

By: Jeff Stachler (Tables originally authored by Jeff Gunsolus and adapted by Jeff Stachler) – 3-5-12

Glyphosate-resistant weeds continue to increase! Careful selection of the MOST EFFECTIVE herbicide(s) having alternative mechanisms of action to manage KEY weeds in ALL CROPS in the rotation is critical to preserving the effectiveness of Roundup Ready crops. The tables below provide herbicide options to controlling key weeds with PRE and POST herbicides in sugarbeet, corn, and soybean with crop rotation intervals to sugarbeet included.

**Table 1. PRE/PPI, POST & Lay-by Herbicide Options for Roundup Ready Sugarbeet in MN and ND<sup>1</sup>**

Herbicides to Complement Glyphosate								
MOA #	PRE/PPI	Canola (RR) (3-lvs / begin bolt)	Kochia (ALS-Res.)	Lambsquarters	Common ragweed	Giant ragweed	Smartweed (annual)	Waterhemp (ALS-Res.)
15	Dual Magnum* (PRE best)	–	P	F	P/F	P	P	F/G
8	Eptam* (PPI only)	–	F	F/G	F	P	P	F/G
16	Nortron* (PPI best)	N/P	F/G	P/F	P	N	G	F/G
8	Ro-Neet SB (PPI only)	–	P	F/G	F	P	P	F/G
POST								
5	Betamix*	N/P / N	F	G	F	P	P	F
4	Stinger*	N	N	P/F	F/E	F/E	P/F	N
2	UpBeet (+ MSO)	F / N	N (E)	P	F**	N	F	N (F)
5+16	Betamix* + Nortron*	N/P / N	F/G	G/E	F/G	P	F/G	F
5+4	Betamix* + Stinger*	P / N	F/G	G/E	G/E	G/E	G/E	F
5+2	Betamix* + UpBeet	P/F / N	F (E)	G/E	F/G	P/F	G	F (G)
5+16+4+2	Betamix*+Nortron*+Stinger*+UpBeet	P/F / N	F/G (E)	G/E	G/E	G/E	G/E	F/G
Lay-by (residual control only)								
15	Dual Magnum*	–	N/P	F	N	N	P	F/G
15	Outlook*	–	N	F/G	N	N	P	G
3	Treflan* (incorporated)	N	P	G/E	P	N	P	G/E

**Table 2. PRE/PPI & POST Herbicide Options for Roundup Ready Corn in MN and ND<sup>1</sup>**

Herbicides to Complement Glyphosate									
MOA #	PRE/PPI	Rotation to sgrbt (months)	Canola (RR) (3 lvs / begin bolt)	Kochia (ALS-Res.)	Lambsquarters	Common ragweed	Giant ragweed	Smartweed (annual)	Waterhemp (ALS-Res.)
Corn Planted Year Prior to Sugarbeet									
5	Atrazine* (0.38 lb ai/A)	NCS b	G	G/E	G/E	P	P	F	F
4	Banvel* / Clarity (dicamba)	4	N	G	G	G	F	G	G
15	Harness* / Surpass* (acetochlor)	NCS	–	F	F/G	F	P	P	G/E
15	Other Acetamides (Dual*, Lasso, Outlook*)	NCS	–	N/P	P/F	P	P	N	G
14	Sharpen (2-3 fl oz/A)	NCS	–	G/E	G/E	G/E	G	E	G/E
14,15	Verdict (> 10 fl oz/A)	NCS	–	E	G/E	G/E	G	E	G/E
POST									
14	Aim	0	P / N	F/E	F/G	P	P	N	F/G
5	Atrazine* (0.38 lb ai/A)	NCS b	G / N	E	G/E	P/F	P/F	G	F/G
4	Banvel* / Clarity* (dicamba)	4	P / P	E	G	G/E	G	E	G
6	Buctril*	1	–	G/E	G	G/E	F/G	G/E	F
14	Cadet	NCS	P / N	P/F	F	P	P	–	F
2	Option	3	E / –	N (E)	F/G**	P/G**	P**	P	N (G/E)
14	Resource	1	–	–	F	F	P	–	F
4,19	Status (≥ 4 oz/A)	4	G / P	E	G/E	G/E	G/E	E	G
4	2,4-D* (1.0 pt/A)	NCS	E / G/E	P	E	E	G/E	P/F	F/G
Alternative Technologies									
10	Liberty / Ignite 280 in LL Corn	0	E / P/F	E	F	G/E	G/E	E	G
Corn Planted 2 Years Prior to Sugarbeet									
PRE/PPI									
5	Atrazine* (0.5 to 1.0 lb ai/A)	2 CS	E	E	G/E	F	F	E	G
27	Balance Flexx (ND Only)	18	E	E	E	G/E	P	G	G/E
27	Callisto	18	E (+ atrazine)	P	G/E	G/E	G	E	G/E
15,27	Camix	18	G/E	F	G/E	G	G	G/E	E
14,15	Fierce (apply 7 to 14 days before planting)	18	E	E	E	F/G	N/P	G	E
5,15,27	Lumax	18	E	G/E	G/E	G/E	G	G/E	E
2,27	Prequel (ND Only)	18	E	G/E	G/E	G/E	P	F/G	G/E
POST									
5	Atrazine* (0.5 to 1.0 lb ai/A)	2 CS	G/E / P	E	G/E	F/G	F/G	E	G
28	Callisto	18	E / E (+ atrazine)	P/F	G/E	F	G	E	E**
5,27	Calisto Xtra	18	E	E	–	–	–	–	–
27	Impact / Armezon	18	–	G	G/E	G	G	G/E	G/E**
27	Laudis	18 / 10 [if 20" rain]	E / E (+ atrazine)	G	G/E	G	G	G/E	G/E**
2,4	Resolve Q	18 / 10 [see label]	–	N (G)	F**	P**	P**	F/G	N (G/E)
Corn Planted 3 Years Prior to Sugarbeet									
PRE/PPI									
2,4	Hornet	26 b	P/F	–	G	G/E	F/G	G/E	N/P
2,4,15	SureStart / TripleFLEX	26 b	E	F/G	E	G/E	F/G	E	G
POST									
2,27	Capreno	18 / 24 [see label]	–	G/E	G/E	G	G	E	G/E**
2,4	Hornet	26 b	G/E / –	N (G)	P/F	G/E**	G/E	F/G	N (G)
2	Permit	36	E / –	N (P)	P	G/E**	G**	F/G	N (G/E)
2,14	Priority	36	E / –	F/G	F/G	G/E**	G**	F/G	F/G**

**Table 3. PRE/PPI and POST Herbicide Options for Roundup Ready Soybean in MN and ND<sup>1</sup>**

Herbicides to Complement Glyphosate									
MOA #	PRE/PPI	Rotation to sgrbt (months)	Canola (RR) (3 lvs / begin bolt)	Kochia (ALS-Res.)	Lambsquarters	Common ragweed	Giant ragweed	Smartweed (annual)	Waterhemp (ALS-Res.)
<b>Soybean Planted Year Prior to Sugarbeet</b>									
15	Alachlor (INTRRo)	NCS	-	N/P	P/F	P	P	N	F
15	Other Acetamides (Dual*, Outlook*)	NCS	-	N/P	P/F	P	P	N	F/G
14	Sharpen (1 oz/A)	4	E	P/F	P/F	P/F	P	P/G	N/F
14	Valor	4 to 10	E	G/E	G/E	N/F	N/P	F	G/E
14,15	Verdict (5 fl oz/A)	NCS	E	F	P/G	P/F	P	P/G	F/G
<b>POST</b>									
6	Basagran*	NCS	G/E / P	P/F	F/G	P/F	P	E	N/P
14	Cadet	NCS	P / N	P/F	F	P**	P**	-	F**
14	Cobra / Phoenix	NCS	P/F / N	P/F	P	G/E**	F/G**	G	G/E**
2	Harmony SG*	45 days	P/F / N	N	G/E**	P/F**	P**	G/E	N (G/E)
14	Resource	1	-	P	F	F**	P**	P	F**
14	Ultra Blazer	100 days	E / F	P/F	F	G**	F**	E	G**
15	Warrant (residual control only)	NCS	-	F	F/G	N	N	N	F
<b>Alternative Technologies</b>									
10	Liberty / Ignite 280 in LL Soybean	0	E / P/F	E	F	G/E	G/E	E	G
<b>Soybean Planted 2 Years Prior to Sugarbeet</b>									
<b>PRE/PPI</b>									
5,15	Boundary	18	-	P	G/E	G	P/F	G	G/E
14,15	Prefix (See #3 below!; can apply POST)	18	-	F	G	G	F	-	G/E
3	Prowl* (PPI only)	12 / 2CS	N/P	P	G	P	P	P	F/G
5	Sencor* (metribuzin)	18	E	F/G	P/F	G	P	G	G
3	Sonalan (PPI only)	2 CS	N	P/F	E	P	P	P	G/E
3	Treflan* (PPI only)	12 / 2CS	N	P	G/E	P	P	P	G/E
<b>POST</b>									
14	Flexstar* / Flexstar GT 3.5 (See # 3 below!)	18	E / E	G/E	P/F	G/E**	G**	G/E	G/E**
<b>Soybean Planted 3 Years Prior to Sugarbeet</b>									
<b>PRE/PPI</b>									
2,14	Authority First / Sonic	30 b	E	E	G/E	F/G	P/G	E	F/E**
5,14	Authority MTZ	36	-	E	G	G	P/F	E	F/E**
2,2,14	Enlite (MN only)	30	-	-	G/E	G	F	G/E	G/E
2	FirstRate	30 b	E	N (P)	G	G/E	G	G/E	N/P (G)
2,14	Gangster	30 b	-	G	G/E	G/E	G	E	G
14	Spartan	36	P/F	E	E	P	N	G/E	F/E
<b>POST</b>									
2	Classic (MN only)	30	-	N (P)	P	G**	F/G**	G/E	N (G)
2	FirstRate	30 b	E / P/F	N (P)	P	E**	E**	E	N (G)
2	Raptor	18 / 26	E / P/F	N (E)	F	P*	P**	G/E	N (G/E)
2	Synchrony XP (MN only)	30	-	N (P)	G/E	G**	F/G**	E	N (G/E)
<b>Soybean Planted 4 Years Prior to Sugarbeet</b>									
<b>PRE/PPI</b>									
2,14	Authority Assist	40 b	G	E	E	F	P	E	F/E**
2,14	Optill	40 b	G	F	G	G	F/G	G	P/G
<b>POST</b>									
2	Pursuit*	40 b	E / P	N (E)	P/F	P*	P**	G	N (G)

**Table Footnotes:** <sup>1</sup>Abbreviations: “-” = insufficient information; b = successful bioassay; CS = cropping season; E = excellent; F = fair; G = good; lvs = leaves; MOA = mechanism of action; N = None (no control); NCS = next cropping season; P = poor; PPI = preplant incorporated; PRE = preemergence; POST = postemergence; sgrbt = sugarbeet; RR = Roundup Ready; Res. = resistance. \*Or generic equivalent of this product. \*\*Control will be reduced or negligible if resistant biotype(s) are present in a field {biotype(s) of this weed species have been confirmed resistant to this product in MN and/or ND or may soon be likely because it has been confirmed in the Midwest}. (Possible effectiveness if not resistant)

**Additional Information and Comments:** 1. Choose herbicides based upon **mechanism of action [MOA]** (metabolic site in plants affected by the herbicide causing plant death) **and effectiveness** in controlling the most difficult to control weed species in the field. The numbers in the MOA column correspond to a numerical classification system for MOA’s listed on herbicide labels and explained on pages 104 and 105 of the 2012 North Dakota Weed Control Guide. The numbers represent the following MOA’s: 2 = ALS inhibitor; 3 = Mitotic inhibitor; 4 = Growth regulator; 5 = Photosystem II inhibitor – Site A; 6 = Photosystem II inhibitor – Site B; 8 = Lipid synthesis inhibitor; 10 = Glutamine synthetase inhibitor; 14 = PPO (Protox) inhibitor; 15 = Very long chain fatty acid inhibitor; 16 = unknown; 19 = Auxin inhibitor; 27 = HPPD inhibitor.

2. Manage weeds **throughout the entire cropping rotation, striving for zero weed seed rain** (no weed seed production) in all crops, but especially corn and soybean to reduce weed populations for sugarbeet.

3. Flexstar and products containing fomesafen can only be used in specific geographies and at specified rates. Consult each fomesafen product label for guidelines. Flexstar can only be applied at the maximum rate of 1 pt/A south of I-94 and east of I-29 and at 0.75 pt/A south of U.S. Hwy 2 in MN and east of U.S. Hwy 281 in ND.