping season after herbicide application.

[a] = Do not plant dry bean for 18 months after application on soil with less than 2% organic matter and if less than 15 inches of rainfall during the 12 months following application OR dry bean may be planted 12 months after application if risk of injury is acceptable.

Relative Herbicide Effectiveness on Weeds

The ratings in Tables 17A and 17B show relative herbicide effectiveness at labeled rates. Under favorable conditions, control may be greater than indicated, and under unfavorable conditions, herbicides may give erratic results. Dry and cool weather increases herbicide persistence while wet and/or warm weather reduces herbicide persistence.

Table 17A. Relative herbicide effectiveness on weeds.

SOIL-APPLIED HERBICIDES*	Mode of Action**	Barnyardgrass	Brome, Downy	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Cereals	Wild Oat	Buckwheat, Wild	Cocklebur, Common	Horseweed (Marestail)	Kochia	Lambsquarters	Lanceleaf Sage	Mallow, Common	Marshelder	Mustard, Wild	Mustard, Wntr. Annual	Nightshade, E/Black	Nightshade, Hairy	Pigweed, Redroot	Waterhemp (ALS- Res)	Prickly Lettuce	Ragweed, Common	Smartweed, Annual	Sunflower	Thistle, Russian	Wormwood, Biennial	Thistle, Canada	Herbicide persistence
BroadAxe	14,15	P-E	P-F	F-E	F-E	N	P-F	P-F	P-F	P	F-G	E	E	N	–	P-G	P	P	G-E	F-G	G-E	G-E	P	N	G-E	N	G-E	F-G	N	S
Dual* (PPI/PRE)	15	P-E	P-F	F-E	F-E	N	P	P-F	N-P	N	N	N-P	P-F	N	–	N	N	–	N	N	F-G	F-G	N	N	N	N	P	N	N	N
Outlook* (PPI/PRE)	15	G-E	P-G	G-E	G-E	N	F-G	P	N	N	N	N	F-G	N	N	N	P-F	–	F-G	F-G	G-E	G	–	N	N	N	P-F	N	N	N
Permit* (PPI/PRE)	2	N	–	N	N	N	N	N	N	E	P[1]	N[1]	G-E	–	–	–	E	E	N	N	F-E	N	–	E	E	–	N	N	N	O
Prowl* (PPI)	3	E	F-G	G-E[1]	E	N	N	P-F	N	N	N	P	F-G	N	–	N	N	P	N	N	G-E	G	N	N	P	N	F-G	N	N	S
Pursuit (PRE - 2 fl oz)	2	P	–	P	P	N	N	N	F-G	N	N[1]	E[1]	P	–	F	P	E	E	P-E	P-E	E	N	–	N	G	P	P	N	N	O
Sonalan (PPI)	3	E	F	E[1]	E	N	P	P	N	P	N	P	G	N	–	N	N	P	P	P	E	G-E	P	N	P	N	G-E	N	N	S
Spartan (PRE)	14	N	F-G	P	P	N	N	N	P	P	F	F-E	G-E	N	–	P-G	P	P	E	F-G	F-E	F-E	P	N	G-E	N	G-E	G	N	S
Treflan* (PPI)	3	E	F-G	E[1]	E	N	N	P-F	N	N	N	P	F-G	N	–	N	N	P	N	N	E	G-E	N	N	P	N	G	N	N	S

PPI = Preplant Incorporated, PRE = Pre-emergence. Shallow PPI gives greater and more consistent weed control compared with PRE.

*Or generic equivalent.

**2 = ALS Enzyme Inhibitor, 3 = Mitotic Inhibitor, 14 = PPO (Protox) Inhibitor, and 15 = Very Long Chain Fatty Acid Inhibitor.

[1]Except where resistant populations have developed.

Weed control ratings in this section are based on the following scale: E = Excellent = 90 to 99% control; N = None = No control; P = Poor = 40 to 65% control; F = Fair = 65 to 80% control; G = Good = 80 to 90% control; "-" = insufficient information.

Herbicide persistence ratings are for residues present 12 months after application: O = Often, S = Seldom, N = None.

Table 17B. Relative herbicide effectiveness on weeds.

POST-APPLIED HERBICIDES*	Mode of Action**	Barnyardgrass	Brome, Downy	Foxtail, Green	Foxtail, Yellow	Quackgrass	Volunteer Cereals	Wild Oat	Buckwheat, Wild	Cocklebur, Common	Horseweed (Marestail)	Kochia	Lambsquarters	Lanceleaf Sage	Mallow, Common	Marshelder	Mustard, Wild	Mustard, Wntr. Annual	Nightshade, E/Black	Nightshade, Hairy	Pigweed, Redroot	Waterhemp (ALS- Res)	Prickly Lettuce	Ragweed, Common	Smartweed, Annual	Sunflower	Thistle, Russian	Wormwood, Biennial	Thistle, Canada	Herbicide persistence
Assure II / Targa	1	E	P-E	E	F-G	E	E	G-E[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Basagran*	6	N	N	N	N	N	N	N	P-G	G-E	N	P-E	F-E	P	P	G-E	E	E	N	F-G	F-E	N-E	G	P-F	E	E	G	G-E	F-G	N
Fusilade DX	1	E	F-G	G-E	G-E	G	E	E[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Paraquat	22	G	-	G	G	P	F-G	G	F	F-G	F-G	G-E	E	E	G	G	E	G	G-E	G-E	E	E	F-G	G-E	E	E	E	–	P	N
Permit*	2	N	N	N	N	N	N	N	P	E	–	P[1]	N	P	–	G-E	E	E	P	P	F-G	N	–	G-E[1]	F-G	E	–	P	N	O
Poast	1	E	P-G	E	E	F	G-E	G-E[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Pursuit*	2	G	-	G	F-G	N	G	F[1]	P	G-E	N	E[1]	P	E	P	E	E	E	E	E	N	E[1]	N	G	G-E	P-E[1]	N	N	O
Raptor	2	E	F-E	E	G-E	F	G-E	E[1]	P	G-E	N	E[1]	P-F	E	P	G-E	E	E	E	E	N	G[1]	N	G-E	E	G-E[1]	P	N-P	N
Reflex*	14	N	N	N	N	N	N	N	P	G	N-P	F-E	P	E	–	G	E	E	G	P	G-E	G-E	–	G-E	G	P-F	–	P	N	O
Roundup*/ glyphosate[2]	9	E	G-E	E	E	E	E	G-E	P-G	E	G-E[1]	F-E[1]	P-E[1]	E	P-G	G-E	G-E	G-E	P-G	P-G	E	P-G[1]	P-G	G-E[1]	P-E	G-E	G	F-E	G-E	N
Select*/ Select Max	1	E	P-E	E	E	G-E	E	E	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

* Or generic equivalent.

[1] Herbicides will not control resistant biotypes or provide minimal control in tank mix/premixes with alternative modes of action.

[2] Weed control from Roundup* is dependent on rate, size of weeds, environmental conditions and number of applications.

** 1 = ACC-ase Inhibitor, 2 = ALS Enzyme Inhibitor, 6 = Photosystem II Inhibitor, 9 = EPSP Synthase Inhibitor, 14 = PPO (Protox) Inhibitor, and 22 = Photosystem I Inhibitor.

Weed control ratings in this section are based on the following scale: E = Excellent = 90 to 99% control; N = None = No control; P = Poor = 40 to 65% control; F = Fair = 65 to 80% control; G = Good = 80 to 90% control; "-" = insufficient information.

Herbicide persistence ratings are for residues present 12 months after application: O = Often, S = Seldom, N = None.