Table 1. PRE and POST Herbicide Diversification Options for Glyphosate-Resistant Corn

Prepared by Jeff Gunsolus U of MN Weed Science with input from Rich Zollinger,NDSU Weed Science

NDSU Extension Service North Dakota State University

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	Herbicides to Complement Glyphosate					
SOA #	**PRE as part of sequential with glyphosate**	**Common ragweed**	**Giant ragweed**	**Lambsquarters**	**Kochia**	**Waterhemp**
14,15	Anthem	P/F	P	F	P/F	**E**
5	Atrazine (0.38 lb ai/A)	**G**	F	**G/E**	**G**	**G/E**
27	Balance Flex ***(ND only)***	**G/E**	F/G	**E**	**E**	**G**
4	Banvel / Clarity (dicamba)	**G**	F	**G**	**G**	**G**
27	Callisto	**G/E**	**G**	**G/E**	P	**G/E**
14,15	Fierce	P/F	P/F	**F/G**	**F/G**	**G/E**
15	Harness / Surpass (acetochlor)	F	P	F/G	F	**G/E**
15	Other Acetamides (Dual, Lasso, Outlook)	P	P	P/F	N/P	**G**
2,4	Hornet	**G/E**	F/G	**G**	F	P/F
2,27	Instigate	**F/G**	**F/G**	**G/E**	P	**G/E**
5,15,27	Lumax EZ	**G/E**	**G**	**G/E**	**G/E**	**E**
2,27	Prequel (ND only)	**G/E**	**F/G**	**E**	**E**	**G**
14	Sharpen (2-4 oz/A)	**G/E**	**G**	**E**	**E**	**G/E**
2,4,15	SureStart / TripleFLEX	**G/E**	F/G	**E**	**F/G**	**F/G**
14,15	Verdict (> 12 fl oz/A)	**G/E**	G	**G/E**	G/E	**G/E**
15,27	Zemax	**G**	G	**G/E**	F	**E**
15	Zidua (> 2.0 oz/A)	P/F	P	F	**F/G**	**G/E**
	POST as part of tank mix with glyphosate					
14	Aim	P	P	F/G	F/G	F/G
5	Atrazine (0.38 lb ai/A)	**G/E**	**G**	**E**	**E**	**G**
4	Banvel / Clarity (dicamba)	**G/E**	**G**	**G**	**G/E**	**G**
6	Buctril	**G/E**	F/G	**G**	**G/E**	F
14	Cadet	P	P	F	P/F	F
27	Callisto	F	**G**	**G/E**	P/F	**E**
2,27	Capreno	**G**	**G**	**G/E**	**E**	**G/E**
9,15,27	Halex GT	**G**	**G**	**G/E**	**G/E**	**G/E**
2,4	Hornet	**G/E**	**G/E**	P/F	F/G	P/F
27	Impact	**G**	**G**	**G/E**	**E**	**G/E**
27	Laudis	**G**	**G**	**G/E**	**E**	**G/E**
2	Option	P/G	P	F/G	P/G	P
2	Permit	P/G	P/G	P	P/G	P/G
2,4	Resolve Q	P	P	F	P/E	P/G
14	Resource	F	P	F	P	F
4,19	Status / Distinct	**G/E**	**G/E**	**G/E**	**E**	**G**
4	2,4-D	**E**	**G/E**	**E**	P	F/G
	Alternative Technologies					
10	Ignite 280 in LL Corn	**G/E**	**G/E**	F	**E**	**G**

E = Excellent Control G = Good Control F = Fair Control P = Poor Control N = No Control

SOA = Site of action is defined as the biochemical site at which the herbicide binds to control a plant

Note: strengths and weakness and PRO's and CON's of PRE's such as crop injury potential under cool/wet conditions

Note: problems with timing, crop injury potential, and vol. crops of POST herbicides

Note: problems with timing, crop injury potential, and off-target injury of tank mixtures

Table 2. PRE and POST Herbicide Diversification Options for Glyphosate-Resistant Corn - Crop Rotation

Prepared by Jeff Gunsolus U of MN Weed Science with input from Rich Zollinger,NDSU Weed Science

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	Herbicides to Complement Glyphosate						
		Herbicide Crop Rotation Interval (Months)					
SOA #	**PRE as part of sequential with glyphosate**	**Dry bean**	**Pea**	**Potato**	**Soybean**	**Sugarbeet**	**Wheat**
14,15	Anthem	18	18	18	18	18	18
5	Atrazine (0.38 lb ai/A)	NCS	NCS	NCS	12	NCS b	NCS
27	Balance Flex (ND only)	18	18	6	6	18	6
4	Banvel / Clarity (dicamba)	4	4	4	4	4	0
27	Callisto	18	18	10	10	18	4
14,15	Fierce	18	18	4	0	18	4
15	Harness / Surpass (acetochlor)	NCS	NCS	NCS	NCS	NCS	4
15	Other Acetamides (Dual, Lasso, Outlook)	0	NCS	0	0	NCS	4 to 4.5
2,4	Hornet	10.5	10.5	18	10.5	26 b	4
2,27	Instigate	18	18	10	10	18	9
5,15,27	Lumax EZ	18	18	18	NCS	18	NCS
2,27	Prequel (ND only)	18	18	6	10	18	4(Fall)/9(Sp)
14	Sharpen (2-4 oz/A)	5 to 7	1 to 4	5 to 7	1 to 4	5 to 7	0
2,4,15	SureStart / TripleFLEX	18	NCS	18	NCS	26 b	4
14,15	Verdict (> 12 fl oz/A)	NCS	NCS	NCS	NCS	NCS	NCS
15,27	Zemax	18	18	NCS	NCS	18	4.5
15	Zidua (> 2.0 oz/A)	11	11	4	0 to 4	15	4 to 6
	POST as part of tank mix with glyphosate						
14	Aim	0	0	0	0	0	0
5	Atrazine (0.38 lb ai/A)	NCS	NCS	NCS	12	NCS b	2CS
4	Banvel / Clarity (dicamba)	4	4	4	4	4	4
6	Buctril	1	1	1	1	1	1
14	Cadet	NCS	NCS	NCS	0	NCS	NCS
27	Callisto	18	18	10	10	18	4
2,27	Capreno	18 [see label]	18 [see label]	18 [see label]	10	(24) [see label]	4
9,15,27	Halex GT	18	18	10	10	18	4
2,4	Hornet	10.5	10.5	18	10.5	26 b	4
27	Impact	18 / 9 [0.5oz/A]	9	9	9	9 [0.5 fl oz/A] / (18)	3
27	Laudis	9 to 18 [see label]	10	10	8	10 [20" rain] / (18)	4
2	Option	3	3	3	0.5	3	3
2	Permit	9	9	9	9	36	2
2,4	Resolve Q	10	18	0	10	10/18 [see label]	9
14	Resource	1	1	1	0	1	1
4,19	Status / Distinct	4	4	4	1 to 4	4	1 to 4
4	2,4-D	NCS	NCS	NCS	7 to 30 Days	NCS	NCS
	Alternative Technologies						
10	Ignite 280 in LL Corn	6	6	2.33	0	0	2.33

SOA = Site of action is defined as the biochemical site at which the herbicide binds to control a plan

NCS = Next Cropping Season

2CS = 2 Cropping Seasons

( ) = Recommended interval

Shading = Herbicides requiring ≥2 years before planting sugarbeets

b = including a successful bioassay

Table 3. PRE and POST Herbicide Diversification Options for Glyphosate-Resistant Soybean

Prepared by Jeff Gunsolus U of MN Weed Science with input from Rich Zollinger,NDSU Weed Science

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SOA #	Herbicides to Complement Glyphosate PRE as part of sequential with glyphosate	Common ragweed	Giant ragweed	Lambsquarters	Kochia	Waterhemp
15	Alachlor (IntRRo)	P	P	P/F	P	**F**
15	Other Acetamides (Dual, Oulook)	P	P	P/F	N/P	F/G
2,14	Authority Assist	F	P	**E**	**E**	**G/E**
14,15	Authority Elite	**P**	N	**E**	**E**	**F/E**
2,14	Authority First / Sonic	**G/E**	**G**	**G/E**	**G/E**	**G/E**
5,14	Authority MTZ	**G**	P/F	**G**	**G/E**	**G/E**
5,15	Boundary	**G**	P/F	**G**	P	**G/E**
2,2,14	Enlite (MN Only)	**G**	**F**	**G/E**	G	G/E
14,15	Fierce	P/F	P/F	**F/G**	**F/G**	**G/E**
2,14	Gangster	**G/E**	G	**G/E**	**G**	**G**
2,14	Optill	**G**	F/G	**G**	P/G	**F/G**
2,14,15	Optill PRO	**G**	F/G	**G**	**F/G**	**G/E**
14,15	Prefix (E. of I-29 and S. of I-94 Only)	G	F	**G**	F	G/E
3	Prowl	P	P	G	P	**F/G**
5	Metribuzin (generic Sencor)	**G**	P	**P/F**	**F/G**	**F/G**
14	Sharpen (1 oz/A)	P/F	P	**P/F**	**P/F**	F
14	Spartan	P	N	**E**	E	**F/E**
3	Treflan	P	P	**G/E**	**P**	**G**
14	Valor	N/F	N/P	**G/E**	**G/E**	**G/E**
14,15	Verdict (5 fl oz/A)	P/F	P	P/G	P/F	F/G
15	Warrant (PRE to weeds)	P	P	**F/G**	P	**G/E**
15	Zidua (> 2.0 oz/A)	P/F	P	F	**F/G**	**G/E**
	POST as part of tank mix with glyphosate					
14	Cadet	P	P	F	P/F	F
2	Classic ***(MN Only)***	**G**	F/G	P	P	P
14	Cobra / Phoenix	**G/E**	**G**	P	P/F	**G/E**
2	FirstRate	**E**	**E**	P	P	P
14	Flexstar	**G/E**	**G**	P/F	**G**	**G/E**
2	Harmony SG	P/F	P	**G/E**	F/G	P/G
2	Pursuit	P	P	P/F	P/G	P/E
2	Raptor	P	P	F	P/E	P/E
14	Resource	F	P	F	P	F
14	Ultra Blazer	**G**	F	F	P/F	**G**
	Alternative Technologies					
10	Ignite 280 in LL Soybean	**G/E**	**G/E**	F	**E**	**G**

E = Excellent Control G = Good Control F = Fair Control P = Poor Control N = No control

SOA = Site of action is defined as the biochemical site at which the herbicide binds to control a plant

Note: strengths and weakness and PRO's and CON's of PRE's such as crop injury potential under cool/wet conditions

Note: problems with timing, crop injury potential, and vol. crops of POST herbicides

Note: problems with timing, crop injury potential, and off-target injury of tank mixtures

Table 4. PRE and POST Herbicide Diversification Options for Glyphosate-Resistant Soybean - Crop Rotation

Prepared by Jeff Gunsolus U of MN Weed Science with input from Rich Zollinger,NDSU Weed Science

NDSU Extension Service North Dakota State University

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	Herbicides to Complement Glyphosate						
		Herbicide Crop Rotation Interval (Months)					
SOA #	**PRE as part of sequential with glyphosate**	**Corn**	**Pea**	**Dry bean**	**Potato**	**Sugarbeet**	**Wheat**
15	Alachlor (IntRRo)	0	NCS	NCS	NCS	NCS	NCS
15	Other Acetanalides (Dual, Outlook)	0	NCS	0	0	NCS	4 to 4.5
2,14	Authority Assist	10	10	10	26	40 b	4
14,15	Authority Elite	10	12	12	4	36	4.5
2,14	Authority First / Sonic	10	12	12	18	30 b	4
5,14	Authority MTZ	10	18	12	12	36	4
5,15	Boundary	8	8	12	0	18	8
2,2,14	Enlite ***(MN Only)***	9	9	9	30	30	4
14,15	Fierce	1	18	18	4	18	4
2	FirstRate	9	9	9	18	30 b	3
2,14	Gangster	9	9	9	18	30 b	3
5	Metribuzin (generic Sencor)	4	8	No Data	12	18	8
2,14	Optill	8.5	4	4	26	40 b	4
2,14,15	Optill PRO	8.5	4	4	26	40 b	4
14,15	Prefix ***(E. of I-29 and S. of I-94 Only)***	10	10	0	18	18	4.5
3	Prowl	0	0	0	0	12 (2CS)	NCS
14	Sharpen (1 oz/A)	0	0	4	4	4	0
14	Spartan	10	0	0	12	36	4
3	Treflan	NCS	0	0	0	12 (2CS)	NCS
14	Valor	0.5 to1	3 to 4	3 to 4	4 to12	4 to 10	1 to 2
14,15	Verdict (5 fl oz/A)	NCS	NCS	NCS	NCS	NCS	4
15	Warrant (PRE to weeds)	NCS	NCS	NCS	NCS	NCS	4
15	Zidua (> 2.0 oz/A)	0	11	11	4	15	4 to 6
	POST as part of tank mix with glyphosate						
14	Cadet	0	NCS	NCS	NCS	NCS	NCS
2	Classic ***(MN Only)***	9	9	9	30	30	3
14	Cobra / Phoenix	0	0	0	0	0	0
2	FirstRate	9	9	9	18	30 b	3
14	Flexstar	10	10	10	18	18	4
2	Harmony GT	0	45 days	45 days	45 days	45 days	0
2	Pursuit	8.5	4	4	26	40 b	4
2	Raptor	8.5	0	0	9 to 18	18 to 26	3
14	Resource	0	1	1	1	1	1
2	Synchrony XP ***(MN Only)***	9	9	9	30	30	3
14	Ultra Blazer	100 days	100 days	100 days	100 days	100 days	40 days
	Alternative Technologies						
10	Ignite 280 in LL Soybean	0		6	2.33	0	2.33

SOA = Site of action is defined as the biochemical site at which the herbicide binds to control a plant

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2CS = 2 Cropping Seasons

( ) = Recommended interval

Shading = Herbicides requiring ≥2 years before planting sugarbeets

b = Including a successful bioassay