

Weed Research Report - 2013

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Table of Contents

Controlling Glyphosate-Resistant Kochia in Roundup Ready Sugarbeet Rotations – Corn.....	1
Effect of Kochia Control in Corn on Kochia Density in Sugarbeet the Following Year.....	5
Controlling Glyphosate-Resistant Kochia in Roundup Ready Sugarbeet Rotations – Sugarbeet.....	7
Herbicide Tank Mixtures for Kochia Control in Roundup Ready Sugarbeet.....	9
Summary & Recommendations for Glyphosate-resistant Kochia Control in Sugarbeet Rotations.....	11
Kochia control with residual herbicides preplant in corn (2013_CN02).....	13
Nightshade control with POST herbicides in corn (2013_CN03).....	19
Kochia control with PRE & POST herbicides in corn (2013_CN04).....	23
Anthem for weed control in corn (2013_CN05).....	27
Corvus, Balance Flexx, Capreno, Laudis, Liberty in Field Corn (2013_CN06).....	33
Effect of chlorflurenol on dicamba efficacy for weed control in corn (2013_CN07).....	45
Effect of humectants on weed control with glufosinate (2013_CN08).....	53
Weed control and crop safety of F9140-8 in pinto and great northern bean (2013_DB01).....	57
Weed control and crop injury with BAS 762 01H in dry bean (2013_DB02).....	63
F9310-7 PRE and POST for weed control and crop safety in dry bean (2013_DB04).....	67
Weed control and sugarbeet tolerance of a new Sequence formulation (2013_SB04).....	73
Warrant Best Management Practices in Roundup Ready Sugarbeet (2013_SB05).....	77
Weed Resistance Management in Roundup Ready Sugarbeet (2013_SB06).....	81
Ethofumesate use in Roundup Ready sugarbeet (2013_SB07).....	95
Effect of Warrant on sugarbeet when applied PRE and PPI (2013_SB09).....	109
Glyphosate plus micronutrients and AMS replacement products in sugarbeet (2013_SB10).....	113
POST green foxtail control in spring wheat with pyroxsulam (2013_SW01).....	121
Weed control in spring wheat (2013_SW02).....	123
BroadAxe rate and timing comparison in Sunflower (2013_SF01).....	125
Weed control in winter wheat with Anthem (2013_WW01).....	133

Herbicides for PRE burndown and downy brome control in winter wheat (2013_WW02).....	137
Finesse for weed control in winter wheat (2013_WW04).....	141
Huskie Complete + Olympus efficacy on downy brome in winter wheat (2013_WW05).....	145
Efficacy of various BCS products applied to fallow (2013_FA01).....	147
Authority & Spartan Charge combinations for kochia and broadleaf weed control in fallow (2013_FA02)....	151
Winfield adjuvants for glyphosate efficacy in fallow (2013_FA03).....	153
Broadleaf weed control in fallow with 2,4-D and small grain herbicides (2013_FA04).....	155
AGH 11021 plus glyphosate or oil adjuvants for weed control in fallow (2013_FA05).....	157
Kochia and Russian thistle control with Linex in fallow prior to winter wheat (2013_FA06).....	161
APPENDIX 1: 2013 Irrigated Trial Locations, SAREC - Lingle, Wyoming.....	163
APPENDIX 2: 2013 Dryland Trial Locations, SAREC - Lingle, Wyoming.....	165

Controlling Glyphosate-Resistant Kochia in Roundup Ready Sugarbeet Rotations – Corn

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Introduction

Glyphosate-resistant (GR) kochia has become widespread in western Kansas, and has recently been confirmed in Nebraska, Colorado, and Montana. Multiple tactics will need to be used to manage GR kochia once it shows up in sugarbeet rotations. A diverse crop rotation will, in itself, help manage GR kochia. It is critical that we focus on kochia management in all crops in the rotation, and not just in sugarbeet. Management becomes more complex when we consider that many growers are also including Roundup Ready corn in the cropping systems. Previous research has indicated that excellent weed management in one crop will reduce the number of germinating weeds the following year by as much as 50%. Kochia has a relatively short-lived seed (only 2 to 3 years); therefore if kochia can be successfully controlled in other crops in the rotation (most notably corn), the remaining kochia population should decline and be more manageable in the sugarbeet crop. Ironically, though, use of a crop rotation will also limit the available herbicide options. For example, many corn herbicides provide excellent control of kochia, but will not allow rotation to sugarbeet the following year. It is important that we determine which herbicide programs in corn will provide the best control of GR kochia, and will also allow planting of Roundup Ready sugarbeet the following year.

Materials & Methods

Field studies were conducted near Lingle, Wyoming and Scottsbluff, NE in 2012 and 2013 to evaluate herbicides for kochia control that allow rotation the next year to sugarbeet. Corn was planted in 30-inch rows (Lingle) or 22-inch rows (Scottsbluff) between May 7 and May 13 both years. Soil at the Lingle was a silt loam with 1.1% organic matter and pH 7.8; at Scottsbluff, soil was a loamy sand with organic matter of 1.1% and pH of 8.2. Herbicide treatments were applied at 16.8 gallons (Lingle) or 20 gallons (Scottsbluff) of total volume per acre at 30 psi with TeeJet 11002 nozzles. Plots were 10 feet wide by 30 feet long at Lingle, and 11 feet wide by 45 feet long at Scottsbluff. The experiment was a randomized complete block with 4 replicates at each location. Kochia control was evaluated approximately 14 days after postemergence (POST) herbicide applications at all sites.

Results & Discussion

Preemergence (PRE) treatments followed by Roundup provided 87 to 98% kochia control in 2012, and 97 to 98% kochia control in 2013. At the time of POST herbicide application, Sharpen plus Prowl H2O PRE provided greater control of kochia compared to Verdict PRE (99 and 60% control, respectively) in 2012, but both treatments provided at least 97% kochia control in 2013. However, Prowl H2O requires at least 12 months between application and sugarbeet planting, and will therefore not be an option if sugarbeet is planted early.

When applied without Roundup, Status provided the greatest and most consistent kochia control of any POST treatment, averaging 95% across locations and years (Figure 1.1). Laudis plus Buctril was the only other treatment to provide greater than 90% kochia control when averaged over locations and years. All other POST treatments provided variable kochia control.

When Roundup was included as a tank-mix partner POST, Status remained the most effective and consistent POST herbicide, averaging 97% control across locations and years. Kochia control with Laudis plus Buctril was reduced when tank-mixed with Roundup, indicating there may be some antagonism between these products.

Based on these results, a PRE treatment of Verdict followed by Status plus Roundup POST would provide excellent season-long kochia control in corn, and be an excellent treatment to proactively manage glyphosate-resistant kochia. This treatment will contain three separate herbicide modes of action that are effective on kochia (saflufenacil, PPO; dicamba, auxin; glyphosate, EPSPS). The cost of this treatment would be roughly \$45/acre, and will allow rotation to sugarbeet the following year.

Table 1.1. Kochia control and corn yield from herbicide treatments in corn that allow rotation to sugarbeet. Data averaged over three sites near Scottsbluff, Nebraska, and Lingle, Wyoming, 2012 and 2013.

Treatment	Rate	Timing	Kochia control – % –	Corn yield – Bu/A –
Untreated Check			0	38
Verdict	13 fl oz/a	PRE	98	133
Roundup PowerMax ¹	22 fl oz/a	LPOST		
Sharpen	2.5 fl oz/a	PRE	96	133
Prowl H2O	3 pt/a	PRE		
Roundup PowerMax ¹	22 fl oz/a	LPOST		
Status ^{1,2}	5 oz/a	EPOST	95	121
Status ^{1,2}	5 oz/a	EPOST	97	127
Roundup PowerMax	22 fl oz/a			
Starane NXT ²	14 fl oz/a	EPOST	85	107
Starane NXT ^{1,2}	14 fl oz/a	EPOST	91	126
Roundup PowerMax	22 fl oz/a			
Cadet ^{1,3}	0.9 oz/a	EPOST	66	83
Cadet ^{1,3}	0.9 oz/a	EPOST	79	97
Roundup PowerMax	22 fl oz/a			
Buctril	1.5 pt/a	EPOST	49	88
Buctril	1.5 pt/a	EPOST	75	111
Roundup PowerMax ¹	22 fl oz/a			
Laudis ^{1,4}	3 fl oz/a	EPOST	91	123
Buctril	6 oz/a			
Laudis ^{1,4}	3 fl oz/a	EPOST	78	119
Buctril	6 oz/a			
Roundup PowerMax	22 fl oz/a			
Require Q ²	4 oz/a	EPOST	80	120
UAN (28-0-0)	2 qt/a			
Require Q	4 oz/a	EPOST	92	130
Roundup PowerMax ¹	22 fl oz/a			
<i>LSD (P=.05)</i>			19	24

¹ Included ammonium sulfate at 17 lbs/100gal

² Included NIS at 0.25% v/v.

³ Included crop oil concentrate at 2 pt/A.

⁴ Included MSO at 1 % v/v.

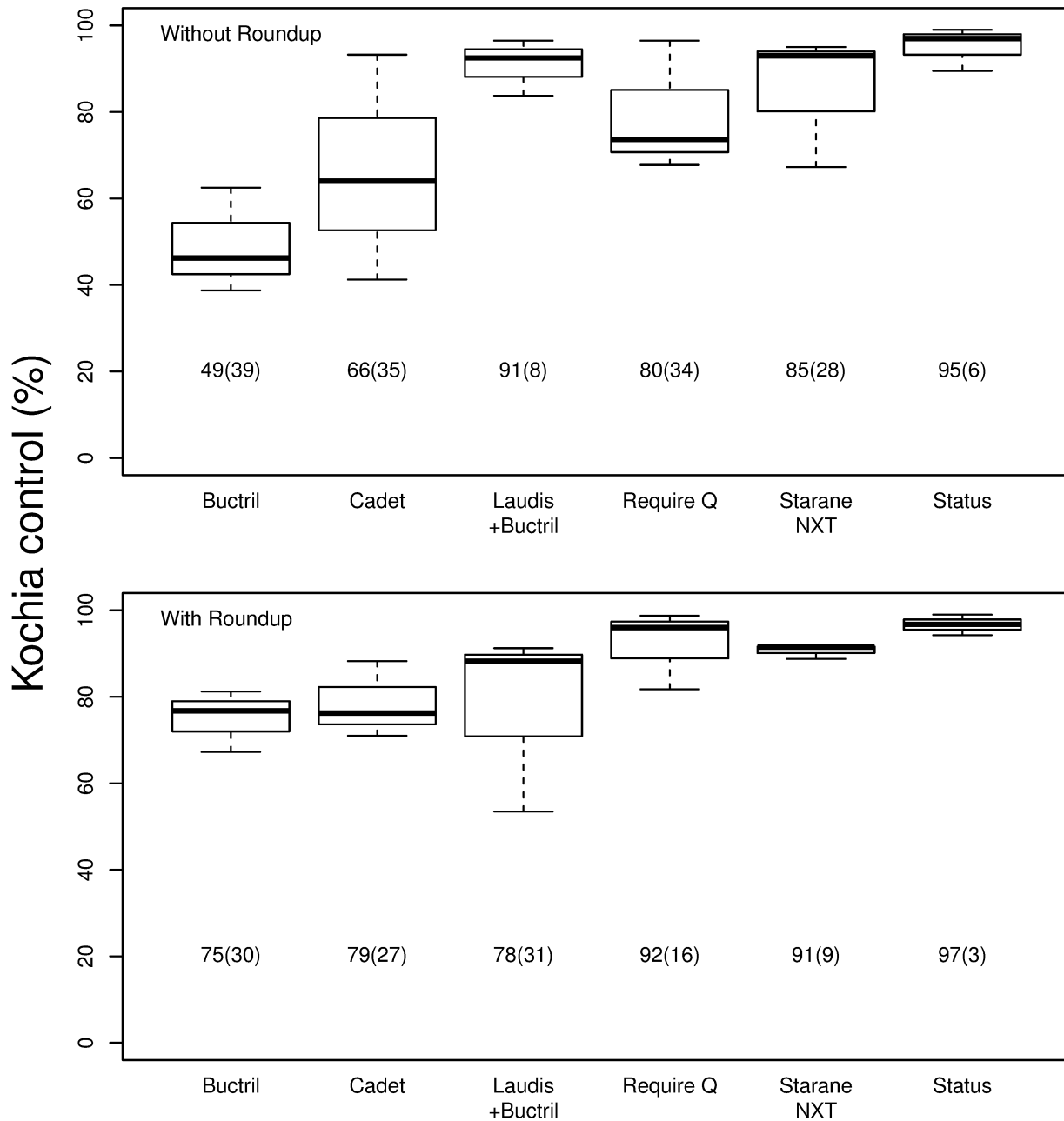


Figure 1.1. Kochia control from six postemergence (POST) applied herbicides alone (top panel) or tank mixed with Roundup PowerMAX (bottom panel). Boxes and lines represent the range of kochia control values observed across all four field studies. Numbers below box plots are the average kochia control with standard deviation in parentheses.

Effect of Kochia Control in Corn on Kochia Density in Sugarbeet the Following Year.

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Introduction

Previous research has indicated that excellent weed management in one crop can reduce the number of germinating weeds the following year by as much as 50%. Kochia has a relatively short-lived seed (only 2 to 3 years); therefore if kochia can be successfully controlled in other crops in the rotation (most notably corn), the remaining kochia population should decline and be more manageable in the sugarbeet crop. However, if kochia is not controlled in previous crops, the prolific seed production may result in a dramatic number of seedlings the following year. This study was carried out to determine the impact of kochia control in corn on kochia seedling density the following year.

Materials & Methods

In 2012, herbicide treatments were applied in corn that allowed rotation to sugarbeet (see previous study). Kochia density was evaluated in the corn crop after all treatments had been applied. Kochia plants that survived herbicide treatments were allowed to produce seed. In 2013, sugarbeet was planted in the same location. Kochia density in the sugarbeet crop was then evaluated to determine the effect of kochia control in corn on kochia density in sugarbeet the following year.

Results & Discussion

Kochia control in the 2012 corn crop was strongly correlated with kochia density in the 2013 sugarbeet crop ($P < 0.001$; correlation coefficient=0.48). On average, each kochia plant that survived treatment in 2012 resulted in over a 100-fold increase in the number of seedlings the following year. Kochia can produce many thousands of seeds per plant if uncontrolled, and this result emphasizes the impact that good kochia control in corn can have on weed control the following year.

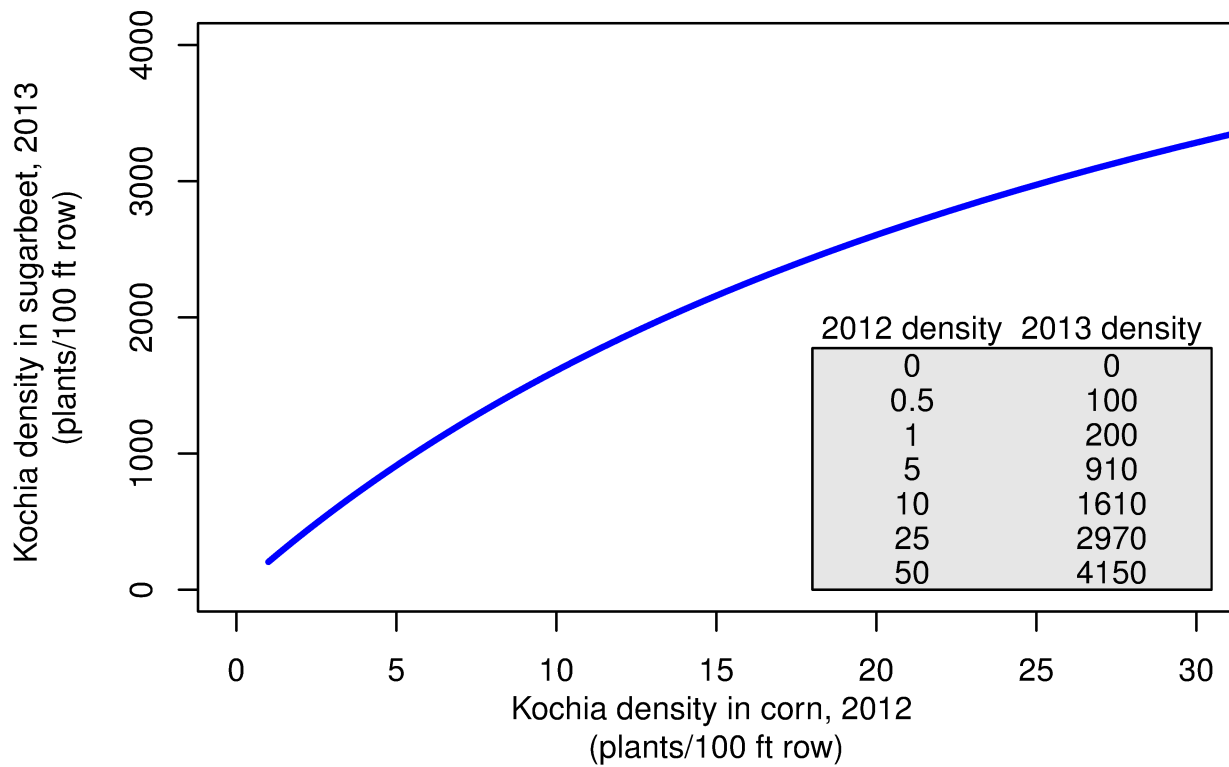


Figure 2.1. Effect of kochia density in corn (2012) on kochia seedling density in sugarbeet the following year.

Controlling Glyphosate-Resistant Kochia in Roundup Ready Sugarbeet Rotations – Sugarbeet

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Introduction

One of the primary benefits of Roundup Ready sugarbeet is virtually no crop injury from glyphosate applications. This was a drastic and highly beneficial change compared to conventional herbicide programs that included Nortron PRE followed by the typical mixture of 2 to 5 POST herbicides. Herbicide options to manage GR kochia in the sugarbeet crop will be limited, much like they were prior to the introduction of Roundup Ready sugarbeet. If we cannot control kochia with glyphosate, we will need to return to using conventional herbicides, and consequently, there will once again be the potential for crop injury. Because most kochia tends to emerge early in the growing season, Nortron applied PRE and early POST has the greatest potential to provide effective GR kochia control. We are also uncertain how prevalent UpBeet resistance still is in the growing region, since ALS-inhibitor herbicides are not as ubiquitous as they once were (thanks in large part to Roundup Ready technology). If a significant proportion of the kochia population is susceptible to UpBeet there would be value in combining UpBeet with postemergence applications of glyphosate.

Materials & Methods

A field study was conducted near Lingle, Wyoming and Mitchell, Nebraska in 2013 to evaluate Nortron and UpBeet for kochia control in Roundup Ready sugarbeet. At Lingle, sugarbeet was planted in 30-inch rows. Soil at Lingle was a loam (38% sand, 42% silt, 20% clay, 1.7% organic matter, pH 7.8, and CEC 16.0). Herbicide treatments were applied with a sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Plots were 10 feet wide by 30 feet long. At Scottsbluff, plots were 11 feet wide by 55 feet long and were located on a sandy loam soil with a pH of 7.9 and organic matter content of 1.8%. Sugarbeet was planted in 22-inch rows. Herbicides were applied with a tractor mounted sprayer calibrated to deliver 20 gallons of spray solution per acre at 32-psi pressure using Spraying Systems 11002 VS nozzles. Experimental design was a randomized complete block with 4 replicates at all locations. Betamix was included this year in all treatments as a POST herbicide, either as a standalone application (treatments 2 through 5) or as a tank-mixture with the other POST herbicides (treatments 6 through 19). Unfortunately, kochia was not present at high enough density in the study area at Mitchell to evaluate control, so only Lingle data are presented in this report. Results for control of other species will be available in a subsequent report.

Results & Discussion

Similar to results from 2012, the best kochia control was obtained with a combination of Nortron PRE followed by UpBeet POST (Table 3.1). However, control was much greater in 2013 than in the previous year. This may be due in part due to environmental conditions being more favorable to herbicide efficacy in 2013, but may also be partially due to addition of the Betamix in the POST treatment this year. A significant response to Nortron rate was observed, but increasing the rate above 24 oz/A had less of an effect compared to rates less than 24 oz/A. Based on this result, we recommend using Nortron at no less than 24 oz/A for kochia control. POST Nortron POST did not provide a significant increase in kochia control again this year. This may be due to a lack of adjuvant system.

Table 3.1. Kochia density and control from Nortron, Betamix, and Upbeet in Roundup Ready sugarbeet. Lingle, Wyoming, 2013.

Treatment ^{1,2,3}	Rate	Timing	Kochia density	Kochia control
			– plants per 100 ft row –	– % –
1 Untreated Check			376	--
2 Nortron SC	40 fl oz/a	PRE	114	70
3 Nortron SC	32 fl oz/a	PRE	162	57
4 Nortron SC	24 fl oz/a	PRE	168	55
5 Nortron SC	16 fl oz/a	PRE	257	32
6 UpBeet	1 oz/a	2TL	18	95
7 Nortron SC UpBeet	40 fl oz/a 1 oz/a	PRE 2TL	10	97
8 Nortron SC UpBeet	32 fl oz/a 1 oz/a	PRE 2TL	73	81
9 Nortron SC UpBeet	24 fl oz/a 1 oz/a	PRE 2TL	20	95
10 Nortron SC UpBeet	16 fl oz/a 1 oz/a	PRE 2TL	21	94
11 Nortron SC Nortron SC	40 fl oz/a 5 fl oz/a	PRE 2 TL	49	87
12 Nortron SC Nortron SC	32 fl oz/a 5 fl oz/a	PRE 2 TL	95	75
13 Nortron SC Nortron SC	24 fl oz/a 5 fl oz/a	PRE 2 TL	117	69
14 Nortron SC Nortron SC	16 fl oz/a 5 fl oz/a	PRE 2 TL	125	67
15 Nortron SC Nortron SC	24 fl oz/a 24 fl oz/a	PRE 4 TL	106	72
16 Nortron SC Nortron SC	24 fl oz/a 20 fl oz/a	PRE 4 TL	72	81
17 Nortron SC Nortron SC	24 fl oz/a 16 fl oz/a	PRE 4 TL	127	66
18 Nortron SC Nortron SC	24 fl oz/a 12 fl oz/a	PRE 4 TL	134	64
19 Nortron SC Nortron SC	24 fl oz/a 8 fl oz/a	PRE 4 TL	140	63
<i>LSD (0.05)</i>			76	

¹ all Upbeet treatments included NIS at 0.25%

² all POST applications of UpBeet or Nortron contained MON 56159, a blank Roudup PowerMax formulation.

³ all treatments included a POST application of Betamix at 32.5 fluid ounces per acre.

Herbicide Tank Mixtures for Kochia Control in Roundup Ready Sugarbeet

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Materials & Methods

Field studies were conducted near Lingle, Wyoming and Mitchell, Nebraska in 2013 to evaluate Roundup tank mixtures for kochia control in Roundup Ready sugarbeet. At Lingle, sugarbeet was planted in 30-inch rows. Soil at Lingle was a loam (38% sand, 42% silt, 20% clay, 1.7% organic matter, pH 7.8, and CEC 16.0). Herbicide treatments were applied with a sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Plots were 10 feet wide by 30 feet long. At Mitchell, plots were 11 feet wide by 55 feet long and were located on a sandy loam soil with a pH of 7.9 and organic matter content of 1.8%. Sugarbeet was planted in 22-inch rows. Herbicides were applied with a tractor mounted sprayer calibrated to deliver 20 gallons of spray solution per acre at 32-psi pressure using Spraying Systems 11002 VS nozzles. Experimental design was a randomized complete block with 4 replicates at all locations. Betamix was included this year in all treatments as a POST herbicide, either as a standalone application (treatments 2 through 5) or as a tank-mixture with the other POST herbicides (treatments 6 through 19). Unfortunately, kochia was not present at high enough density in the study area at Mitchell to evaluate control, so only Lingle data are presented in this report. Results for control of other species will be available in a subsequent report.

Results & Discussion

Early season kochia control was excellent in all treatments (Table 4.1). By August, treatments that contained only Nortron PRE followed by Roundup POST provided between 87 and 96% kochia control. Two applications of Roundup with no PRE provided similar level of kochia control, confirming kochia at the Lingle site is not glyphosate-resistant. Three applications of Roundup POST provided the greatest kochia control, with or without PRE or tank mixtures. No antagonism was observed with any of the tank-mixtures in this study, indicating that UpBeet can be safely mixed with glyphosate products to aid in control of kochia that may be resistant to glyphosate. Sugarbeet yields were not reduced by Nortron PRE rates up to 64 fluid oz/A in this study. In fact, the 64 oz/A rate resulted in one of the greatest sugarbeet yields in this study, in large part due to the broad spectrum weed control it provided early in the season. Sugarbeet yield was only reduced where kochia was controlled less than 90%.

Table 4.1. Effect of PRE and POST herbicide combinations on kochia control and sugarbeet yield, Lingle, WY, 2013.

Treatment	Rate	Timing	Kochia density		Sugarbeet			
			Jun-21 plants/m ²	Aug-19 %	Yield ton/A	Sugar %	Recoverable sucrose lbs/A	
1	Nortron SC	32 fl oz/a	PRE	0	88	17.6	11.8	3346
	Roundup PowerMax	32 fl oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
2	Nortron SC	32 fl oz/a	PRE	0	87	16.6	12.1	3309
	Roundup PowerMax	22 fl oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
3	Nortron SC	48 fl oz/a	PRE	0	91	19.1	12.4	3872
	Roundup PowerMax	32 fl oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
4	Nortron SC	64 fl oz/a	PRE	0	96	19.3	12.4	3982
	Roundup PowerMax	32 fl oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
5	Roundup PowerMax	32 fl oz/a	2 TL	0	96	18.1	11.9	3506
	Roundup PowerMax	22 fl oz/a	6 TL					
6	Roundup PowerMax	22 fl oz/a	2 TL	0	86	15.9	12.2	3134
	Roundup PowerMax	22 fl oz/a	6 TL					
7	Roundup PowerMax	32 fl oz/a	2 TL	0	99	20.9	12.4	4227
	Roundup PowerMax	22 fl oz/a	6 TL					
	Roundup PowerMax	22 fl oz/a	Canopy					
8	Nortron SC	32 fl oz/a	PRE	0	99	19	11.8	3626
	Roundup PowerMax	32 fl oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
	Roundup PowerMax	22 fl oz/a	Canopy					
9	Roundup PowerMax	32 fl oz/a	2 TL	0	95	19.1	12.6	4067
	UpBeet	1 oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
	UpBeet	1 oz/a	6 TL					
10	Nortron SC	32 fl oz/a	PRE	0	96	17.8	12.2	3572
	Roundup PowerMax	32 fl oz/a	2 TL					
	UpBeet	1 oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
	UpBeet	1 oz/a	6 TL					
11	Nortron SC	32 fl oz/a	PRE	0	99	18	12.6	3780
	Roundup PowerMax	32 fl oz/a	2 TL					
	UpBeet	1 oz/a	2 TL					
	Roundup PowerMax	22 fl oz/a	6 TL					
	UpBeet	1 oz/a	6 TL					
	Roundup PowerMax	22 fl oz/a	Canopy					
<i>LSD (P=0.05)</i>				1	6	2.7	NS	698

Summary & Recommendations for Glyphosate-resistant Kochia Control in Sugarbeet Rotations

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Based on the results of our series of field studies, several conclusions and recommendations can be made. The primary finding (which will be no surprise) is that options to manage glyphosate-resistant kochia in the sugarbeet crop are limited, and may be heavily influenced by environmental conditions. In 2013, kochia control was much greater than in 2012, at least in part due to better weather during herbicide applications. Severe drought and dry conditions reduced herbicide efficacy in 2012. Good conditions in 2013 allowed us to get much better kochia control, but without Roundup, kochia control was still lacking in most treatments. The best combination observed so far was Nortron PRE at 24 to 40 fluid oz/A followed by UpBeet at 1 oz/A plus Betamix at 32 fluid oz/A applied at the 2 true-leaf stage of sugarbeet. This combination will provide between 70 to 95% control of kochia. In combination with Roundup, this treatment will be quite expensive (compared with Roundup alone), and is an indication of how the cost of weed control will increase once glyphosate-resistant kochia invades sugarbeet fields in our region.

Because glyphosate-resistant kochia control will be difficult in sugarbeet, it is imperative that kochia be managed aggressively elsewhere in the rotation. Our research suggests that if corn precedes sugarbeet in the crop rotation, the density of kochia can be reduced significantly by using a corn herbicide program of Verdict PRE followed by Roundup plus Status POST. It will be very important to control any kochia plants that escape herbicide treatment in crops preceding sugarbeet, because kochia is a prolific seed producer, and each surviving plant can result in nearly 200 seedlings the following year. To emphasize this point, consider the following scenario based on the data obtained from these studies.

When glyphosate-resistant kochia first appears in a field, the density will be relatively low. A grower scouting a field may not be concerned about a few plants scattered throughout the field, particularly if it is a competitive crop such as corn. But because of the prolific seed production and limited options for control in sugarbeet, it is in the best economic interests of the grower to manage those few plants, just in case they are glyphosate-resistant.

Kochia density	Handweed time	Cost (assuming \$12/hr)
– plants/100 ft row –	– hr/A –	– \$/A –
1	0.1	\$1.33
2	0.2	\$2.65
5	0.6	\$6.63
10	1.1	\$13.25
25	2.8	\$33.09
50	5.5	\$66.04
100	11	\$131.55
250	27.1	\$324.99
500	53.1	\$637.38

If only 1 or 2 plants per 100 feet of row survive or escape herbicide application in corn, it is likely that corn yield will not be reduced. The grower may have little interest in spending the time or money to remove those plants, even though removing those plants at this early stage by hand would cost less than \$10/acre. However, if those 1 or 2 plants are left to produce seed in the corn crop, our data indicate we

could expect between 200 to 400 seedlings per 100 feet of row the following year in the sugarbeet crop. If those seedlings are glyphosate-resistant it is quite possible we would not realize it until it is too late to use any control practices other than hand weeding. It would then cost well over \$300/A to handweed this sugarbeet field. But even if we use a herbicide program in sugarbeet to target glyphosate-resistant kochia, we will likely only get 70 to 90% control of those 200 to 400 kochia seedlings. Even after spending additional money on the Nortron, UpBeet, and Betamix, we would still likely have to spend between \$20 to \$150 per acre on hand weeding.

We recommend the following for kochia control in sugarbeet rotations:

- **Target kochia** as the primary weed in all crops grown in rotation with sugarbeet. Always manage kochia aggressively in the rotation.
- **Use non-glyphosate herbicides that are effective on kochia** in each of the crops rotated with sugarbeet. If the preceding crop is corn, Verdict PRE followed by Roundup plus Status POST has shown excellent kochia control, and uses 3 different herbicide modes of action that are effective on kochia.
- Have a **near-zero tolerance for kochia escapes** in the crop preceding sugarbeet in the rotation. Each dollar spent on an additional herbicide treatment or even hand-weeding in corn may result in many dollars saved on weed control in the sugarbeet crop.
- If you suspect kochia will be a problem in your sugarbeet field, apply Nortron (or another ethofumesate product) PRE. Use at least 24 fluid ounces per acre on sandy soils, and increase the rate accordingly for heavier soils.

Kochia control with residual herbicides preplant in corn (2013_CN02)

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate kochia control with residual herbicides preplant. Corn ('Pioneer P8954AM1') was planted in 30-inch rows at a rate of 34,000 seeds per acre on May 13. Soils at the site were Haverson and McCook loams (41% sand, 40% silt, 19% clay, 1.5% organic matter, pH 7.8, CEC 15.1). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 3 and 11. Kochia populations were counted on June 21 and July 10. Kochia control was visually evaluated on June 3 and 11. Corn yield and test weight were determined from one row per plot harvested on December 2. Weed counts and control are shown in Table 2. Corn injury and yields and shown in Table 3.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	05/15/13	06/11/13
Time of Day:	10:40 AM	02:55 PM
Application Method:	SPRAY	SPRAY
Application Timing:	PRE	V4
Application Placement:	BROADCAST - SOIL	FOLIAR
Air Temperature, Unit:	67 F	99 F
% Relative Humidity:	41	18
Wind Velocity, Unit:	3.0 MPH	0.9 MPH
Wind Direction:	SE	SE
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	63 F	85 F
Soil Moisture:	FAIR	FAIR
% Cloud Cover:	80	20

Table 2. Kochia control and density with residual herbicides preplant

Treatment ¹	Rate		Weed control		Kochia density	
			Jun 03	Jun 11	Jun 21	Jul 10
			----- % -----		----- plants/m ² -----	
Nontreated Check			23	0	5	5
Clarity	0.25	lb ae/a	97	99	0	1
Verdict	0.566	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Clarity	0.25	lb ae/a	98	99	0	0
Zidua	0.16	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Clarity	0.25	lb ae/a	99	96	1	1
Sharpen	0.0557	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Clarity	0.25	lb ae/a	96	94	0	0
AAtrex	0.5	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.175	lb ai/a	99	97	0	0
Verdict	0.566	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.175	lb ai/a	99	93	0	0
Zidua	0.16	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.175	lb ai/a	99	98	0	1
Verdict	0.566	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.175	lb ai/a	99	94	0	0
AAtrex	0.5	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.263	lb ai/a	99	99	0	2
Verdict	0.566	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.263	lb ai/a	99	96	0	0
Zidua	0.16	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.263	lb ai/a	98	99	0	1
Verdict	0.566	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
Distinct	0.263	lb ai/a	94	94	0	0

Table 2. Kochia control and density with residual herbicides preplant

Treatment ¹	Rate		Weed control		Kochia density	
			Jun 03	Jun 11	Jun 21	Jul 10
			----- % -----		----- plants/m ² -----	
AAtrex	0.5	lb ai/a				
Roundup PowerMax	0.77	lb ae/a				
LSD (P=.05)			18	4	4	1
CV (%)			13.8	2.8	608.2	90.5
Treatment Prob(F)			0.0001	0.0001	0.4831	0.0001

¹ All herbicide treatments included methylated seed oil at 1% v/v and ammonium sulfate at 17 lb/100 gal.

Table 3. Kochia control with residual herbicides preplant

Treatment ¹	Rate		Population	Injury		Yield ²	Test Weight ²	Grain Moisture
			Jun 28	Jun 03	Jun 11	bu/A	lbs/bu	%
			plants/A	----- % -----				
Nontreated Check			25,483	0	0	81.7	49.9	16.0
Clarity	0.25	lb ae/a	24,176	3	0	98.2	56.3	15.2
Verdict	0.566	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Clarity	0.25	lb ae/a	23,958	4	0	109.0	56.8	15.1
Zidua	0.16	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Clarity	0.25	lb ae/a	21,127	1	0	116.8	56.1	15.1
Sharpen	0.0557	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Clarity	0.25	lb ae/a	23,305	4	0	97.2	56.5	15.0
AAtrex	0.5	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Distinct	0.175	lb ai/a	26,354	2	0	114.4	56.6	15.2
Verdict	0.566	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Distinct	0.175	lb ai/a	23,958	1	0	124.9	57.2	15.0
Zidua	0.16	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Distinct	0.175	lb ai/a	21,127	1	0	141.0	56.7	15.1
Verdict	0.566	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Distinct	0.175	lb ai/a	24,176	1	0	129.5	56.3	15.0
AAtrex	0.5	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Distinct	0.263	lb ai/a	24,176	1	0	131.1	56.2	14.9
Verdict	0.566	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						

Table 3. Kochia control with residual herbicides preplant

Treatment ¹	Rate		Population	Injury		Yield ²	Test Weight ²	Grain Moisture
			Jun 28	Jun 03	Jun 11			
Distinct	0.263	lb ai/a	26,789	1	0	129.7	56.8	15.1
Zidua	0.16	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Distinct	0.263	lb ai/a	21,780	2	0	86.6	55.6	15.0
Verdict	0.566	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
Distinct	0.263	lb ai/a	23,087	1	0	120.5	56.5	15.0
AAtrex	0.5	lb ai/a						
Roundup PowerMax	0.77	lb ae/a						
LSD (P=.05)			3,819	3	0	46.8	5.6	0.3
CV (%)			11.2	128.1	0.0	28.5	6.9	1.6
Treatment Prob(F)			0.0924	0.1974	1.0000	0.2775	0.5131	0.0001

¹ All herbicide treatments included methylated seed oil at 1% v/v and ammonium sulfate at 17 lb/100 gal.

² Yield and test weight were adjusted to 15.5% moisture.

Nightshade control with POST herbicides in corn (2013_CN03)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate Nightshade control with POST herbicides. Corn ('Pioneer P8954AM1') was planted in 30-inch rows at a rate of 34,000 seeds per acre on May 13. Soils at the site were Haverson and McCook loams (41% sand, 40% silt, 19% clay, 1.5% organic matter, pH 7.8, CEC 15.1). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3. Weed evaluated was hairy nightshade. Weed control was visually evaluated on July 3, 26, and August 30 (Table 2). Corn yields were determined from one row per plot harvested on December 2 (Table 3).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/11/13	07/18/13
Time of Day:	02:05 PM	08:52 AM
Application Method:	SPRAY	SPRAY
Application Timing:	V4	V8
Application Placement:	FOLIAR	FOLIAR
Air Temperature, Unit:	99 F	78 F
% Relative Humidity:	25	52
Wind Velocity, Unit:	0.7 MPH	1.3 MPH
Wind Direction:	SE	SE
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	80 F	68 F
Soil Moisture:	FAIR	GOOD
% Cloud Cover:	20	10

Table 2. Nightshade control with POST herbicides.

Treatment	Rate	Timing	Nightshade control			
			Jul 03	Jul 26	Aug 20	
Nontreated Check			0	0	0	
Status ¹	0.175	lb ai/a	V4	99	99	98
Roundup PowerMax	0.77	lb ae/a				
Prowl H2O	1.19	lb ai/a				
Status ¹	0.175	lb ai/a	V4	99	99	99
Roundup PowerMax	0.77	lb ae/a				
Prowl H2O	1.19	lb ai/a				
Zidua	0.133	lb ai/a				
Status ¹	0.175	lb ai/a	V4	99	99	99
Roundup PowerMax	0.77	lb ae/a				
Roundup PowerMax ¹	0.77	lb ae/a	V8			
Prowl H2O	1.19	lb ai/a				
Status ¹	0.175	lb ai/a	V4	99	99	99
Roundup PowerMax	0.77	lb ae/a				
Roundup PowerMax ¹	0.77	lb ae/a	V8			
Prowl H2O	1.19	lb ai/a				
Zidua	0.133	lb ai/a				
Status ¹	0.175	lb ai/a	V4	99	99	99
Roundup PowerMax	0.77	lb ae/a				
Roundup PowerMax ¹	0.77	lb ae/a	V8			
Prowl H2O	1.19	lb ai/a				
Outlook	0.75	lb ai/a				
Status	0.175	lb ai/a	V4	96	98	98
Aim	0.0156	lb ai/a				
Outlook	0.61	lb ai/a				
COC	1	% v/v				
LSD (P=.05)				4	1	1
CV (%)				2.5	0.9	0.9
Treatment Prob(F)				0.4509	0.4509	0.3032

¹ Treatment included methylated seed oil at 1% v/v and ammonium sulfate at 17 lb/100 gal.

Table 3. Nightshade control with POST herbicides

Treatment	Rate		Timing	Crop injury	Yield	Test Weight	Grain moisture
				%	bu/A	lbs/bu	%
Nontreated Check				0	56.2	57.5	15.6
Status ¹	0.175	lb ai/a	V4	0	119.2	56.5	14.9
Roundup PowerMax	0.77	lb ae/a					
Prowl H2O	1.19	lb ai/a					
Status ¹	0.175	lb ai/a	V4	0	100.4	57.6	15.0
Roundup PowerMax	0.77	lb ae/a					
Prowl H2O	1.19	lb ai/a					
Zidua	0.133	lb ai/a					
Status ¹	0.175	lb ai/a	V4	0	88.5	58.1	14.8
Roundup PowerMax	0.77	lb ae/a					
Roundup PowerMax ¹	0.77	lb ae/a	V8				
Prowl H2O	1.19	lb ai/a					
Status ¹	0.175	lb ai/a	V4	0	113.6	59.5	15.2
Roundup PowerMax	0.77	lb ae/a					
Roundup PowerMax ¹	0.77	lb ae/a	V8				
Prowl H2O	1.19	lb ai/a					
Zidua	0.133	lb ai/a					
Status ¹	0.175	lb ai/a	V4	1	97.5	57.0	14.9
Roundup PowerMax	0.77	lb ae/a					
Roundup PowerMax ¹	0.77	lb ae/a	V8				
Prowl H2O	1.19	lb ai/a					
Outlook	0.75	lb ai/a					
Status	0.175	lb ai/a	V4	0	85.9	57.8	15.4
Aim	0.0156	lb ai/a					
Outlook	0.61	lb ai/a					
COC	1	% v/v					
LSD (P=.05)				1	51.1	3.4	0.6
CV (%)				489.9	33.6	3.9	2.6
Treatment Prob(F)				0.4509	0.6878	0.5517	0.3392

¹ Treatment included methylated seed soil at 1% v/v and ammonium sulfate at 17 lb/100 gal.

² Yield and test weight were adjusted to 15.5% moisture.

Kochia control with PRE & POST herbicides in corn (2013_CN04)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate Kochia control with PRE & POST herbicides. Corn ('Pioneer P8954AM1') was planted in 30-inch rows at a rate of 34,000 seeds per acre on May 13. Soils at the site were Haverson and McCook loams (41% sand, 40% silt, 19% clay, 1.5% organic matter, pH 7.8, CEC 15.1). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3. Kochia control was visually evaluated on July 3 (Table 2). Corn yields were determined from one row per plot harvested on November 20 (Table 3).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	05/15/13	06/11/13
Time of Day:	12:00 PM	01:39 PM
Application Method:	SPRAY	SPRAY
Application Timing:	PRE	V4
Application Placement:	BROADCAST - SOIL	FOLIAR
Air Temperature, Unit:	72 F	95 F
% Relative Humidity:	33	24
Wind Velocity, Unit:	4.5 MPH	2.1 MPH
Wind Direction:	E	SE
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	63 F	80 F
Soil Moisture:	FAIR	FAIR
% Cloud Cover:	80	20

Table 2. Kochia response to PRE & POST herbicides.

Treatment	Rate		Timing	Kochia control
				Jul 03
Nontreated Check				% 0
Prowl H2O Outlook	1.19 0.656	lb ai/a lb ai/a	PRE	97
Prowl H2O Zidua	1.19 0.133	lb ai/a lb ai/a	PRE	99
Prowl H2O Verdict	1.19 0.566	lb ai/a lb ai/a	PRE	95
Prowl H2O	1.19	lb ai/a	PRE	83
Armezon ¹ AAtrex Prowl H2O	0.0109 0.5 1.19	lb ai/a lb ai/a lb ai/a	POST	98
Armezon ¹ Buctril Prowl H2O	0.0109 0.25 1.19	lb ai/a lb ai/a lb ai/a	POST	86
Armezon ¹ Clarity Prowl H2O	0.0109 0.25 1.19	lb ai/a lb ae/a lb ai/a	POST	99
Armezon ¹ AAtrex Zidua	0.0109 0.5 0.133	lb ai/a lb ai/a lb ai/a	POST	93
Armezon ¹ Buctril Zidua	0.0109 0.25 0.133	lb ai/a lb ai/a lb ai/a	POST	97
Armezon ¹ Clarity Zidua	0.0109 0.25 0.133	lb ai/a lb ae/a lb ai/a	POST	96
LSD (P=.05)				9
CV (%)				6.65
Treatment Prob(F)				0.0085

¹ Treatments included methylated seed oil at 1% v/v and ammonium sulfate at 17 lb/100 gal.

Table 3. Corn response to kochia control with PRE & POST herbicides

Treatment	Rate		Timing	Yield ²	Test weight ²	Grain moisture
				bu/A	lbs/bu	%
Nontreated Check				51.9	50.0	16.0
Prowl H2O	1.19	lb ai/a	PRE	147.8	58.8	15.8
Outlook	0.656	lb ai/a				
Prowl H2O	1.19	lb ai/a	PRE	167.3	60.9	16.1
Zidua	0.133	lb ai/a				
Prowl H2O	1.19	lb ai/a	PRE	176.1	60.5	15.6
Verdict	0.566	lb ai/a				
Prowl H2O	1.19	lb ai/a	PRE	143.8	60.3	15.7
Armezon ¹	0.0109	lb ai/a	POST	164.6	60.8	15.4
AAtrex	0.5	lb ai/a				
Prowl H2O	1.19	lb ai/a				
Armezon ¹	0.0109	lb ai/a	POST	163.7	61.1	15.7
Buctril	0.25	lb ai/a				
Prowl H2O	1.19	lb ai/a				
Armezon ¹	0.0109	lb ai/a	POST	149.3	60.2	15.5
Clarity	0.25	lb ae/a				
Prowl H2O	1.19	lb ai/a				
Armezon ¹	0.0109	lb ai/a	POST	135.6	60.1	15.2
AAtrex	0.5	lb ai/a				
Zidua	0.133	lb ai/a				
Armezon ¹	0.0109	lb ai/a	POST	140.7	60.1	15.4
Buctril	0.25	lb ai/a				
Zidua	0.133	lb ai/a				
Armezon ¹	0.0109	lb ai/a	POST	163.1	57.9	15.6
Clarity	0.25	lb ae/a				
Zidua	0.13	lb ai/a				
LSD (P=.05)				44.3	2.3	0.5
CV (%)				19.7	2.6	2.3
Treatment Prob(F)				0.6402	0.1597	0.0859

¹ Treatments included methylated seed oil at 1% v/v and ammonium sulfate at 17 lb/100 gal.

² Yield and test weight were adjusted to 15.5% moisture.

Anthem for weed control in corn (2013_CN05)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate Anthem for weed control in corn. Corn ('Pioneer P8954AM1') was planted in 30-inch rows at a rate of 34,000 seeds per acre on May 13. Soils at the site were Haverson and McCook loams (38% sand, 42% silt, 20 clay, 1.7% organic matter, pH 7.8, CEC 16.0). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3. Weeds evaluated were redroot pigweed, common lambsquarters, kochia, hairy nightshade, and green foxtail. Weed control was visually evaluated on July 3 (Table 2). Corn yields were determined from one row per plot harvested on December 2 (Table 3).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	05/15/13	06/11/13
Time of Day:	11:15 AM	03:35 PM
Application Method:	SPRAY	SPRAY
Application Timing:	PRE	V4
Application Placement:	BROADCAST - SOIL	FOLIAR
Air Temperature, Unit:	67 F	91 F
% Relative Humidity:	39	26
Wind Velocity, Unit:	5.0 MPH	2.0 MPH
Wind Direction:	variable	WNW
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	63 F	82 F
Soil Moisture:	FAIR	FAIR
% Cloud Cover:	80	76

Table 2. Weed control in Anthem treatments in corn.

Treatment ¹	Rate		Timing	Weed control (Jul 3)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				-----%-----				
Dual II Magnum	1.25	pt/a	PRE	98	65	79	98	99
Roundup PowerMax	22	fl oz/a	EPOST					
Verdict	13	fl oz/a	PRE	95	89	90	98	99
Roundup PowerMax	22	fl oz/a	EPOST					
Anthem	8	fl oz/a	PRE	99	88	97	98	99
Roundup PowerMax	22	fl oz/a	EPOST					
Anthem ATZ	2	pt/a	PRE	99	99	98	99	99
Roundup PowerMax	22	fl oz/a	EPOST					
Anthem ATZ	2	pt/a	PRE	99	98	98	99	99
Balance Flexx	2	fl oz/a						
Roundup PowerMax	22	fl oz/a	EPOST					
Anthem	8	fl oz/a	PRE	99	99	99	99	99
F9387-1 ²	2.5	fl oz/a	EPOST					
Roundup PowerMax	22	fl oz/a						
AAtrex	1	pt/a						
Anthem ATZ	2	pt/a	PRE	99	98	98	99	99
F9387-1 ²	2.5	fl oz/a	EPOST					
Roundup PowerMax	22	fl oz/a						
AAtrex	1	pt/a						
Anthem	8	fl oz/a	PRE	99	86	93	99	99
Cadet	0.75	fl oz/a	EPOST					
Roundup PowerMax	22	fl oz/a						
Anthem ATZ	2	pt/a	PRE	98	95	97	99	99
Cadet	0.75	fl oz/a	EPOST					
Roundup PowerMax	22	fl oz/a						
Anthem ATZ ²	2	pt/a	EPOST	99	99	99	99	99
Roundup PowerMax	22	fl oz/a						
Roundup PowerMax	22	fl oz/a	EPOST	44	34	43	45	98
F9387-1 ²	2.5	fl oz/a	EPOST	99	99	99	99	99

Table 2. Weed control in Anthem treatments in corn.

Treatment ¹	Rate		Timing	Weed control (Jul 3)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	22	fl oz/a						
AAtrex	1	pt/a						
F9387-1 ²	2	fl oz/a	EPOST	99	99	99	99	99
Roundup PowerMax	22	fl oz/a						
Anthem ATZ	1	pt/a						
LSD (P=.05)				17	16	15	15	1
CV (%)				12.54	13.04	11.78	11.38	0.56
Treatment Prob(F)				0.0001	0.0001	0.0001	0.0001	0.4690

¹ All treatments included ammonium sulfate at 17 lb/100gal.

² Treatment included crop oil concentrate at 1% v/v.

Table 3. Corn response to Anthem treatments for weed control.

Treatment ¹	Rate		Timing	Crop injury	Yield ³	Test Weight ³	Grain moisture
				%	bu/A	lbs/bu	%
Dual II Magnum	1.25	pt/a	PRE	0	126.0	56.0	15.3
Roundup PowerMax	22	fl oz/a	EPOST				
Verdict	13	fl oz/a	PRE	1	128.1	86.3	15.4
Roundup PowerMax	22	fl oz/a	EPOST				
Anthem	8	fl oz/a	PRE	1	121.4	56.5	15.1
Roundup PowerMax	22	fl oz/a	EPOST				
Anthem ATZ	2	pt/a	PRE	2	86.9	56.4	15.2
Roundup PowerMax	22	fl oz/a	EPOST				
Anthem ATZ	2	pt/a	PRE	1	109.7	57.1	15.2
Balance Flexx	2	fl oz/a					
Roundup PowerMax	22	fl oz/a	EPOST				
Anthem	8	fl oz/a	PRE	1	112.8	55.4	15.2
F9387-1 ²	2.5	fl oz/a	EPOST				
Roundup PowerMax	22	fl oz/a					
AAtrex	1	pt/a					
Anthem ATZ	2	pt/a	PRE	1	113.4	55.2	15.0
F9387-1 ²	2.5	fl oz/a	EPOST				
Roundup PowerMax	22	fl oz/a					
AAtrex	1	pt/a					
Anthem	8	fl oz/a	PRE	1	118.6	57.0	15.3
Cadet	0.75	fl oz/a	EPOST				
Roundup PowerMax	22	fl oz/a					
Anthem ATZ	2	pt/a	PRE	1	118.8	56.9	15.2
Cadet	0.75	fl oz/a	EPOST				
Roundup PowerMax	22	fl oz/a					
Anthem ATZ ²	2	pt/a	EPOST	2	122.3	55.0	15.0
Roundup PowerMax	22	fl oz/a					
Roundup PowerMax	22	fl oz/a	EPOST	0	112.8	57.4	15.1
F9387-1 ²	2.5	fl oz/a	EPOST	1	86.8	55.9	15.0

Table 3. Corn response to Anthem treatments for weed control.

Treatment ¹	Rate		Timing	Crop injury %	Yield ³ bu/A	Test Weight ³ lbs/bu	Grain moisture %
Roundup PowerMax	22	fl oz/a					
AAtrex	1	pt/a					
F9387-1 ²	2	fl oz/a	EPOST	1	114.6	85.9	15.3
Roundup PowerMax	22	fl oz/a					
Anthem ATZ	1	pt/a					
LSD (P=.05)				2	33.0	30.5	0.4
CV (%)				180.52	20.38	35.07	1.7
Treatment Prob(F)				0.8227	0.2897	0.3854	0.5000

¹ All treatments included ammonium sulfate at 17 lb/100gal.

² Treatment included crop oil concentrate at 1% v/v.

³ Yield and test weight were adjusted to 15.5% moisture.

Corvus, Balance Flexx, Capreno, Laudis, Liberty in Field Corn (2013_CN06)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate Corvus, Balance Flexx, Capreno, Laudis, Liberty in field corn. Corn ('Pioneer P8954AM1') was planted in 30-inch rows at a rate of 34,000 seeds per acre on May 13. Soils at the site were Haverson and McCook loams (38% sand, 42% silt, 20 clay, 1.7% organic matter, pH 7.8, CEC 16.0). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3 and 10. Weeds evaluated were redroot pigweed, common lambsquarters, kochia, hairy nightshade, and green foxtail. Weed control was visually evaluated on July 3, 10, 26, and August 20 (Table 2). Corn yields were determined from one row per plot harvested on December 2 (Table 3).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	05/13/13	06/03/13	06/27/13
Time of Day:	11:35 AM	11:10 AM	11:50:00 AM
Application Method:	SPRAY	SPRAY	SPRAY
Application Timing:	PRE	EPOST	V5
Application Placement:	BROADCAST - SOIL	FOLIAR	FOLIAR
Air Temperature, Unit:	72 F	82 F	80 F
% Relative Humidity:	33	20	42
Wind Velocity, Unit:	4.5 MPH	9.7 MPH	5.0 MPH
Wind Direction:	E	NW	SE
Dew Presence (Y/N):	N	N	N
Soil Temperature, Unit:	63 F	65 F	77 F
Soil Moisture:	FAIR	FAIR	FAIR
% Cloud Cover:	80	35	0

Table 2a. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate	Unit	Timing	Weed control (Jul 3)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
Nontreated Check				0	0	0	0	0
Corvus	3.3	fl oz/a	PRE	98	97	99	96	99
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	99	93	99	97
Anthem ATZ	24	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	98	99	99	98
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	99	99	99	99
Atrazine	32	fl oz/a						
Harness	36	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	99	99	99	99
Atrazine	32	fl oz/a						
Clarity	16	fl oz/a						
Capreno ¹	3	fl oz/a	EPOST	96	93	74	98	99
Roundup PowerMax	22	fl oz/a						
Atrazine	16	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	99	99	99	99
Atrazine	32	fl oz/a						
Laudis ¹	2.6	fl oz/a	LPOST					
Clarity	8	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	94	80	74	79	99
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	91	77	59	91	88
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Destiny	1	% v/v						
Harness ¹	36	fl oz/a	PRE	99	97	82	99	99
Laudis	3	fl oz/a	LPOST					
Buctril	6	fl oz/a						
COC	1	% v/v						
Lumax	80	fl oz/a	PRE	99	99	97	99	98
Halex GT ¹	58	fl oz/a	EPOST	99	99	98	99	98

Table 2a. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate	Unit	Timing	Weed control (Jul 3)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Atrazine	16	fl oz/a						
NIS	0.25	% v/v						
Harness Xtra	64	fl oz/a	PRE	99	99	99	99	99
LSD (P=.05)				6	18	28	17	6
CV (%)				4.5	13.1	21.5	12.2	4.2
Treatment Prob(F)				0.2642	0.1638	0.0663	0.5152	0.0517

¹ Treatment included ammonium sulfate at 17 lb/100 gal.

Table 2b. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate	Timing	Weed control (Jul 10)				
			AMARE	CHEAL	KCHSC	SOLSA	SETVI
Nontreated Check			23	0	15	9	24
Corvus	3.3 fl oz/a	PRE	99	96	96	96	99
Atrazine	32 fl oz/a						
Balance Flexx	3 fl oz/a	PRE	99	97	95	97	96
Anthem ATZ	24 fl oz/a						
Balance Flexx	3 fl oz/a	PRE	99	98	99	99	95
Atrazine	32 fl oz/a						
Balance Flexx	3 fl oz/a	PRE	99	98	99	98	99
Atrazine	32 fl oz/a						
Harness	36 fl oz/a						
Balance Flexx	3 fl oz/a	PRE	99	99	99	99	98
Atrazine	32 fl oz/a						
Clarity	16 fl oz/a						
Capreno ¹	3 fl oz/a	EPOST	98	93	71	99	99
Roundup PowerMax	22 fl oz/a						
Atrazine	16 fl oz/a						
Balance Flexx	3 fl oz/a	PRE	99	99	99	99	99
Atrazine	32 fl oz/a						
Laudis ¹	2.6 fl oz/a	LPOST					
Clarity	8 fl oz/a						
Roundup PowerMax	22 fl oz/a						
Destiny HC	0.5 % v/v						
Laudis ¹	3 fl oz/a	LPOST	87	94	86	99	99
Clarity	8 fl oz/a						
Harness Xtra	32 fl oz/a						
Roundup PowerMax	22 fl oz/a						
Destiny HC	0.5 % v/v						
Laudis ¹	3 fl oz/a	LPOST	98	96	87	98	57
Clarity	8 fl oz/a						
Harness Xtra	32 fl oz/a						
Destiny	1 % v/v						
Harness ¹	36 fl oz/a	PRE	99	99	99	99	99
Laudis	3 fl oz/a	LPOST					
Buctril	6 fl oz/a						
COC	1 % v/v						
Lumax	80 fl oz/a	PRE	99	97	97	99	77
Halex GT ¹	58 fl oz/a	EPOST	98	99	95	99	96

Table 2b. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate	Timing	Weed control (Jul 10)					
			AMARE	CHEAL	KCHSC	SOLSA	SETVI	
Atrazine	16 fl oz/a							
NIS	0.25 % v/v							
Harness Xtra	64 fl oz/a	PRE	99	99	99	99	99	
LSD (P=.05)			10	4	17	3	25	
CV (%)			7.0	3.2	12.6	2.4	19.0	
Treatment Prob(F)			0.5049	0.0961	0.0664	0.6514	0.0558	

¹ Treatment included ammonium sulfate at 17 lb/100 gal.

Table 2c. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate		Timing	Weed control (Jul 26)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
Nontreated Check				0	0	0	0	0
Corvus	3.3	fl oz/a	PRE	99	91	98	98	99
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	98	97	94	98	98
Anthem ATZ	24	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	98	98	99	98
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	98	92	99	98	97
Atrazine	32	fl oz/a						
Harness	36	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	96	94	99	98	99
Atrazine	32	fl oz/a						
Clarity	16	fl oz/a						
Capreno ¹	3	fl oz/a	EPOST	98	58	50	97	97
Roundup PowerMax	22	fl oz/a						
Atrazine	16	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	98	99	99	98
Atrazine	32	fl oz/a						
Laudis ¹	2.6	fl oz/a	LPOST					
Clarity	8	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	94	91	91	99	96
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	99	97	91	99	71
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Destiny	1	% v/v						
Harness ¹	36	fl oz/a	PRE	99	97	98	97	99
Laudis	3	fl oz/a	LPOST					
Buctril	6	fl oz/a						
COC	1	% v/v						
Lumax	80	fl oz/a	PRE	99	97	96	99	97
Halex GT ¹	58	fl oz/a	EPOST	99	95	97	99	90

Table 2c. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate	Timing	Weed control (Jul 26)					
			AMARE	CHEAL	KCHSC	SOLSA	SETVI	
			----- % -----					
Atrazine	16 fl oz/a							
NIS	0.25 % v/v							
Harness Xtra	64 fl oz/a	PRE	99	96	99	96	99	
LSD (P=.05)			4	18	20	3	13	
CV (%)			3.1	13.7	15.0	2.3	9.6	
Treatment Prob(F)			0.3589	0.0091	0.0014	0.6744	0.0081	

¹ Treatment included ammonium sulfate at 17 lb/100 gal.

Table 2d. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate		Timing	Weed control (Aug 20)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
Nontreated Check				0	0	0	0	0
Corvus	3.3	fl oz/a	PRE	99	94	96	96	98
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	95	95	95	98
Anthem ATZ	24	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	98	98	95	96
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	96	99	94	97
Atrazine	32	fl oz/a						
Harness	36	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	97	99	92	97
Atrazine	32	fl oz/a						
Clarity	16	fl oz/a						
Capreno ¹	3	fl oz/a	EPOST	98	77	75	96	95
Roundup PowerMax	22	fl oz/a						
Atrazine	16	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	99	97	99	94	98
Atrazine	32	fl oz/a						
Laudis ¹	2.6	fl oz/a	LPOST					
Clarity	8	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	94	90	88	90	91
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	97	93	87	96	56
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Destiny	1	% v/v						
Harness ¹	36	fl oz/a	PRE	99	91	98	88	98
Laudis	3	fl oz/a	LPOST					
Buctril	6	fl oz/a						
COC	1	% v/v						
Lumax	80	fl oz/a	PRE	99	95	96	91	97
Halex GT ¹	58	fl oz/a	EPOST	98	94	96	91	94

Table 2d. Weed control of Corvus, Balance Flexx, Capreno, Laudis, and Liberty in field corn.

Treatment	Rate		Timing	Weed control (Aug 20)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
Atrazine	16	fl oz/a						
NIS	0.25	% v/v						
Harness Xtra	64	fl oz/a	PRE	99	91	98	87	94
LSD (P=.05)				3	12	17	6	14
CV (%)				1.8	8.9	12.5	4.3	10.4
Treatment Prob(F)				0.0112	0.0909	0.1880	0.0248	0.0001

¹ Treatment included ammonium sulfate at 17 lb/100 gal.

Table 3. Corn response to Corvus, Balance Flexx, Capreno, Laudis, and Liberty.

Treatment	Rate		Timing	Crop injury		Yield	Test weight	Grain moisture
				Jul 03	Jul 10			
				----- % -----		bu/A	lbs/bu	%
Nontreated Check				0	2	44.3	39.1	16.1
Corvus	3.3	fl oz/a	PRE	1	3	75.7	57.0	15.0
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	1	1	103.9	56.4	14.9
Anthem ATZ	24	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	2	2	90.9	57.4	15.1
Atrazine	32	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	2	1	106.5	57.1	15.0
Atrazine	32	fl oz/a						
Harness	36	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	4	3	90.2	56.7	15.2
Atrazine	32	fl oz/a						
Clarity	16	fl oz/a						
Capreno ¹	3	fl oz/a	EPOST	1	1	105.4	56.6	15.2
Roundup PowerMax	22	fl oz/a						
Atrazine	16	fl oz/a						
Balance Flexx	3	fl oz/a	PRE	2	1	106.7	57.4	15.2
Atrazine	32	fl oz/a						
Laudis ¹	2.6	fl oz/a	LPOST					
Clarity	8	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	1	11	121.8	55.6	15.0
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Roundup PowerMax	22	fl oz/a						
Destiny HC	0.5	% v/v						
Laudis ¹	3	fl oz/a	LPOST	6	13	120.1	56.8	15.0
Clarity	8	fl oz/a						
Harness Xtra	32	fl oz/a						
Destiny	1	% v/v						
Harness ¹	36	fl oz/a	PRE	0	1	115.3	56.9	15.0
Laudis	3	fl oz/a	LPOST					
Buctril	6	fl oz/a						
COC	1	% v/v						
Lumax	80	fl oz/a	PRE	1	2	106.3	56.5	15.2
Halex GT ¹	58	fl oz/a	EPOST	3	4	101.2	56.6	15.3

Table 3. Corn response to Corvus, Balance Flexx, Capreno, Laudis, and Liberty.

Treatment	Rate		Timing	Crop injury		Yield	Test weight	Grain moisture
				Jul 03	Jul 10			
				----- % -----		bu/A	lbs/bu	%
Atrazine	16	fl oz/a						
NIS	0.25	% v/v						
Harness Xtra	64	fl oz/a	PRE	1	3	84.1	56.9	15.4
LSD (P=.05)				3	5	45.5	1.7	0.3
CV (%)				104.1	97.3	31.1	2.1	1.4
Treatment Prob(F)				0.0041	0.0001	0.7027	0.7898	0.1118

¹ Treatment included ammonium sulfate at 17 lb/100 gal.

² Yield and test weight were adjusted to 15.5% moisture.

Effect of chlorflurenol on dicamba efficacy for weed control in corn (2013_CN07)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate the effect of chlorflurenol on dicamba efficacy for weed control in corn. Corn ('Pioneer P8954AM1') was planted in 30-inch rows at a rate of 34,000 seeds per acre on May 13. Soils at the site were Haverson and McCook loams (38% sand, 42% silt, 20 clay, 1.7% organic matter, pH 7.8, CEC 16.0). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weeds evaluated were redroot pigweed, common lambsquarters, kochia, hairy nightshade, and green foxtail. Weed control was visually evaluated on June 27, July 3, and August 5 (Table 2). Visual crop injury evaluations were made on June 27 and July 3 (Table 3). No corn yield data were collected.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/21/13
Time of Day:	09:20 AM
Application Method:	SPRAY
Application Timing:	V5
Application Placement:	FOLIAR
Air Temperature, Unit:	76 F
% Relative Humidity:	68
Wind Velocity, Unit:	1.3 MPH
Wind Direction:	NW
Dew Presence (Y/N):	N
Soil Temperature, Unit:	67 F
Soil Moisture:	GOOD
% Cloud Cover:	80

Table 2a. Effect of chlorflurenol on dicamba efficacy for weed control in corn.

Treatment	Rate	Weed control							
		----- Jun 27 -----			----- Jul 03 -----				
		AMARE	CHEAL	KCHSC	AMARE	CHEAL	KCHSC	SOLSA	SETVI
Nontreated		0	3	0	15	15	15	15	24
Clarity	2 fl oz/a	1	13	6	9	10	9	16	48
Clarity	4 fl oz/a	4	11	8	25	34	20	41	25
Clarity	8 fl oz/a	25	40	29	35	51	53	82	29
Clarity	2 fl oz/a	48	70	44	38	71	79	83	26
Maintain CF 125	8 fl oz/a								
Clarity	4 fl oz/a	55	74	63	24	69	73	90	20
Maintain CF 125	16 fl oz/a								
Clarity	8 fl oz/a	63	78	70	43	76	83	77	28
Maintain CF 125	32 fl oz/a								
Clarity	2 fl oz/a	33	50	32	44	60	63	77	25
Maintain CF 125	4 fl oz/a								
Clarity	4 fl oz/a	61	79	75	44	70	65	76	23
Maintain CF 125	8 fl oz/a								
Clarity	8 fl oz/a	64	78	70	58	84	91	91	27
Maintain CF 125	16 fl oz/a								
Clarity	2 fl oz/a	58	75	75	35	76	74	73	23
Maintain CF 125	16 fl oz/a								
Clarity	4 fl oz/a	56	76	72	45	81	82	70	13
Maintain CF 125	16 fl oz/a								
Clarity	8 fl oz/a	66	81	83	56	80	84	84	26
Maintain CF 125	16 fl oz/a								
Clarity	2 fl oz/a	44	73	56	40	75	88	83	29
Maintain CF 125	32 fl oz/a								
Clarity	4 fl oz/a	64	75	68	43	86	83	80	30
Maintain CF 125	32 fl oz/a								
Clarity	8 fl oz/a	49	59	48	48	63	61	65	25
Maintain CF 125	32 fl oz/a								
Status ¹	2.5 oz/a	70	83	71	68	73	84	82	23

Table 2a. Effect of chlorflurenol on dicamba efficacy for weed control in corn.

Treatment	Rate	Weed control							
		----- Jun 27 -----			----- Jul 03 -----				
		AMARE	CHEAL	KCHSC	AMARE	CHEAL	KCHSC	SOLSA	SETVI
Status ¹	5 oz/a	69	83	63	63	66	79	74	39
Status ¹	10 oz/a	76	85	80	91	88	85	91	29
LSD (P=.05)		23	21	27	30	29	25	28	27
CV (%)		32.0	22.5	33.0	48.0	30.2	25.1	26.4	71.2
Treatment Prob(F)		0.0001	0.0001	0.0001	0.0016	0.0002	0.0001	0.0002	0.8840

¹ Treatment included non-ionic surfactant at 0.25% v/v and UAN (28-0-0) at 5 qt/A.

Table 2b. Effect of chlorflurenol on dicamba efficacy for weed control in corn.

Treatment	Rate	Weed control (Aug 5)				
		AMARE	CHEAL	KCHSC	SOLSA	SETVI
Nontreated		5	10	10	1	23
Clarity	2 fl oz/a	72	65	70	75	93
Clarity	4 fl oz/a	80	78	83	90	80
Clarity	8 fl oz/a	88	86	88	90	84
Clarity	2 fl oz/a	88	95	91	95	85
Maintain CF 125	8 fl oz/a					
Clarity	4 fl oz/a	94	98	97	98	88
Maintain CF 125	16 fl oz/a					
Clarity	8 fl oz/a	94	98	99	99	87
Maintain CF 125	32 fl oz/a					
Clarity	2 fl oz/a	78	91	91	93	84
Maintain CF 125	4 fl oz/a					
Clarity	4 fl oz/a	94	96	96	98	90
Maintain CF 125	8 fl oz/a					
Clarity	8 fl oz/a	94	97	97	97	91
Maintain CF 125	16 fl oz/a					
Clarity	2 fl oz/a	81	96	96	95	86
Maintain CF 125	16 fl oz/a					
Clarity	4 fl oz/a	77	95	97	97	86
Maintain CF 125	16 fl oz/a					
Clarity	8 fl oz/a	93	97	98	98	89
Maintain CF 125	16 fl oz/a					
Clarity	2 fl oz/a	67	86	92	96	90
Maintain CF 125	32 fl oz/a					
Clarity	4 fl oz/a	89	95	99	97	86
Maintain CF 125	32 fl oz/a					
Clarity	8 fl oz/a	72	73	74	74	67
Maintain CF 125	32 fl oz/a					
Status ¹	2.5 oz/a	95	94	96	95	92
Status ¹	5 oz/a	96	96	96	97	92

Table 2b. Effect of chlorflurenol on dicamba efficacy for weed control in corn.

Treatment	Rate	Weed control (Aug 5)				
		AMARE	CHEAL	KCHSC	SOLSA	SETVI
Status ¹	10 oz/a	98	98	99	99	94
LSD (P=.05)		24	19	19	19	18
CV (%)		19.4	14.7	14.4	14.0	14.9
Treatment Prob(F)		0.1942	0.0266	0.0797	0.2388	0.5687

¹ Treatment included non-ionic surfactant at 0.25% v/v and UAN (28-0-0) at 5 qt/A.

Table 3. Effect of chlorflurenol on dicamba efficacy for weed control in corn - corn response.

Treatment	Rate		Population Jun 28 plants/A	Crop injury	
				Jun 27	Jul 03
			----- % -----		
Nontreated			27,443	0	1
Clarity	2	fl oz/a	25,700	0	0
Clarity	4	fl oz/a	29,185	2	0
Clarity	8	fl oz/a	27,225	2	0
Clarity	2	fl oz/a	27,661	3	1
Maintain CF 125	8	fl oz/a			
Clarity	4	fl oz/a	26,572	3	0
Maintain CF 125	16	fl oz/a			
Clarity	8	fl oz/a	25,265	7	3
Maintain CF 125	32	fl oz/a			
Clarity	2	fl oz/a	27,225	2	0
Maintain CF 125	4	fl oz/a			
Clarity	4	fl oz/a	27,878	3	2
Maintain CF 125	8	fl oz/a			
Clarity	8	fl oz/a	27,225	5	1
Maintain CF 125	16	fl oz/a			
Clarity	2	fl oz/a	27,443	3	1
Maintain CF 125	16	fl oz/a			
Clarity	4	fl oz/a	28,314	3	3
Maintain CF 125	16	fl oz/a			
Clarity	8	fl oz/a	27,878	5	0
Maintain CF 125	16	fl oz/a			
Clarity	2	fl oz/a	26,136	5	1
Maintain CF 125	32	fl oz/a			
Clarity	4	fl oz/a	25,047	5	1
Maintain CF 125	32	fl oz/a			
Clarity	8	fl oz/a	26,136	5	0
Maintain CF 125	32	fl oz/a			
Status ¹	2.5	oz/a	27,007	5	1
Status ¹	5	oz/a	26,136	5	6

Table 3. Effect of chlorflurenol on dicamba efficacy for weed control in corn - corn response.

Treatment	Rate		Population Jun 28 plants/A	Crop injury	
				Jun 27 ----- % -----	Jul 03
Status ¹	10	oz/a	24,394	13	7
LSD (P=.05)			3,548	5	3
CV (%)			9.4	77.5	157.9
Treatment Prob(F)			0.5076	0.0009	0.0005

¹ Treatment included non-ionic surfactant at 0.25% v/v and UAN (28-0-0) at 5 qt/A.

Effect of humectants on weed control with glufosinate (2013_CN08)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate the effect of humectants on weed control with glufosinate. Corn ('Pioneer P8954AM1') was planted in 30-inch rows at a rate of 34,000 seeds per acre on May 13. Soils at the site were Haverson and McCook loams (38% sand, 42% silt, 20 clay, 1.7% organic matter, pH 7.8, CEC 16.0). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weeds evaluated were common lambsquarters and kochia. Weed control was visually evaluated on July 3 and 10 (Table 2). Visual crop injury evaluations were made on July 3 and 10 (Table 3). No corn yield data were collected.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/27/13
Time of Day:	01:45 PM
Application Method:	SPRAY
Application Timing:	V5
Application Placement:	FOLIAR
Air Temperature, Unit:	87 F
% Relative Humidity:	32
Wind Velocity, Unit:	2 MPH
Wind Direction:	VARIABLE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	72 F
Soil Moisture:	WET
% Cloud Cover:	0

Table 2. Effect of humectants on weed control with glufosinate.

Treatment	Rate		Weed control			
			----- Jul 03 -----		----- Jul 10 -----	
			CHEAL	KCHSC	CHEAL	KCHSC
Nontreated Check			0	0	0	0
Liberty 280	18	fl oz/a	85	82	67	76
Liberty 280 ¹	18	fl oz/a	83	84	59	87
Liberty 280 ¹ Glycerol	18 0.5	fl oz/a % v/v	84	81	64	85
Liberty 280 ¹ Glycerol	18 1	fl oz/a % v/v	83	78	65	85
Liberty 280 ¹ Glycerol	18 2.5	fl oz/a % v/v	79	86	55	85
Liberty 280 ¹ Glycerol	18 5	fl oz/a % v/v	76	81	55	76
Liberty 280	22	fl oz/a	81	86	46	89
Liberty 280 ¹	22	fl oz/a	86	80	62	88
Liberty 280 ¹ Glycerol	22 0.5	fl oz/a % v/v	87	86	69	91
Liberty 280 ¹ Glycerol	22 1	fl oz/a % v/v	81	81	53	88
Liberty 280 ¹ Ammonium Sulfate Glycerol	22 17 2.5	fl oz/a lb/100 gal % v/v	84	86	59	91
Liberty 280 ¹ Glycerol	22 5	fl oz/a % v/v	86	84	67	77
LSD (P=.05)			9	9	29	14
CV (%)			7.5	7.3	33.4	11.7
Treatment Prob(F)			0.4924	0.5480	0.9006	0.2538

¹ Treatment included ammonium sulfate at 17 lb/100gal.

Table 3. Effect of humectants on weed control with glufosinate - corn response.

Treatment	Rate	Population Jun 28	Crop injury	
			Jul 03	Jul 10
Nontreated Check		plants/A 20,255	0	0
Liberty 280	18 fl oz/a	23,087	0	1
Liberty 280 ¹	18 fl oz/a	23,740	0	1
Liberty 280 ¹ Glycerol	18 fl oz/a 0.5 % v/v	25,265	0	1
Liberty 280 ¹ Glycerol	18 fl oz/a 1 % v/v	24,829	0	1
Liberty 280 ¹ Glycerol	18 fl oz/a 2.5 % v/v	22,869	0	1
Liberty 280 ¹ Glycerol	18 fl oz/a 5 % v/v	22,433	0	1
Liberty 280	22 fl oz/a	22,433	1	3
Liberty 280 ¹	22 fl oz/a	21,998	0	3
Liberty 280 ¹ Glycerol	22 fl oz/a 0.5 % v/v	23,305	0	1
Liberty 280 ¹ Glycerol	22 fl oz/a 1 % v/v	23,087	0	3
Liberty 280 ¹ Ammonium Sulfate Glycerol	22 fl oz/a 17 lb/100 gal 2.5 % v/v	25,483	0	0
Liberty 280 ¹ Glycerol	22 fl oz/a 5 % v/v	25,047	0	2
LSD (P=.05)		4,425	0	3
CV (%)		13.0	692.8	149.2
Treatment Prob(F)		0.7868	0.4671	0.6068

¹Treatment included ammonium sulfate at 17 lb/100gal.

Weed control and crop safety of F9140-8 in pinto and great northern bean (2013_DB01)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate weed control and crop safety of F9140-8 in pinto and Great Northern bean. Pinto ('Othello') and Great Northern ('Orion') beans were planted in 30-inch rows at a rate of 65,000 seeds per acre on June 5. Soil at the site was Heldt clay/Haverson and McCook loams (39% sand, 41% silt, 20% clay, 1.7% organic matter, pH 7.8, CEC 16.0). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 7.5 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3, 10, and 26 and August 5. Weeds evaluated were redroot pigweed, common lambsquarters, hairy nightshade, kochia, and green foxtail. Weed populations were counted on July 10 (Table 2). Weed control was visually evaluated on July 26 and August 5 (Table 3). Bean populations were counted on July 1. Bean yields were determined from twenty feet of row per plot harvested on October 1 (Table 4).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/05/13	06/27/13	07/18/13
Time of Day:	02:35 PM	11:15 AM	09:05 AM
Application Method:	SPRAY	SPRAY	SPRAY
Application Timing:	PRE	2 TRIF	15 TRIF
Application Placement:	BROADCAST - SOIL	FOLIAR	FOLIAR
Air Temperature, Unit:	68 F	86 F	79 F
% Relative Humidity:	29	38	49
Wind Velocity, Unit:	3.8 MPH	1.9 MPH	2.1 MPH
Wind Direction:	N	S	SE
Dew Presence (Y/N):	N	N	N
Soil Temperature, Unit:	65 F	70 F	68 F
Soil Moisture:	FAIR	WET	GOOD
% Cloud Cover:	5	0	10

Table 2. Weed populations in 2013_DB01.

Treatment	Rate		Timing	Weed population (July 10)				
				AMARE	CHEAL	SOLSA	SETVI	KCHSC
Non-treated				3	19	3	8	0
F9140-8 ¹	0.005	lb ai/a	2 trif	2	3	8	15	0
F9140-8 ²	0.005	lb ai/a	2 trif	1	13	1	11	0
F9140-8 ¹	0.005	lb ai/a	2 trif	1	7	2	9	0
F9140-8 ¹	0.005	lb ai/a	2 wk later					
F9140-8 ²	0.005	lb ai/a	2 trif	1	5	5	2	0
F9140-8 ²	0.005	lb ai/a	2 wk later					
Raptor ¹	0.0313	lb ai/a	2 trif	0	4	0	6	0
Basagran	0.5	lb ai/a						
UAN (28-0-0)	2	qt/a						
Rezult B ²	0.68	lb ai/a	2 trif	0	8	0	6	0
Rezult B ²	0.5	lb ai/a	2 trif	2	3	1	11	0
F9140-8	0.005	lb ai/a						
Raptor ¹	0.0313	lb ai/a	2 trif	0	7	1	1	0
Raptor ¹	0.0313	lb ai/a	2 trif	0	7	2	2	0
F9140-8	0.005	lb ai/a						
Marvel ¹	0.14	lb ai/a	2 trif	0	1	2	4	0
Marvel ²	0.14	lb ai/a	2 trif	0	2	1	10	0
Reflex ²	0.25	lb ai/a	2 trif	1	1	1	5	0
Spartan Charge	0.137	lb ai/a	PRE	0	0	0	1	0
F9140-8 ¹	0.005	lb ai/a	2 trif					
LSD (P=.05)				1	9	3	11	0
CV (%)				134.7	117.1	139.3	119.6	748.3
Treatment Prob(F)				0.0009	0.0136	0.0028	0.3168	0.4697

¹ Treatment included Induce (NIS) at 0.25% v/v.

² Treatment included Agridex (COC) at 1% v/v.

Table 3a. Weed control of F9140-8 in pinto and great northern bean.

Treatment	Rate		Timing	Weed control (July 26)			
				AMARE	CHEAL	SOLSA	SETVI
Non-treated				28	28	33	42
F9140-8 ¹	0.005	lb ai/a	2 trif	55	61	54	50
F9140-8 ²	0.005	lb ai/a	2 trif	94	69	80	59
F9140-8 ¹	0.005	lb ai/a	2 trif	95	83	91	78
F9140-8 ¹	0.005	lb ai/a	2 wk later				
F9140-8 ²	0.005	lb ai/a	2 trif	98	88	88	71
F9140-8 ²	0.005	lb ai/a	2 wk later				
Raptor ¹	0.0313	lb ai/a	2 trif	99	94	98	93
Basagran	0.5	lb ai/a					
UAN (28-0-0)	2	qt/a					
Rezult B ²	0.68	lb ai/a	2 trif	90	70	94	74
Rezult B ²	0.5	lb ai/a	2 trif	79	73	89	81
F9140-8	0.005	lb ai/a					
Raptor ¹	0.0313	lb ai/a	2 trif	99	80	97	94
Raptor ¹	0.0313	lb ai/a	2 trif	97	84	96	95
F9140-8	0.005	lb ai/a					
Marvel ¹	0.14	lb ai/a	2 trif	99	88	96	91
Marvel ²	0.14	lb ai/a	2 trif	95	91	91	91
Reflex ²	0.25	lb ai/a	2 trif	95	88	94	95
Spartan Charge	0.137	lb ai/a	PRE	99	97	95	95
F9140-8 ¹	0.005	lb ai/a	2 trif				
LSD (P=.05)				20	26	22	28
CV (%)				16.3	23.3	17.7	24.6
Treatment Prob(F)				0.0001	0.0005	0.0001	0.0015

¹Treatment included Induce (NIS) at 0.25% v/v.

²Treatment included Agridex (COC) at 1% v/v.

Table 3b. Weed control of F9140-8 in pinto and great northern bean.

Treatment	Rate		Timing	Weed control (Aug 5)			
				AMARE	CHEAL	SOLSA	SETVI
Non-treated				76	61	85	84
F9140-8 ¹	0.005	lb ai/a	2 trif	71	87	91	71
F9140-8 ²	0.005	lb ai/a	2 trif	96	88	91	85
F9140-8 ¹	0.005	lb ai/a	2 trif	97	94	98	96
F9140-8 ¹	0.005	lb ai/a	2 wk later				
F9140-8 ²	0.005	lb ai/a	2 trif	97	94	88	84
F9140-8 ²	0.005	lb ai/a	2 wk later				
Raptor ¹	0.0313	lb ai/a	2 trif	97	94	98	96
Basagran	0.5	lb ai/a					
UAN (28-0-0)	2	qt/a					
Rezult B ²	0.68	lb ai/a	2 trif	87	88	96	91
Rezult B ²	0.5	lb ai/a	2 trif	88	83	94	88
F9140-8	0.005	lb ai/a					
Raptor ¹	0.0313	lb ai/a	2 trif	97	88	97	95
Raptor ¹	0.0313	lb ai/a	2 trif	98	84	98	93
F9140-8	0.005	lb ai/a					
Marvel ¹	0.14	lb ai/a	2 trif	99	94	99	95
Marvel ²	0.14	lb ai/a	2 trif	94	91	92	92
Reflex ²	0.25	lb ai/a	2 trif	92	92	96	96
Spartan Charge	0.137	lb ai/a	PRE	98	97	98	95
F9140-8 ¹	0.005	lb ai/a	2 trif				
LSD (P=.05)				17	17	13	17
CV (%)				12.8	13.3	9.8	13.2
Treatment Prob(F)				0.0271	0.0196	0.3378	0.1520

¹Treatment included Induce (NIS) at 0.25% v/v.

²Treatment included Agridex (COC) at 1% v/v.

Table 4. Crop response to weed control and crop safety of F9140-8 in pinto and great northern bean.

Treatment	Rate	Timing	Population		Crop injury		Yield	
			Pinto	G. Nor.	Pinto	G. Nor.	Pinto	G. Nor.
			plants/A		----- % -----		----- lbs/A -----	
Nontreated			36,373	40,511	5	12	2,313	2,230
F9140-8 ¹	0.005 lb ai/a	2 trif	37,244	40,075	15	19	2,518	2,668
F9140-8 ²	0.005 lb ai/a	2 trif	36,373	43,124	23	26	2,557	2,738
F9140-8 ¹	0.005 lb ai/a	2 trif	38,551	40,729	11	26	2,389	3,082
F9140-8 ¹	0.005 lb ai/a	2 wk later						
F9140-8 ²	0.005 lb ai/a	2 trif	35,719	41,818	26	19	2,618	3,117
F9140-8 ²	0.005 lb ai/a	2 wk later						
Raptor ¹	0.031 lb ai/a	2 trif	40,293	42,253	6	5	2,969	3,781
Basagran	0.5 lb ai/a							
UAN (28-0-0)	2 qt/a							
Rezult B ²	0.68 lb ai/a	2 trif	36,155	43,342	15	17	2,727	2,964
Rezult B ²	0.5 lb ai/a	2 trif	37,026	42,907	17	26	2,805	3,267
F9140-8	0.005 lb ai/a							
Raptor ¹	0.031 lb ai/a	2 trif	37,244	41,818	4	6	2,705	3,230
Raptor ¹	0.031 lb ai/a	2 trif	35,284	43,560	17	8	2,844	2,786
F9140-8	0.005 lb ai/a							
Marvel ¹	0.14 lb ai/a	2 trif	33,541	43,124	31	34	2,749	3,461
Marvel ²	0.14 lb ai/a	2 trif	37,462	43,342	11	14	3,023	3,565
Reflex ²	0.25 lb ai/a	2 trif	37,462	43,560	3	7	3,282	3,574
Spartan Charge	0.137 lb ai/a	PRE	31,363	35,719	28	24	3,134	3,382
F9140-8 ¹	0.005 lb ai/a	2 trif						
LSD (P=.05)			5,633	4,308	18	19	639	774
CV (%)			10.82	7.2	83.9	78.4	16.2	17.3
Treatment Prob(F)			0.335	0.05	0.036	0.069	0.149	0.015

¹ Treatment included Induce (NIS) at 0.25% v/v.² Treatment included Agridex (COC) at 1% v/v.

Weed control and crop injury with BAS 762 01H in dry bean (2013_DB02)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate weed control and crop injury with BAS 762 01H in dry beans. Pinto ('Othello') and Great Northern ('Orion') beans were planted in 30-inch rows at a rate of 65,000 seeds per acre on June 5. Soil at the site was Heldt clay/Haverson and McCook loams (39% sand, 41% silt, 20% clay, 1.7% organic matter, pH 7.8, CEC 16.0). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 7.5 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3, and 10 and August 5. Weeds evaluated were redroot pigweed, common lambsquarters, hairy nightshade, and green foxtail. Weed control was visually evaluated on July 3 and August 5 (Table 2). Crop injury results are shown in Table 3. Bean populations were counted on July 1 and bean yields were determined from 10 feet of row per plot harvested on October 1 (Table 4).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/05/13	06/27/13
Time of Day:	04:00 PM	10:30 AM
Application Method:	SPRAY	SPRAY
Application Timing:	PRE	2 TRIF
Application Placement:	BROADCAST - SOIL	FOLIAR
Air Temperature, Unit:	68 F	85 F
% Relative Humidity:	31	41
Wind Velocity, Unit:	6 MPH	2.3 MPH
Wind Direction:	NW	NE
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	68 F	69 F
Soil Moisture:	FAIR	WET
% Cloud Cover:	25	0

Table 2. Weed control and crop injury with BAS 762 01H in dry beans

Treatment	Rate	Timing	Weed control							
			----- Jul 03 -----				----- Aug 05 -----			
			AMARE	SOLSA	CHEAL	SETVI	AMARE	CHEAL	SOLSA	SETVI
Nontreated Check			% 0	% 0	% 0	% 0	% 0	% 0	% 0	% 0
Outlook	14 fl oz/a	PRE	94	88	83	91	56	13	44	46
Outlook BAS 762 01H ^{1,2}	14 fl oz/a 21 fl oz/a	PRE 2 trif	98	99	98	95	98	86	95	91
Prowl H2O BAS 762 01H ^{1,2}	2 pt/a 21 fl oz/a	PRE 2 trif	99	99	99	95	98	96	98	87
Outlook Prowl H2O BAS 762 01H ^{1,2}	14 fl oz/a 2 pt/a 21 fl oz/a	PRE 2 trif	99	99	99	98	97	97	99	97
Basagran ^{1,2} Raptor	21 fl oz/a 3.9 fl oz/a	2 trif	99	98	99	87	94	81	95	71
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif	99	99	99	85	96	75	95	66
Basagran ² Raptor NIS	16 fl oz/a 4 fl oz/a 0.25 % v/v	2 trif	99	97	98	90	97	82	96	84
LSD (P=.05)			2	6	6	5	30	14	24	27
CV (%)			1.5	3.9	4.1	3.9	21.8	12.2	18.5	23.1
Treatment Prob(F)			0.0008	0.0077	0.0002	0.0013	0.1000	0.0000	0.0000	0.0000

¹ Treatment included COC at 1% v/v.² Treatment included UAN (28-0-0) at 2.5% v/v.

Table 3. Crop injury with BAS 762 01H in dry beans.

Treatment	Rate	Timing	Crop injury ³					
			----- Jul 03 -----		----- Jul 10 -----		----- Aug 05 -----	
			GN	P	GN	P	GN	P
			----- % -----					
Nontreated Check			2	1	0	1	0	0
Outlook	14 fl oz/a	PRE	9	3	2	0	0	0
Outlook	14 fl oz/a	PRE	9	3	0	3	0	1
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif						
Prowl H2O	2 pt/a	PRE	27	14	2	3	0	1
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif						
Outlook	14 fl oz/a	PRE	17	15	2	4	0	1
Prowl H2O	2 pt/a							
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif						
Basagran ^{1,2}	21 fl oz/a	2 trif	16	14	1	3	0	1
Raptor	3.9 fl oz/a							
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif	20	10	2	1	0	0
Basagran ²	16 fl oz/a	2 trif	8	7	2	2	0	0
Raptor	4 fl oz/a							
NIS	0.25 % v/v							
LSD (P=.05)			12	9	3	3	0	2
CV (%)			52.6	63.9	126.8	83.7	0.0	218.6
Treatment Prob(F)			0.0300	0.0300	0.6700	0.1800	1.0000	0.5600

¹ Treatment included COC at 1% v/v.

² Treatment included UAN (28-0-0) at 2.5% v/v.

³ GN = Great Northern, P = Pinto.

Table 4. Dry bean populations and yields with BAS 762 01H.

Treatment	Rate	Timing	Population ³		Yield ³	
			GN	P	GN	P
Nontreated Check			35,719	42,108	0	0
			----- plants/A -----		----- lbs/A -----	
Outlook	14 fl oz/a	PRE	38,986	40,075	1,041	1,163
Outlook	14 fl oz/a	PRE	37,256	43,088	4,099	3,313
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif				
Prowl H2O	2 pt/a	PRE	37,244	42,907	4,469	3,947
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif				
Outlook	14 fl oz/a	PRE	40,075	42,253	4,436	3,923
Prowl H2O	2 pt/a					
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif				
Basagran ^{1,2}	21 fl oz/a	2 trif	38,768	41,164	3,162	2,553
Raptor	3.9 fl oz/a					
BAS 762 01H ^{1,2}	21 fl oz/a	2 trif	39,640	43,342	3,354	2,783
Basagran ²	16 fl oz/a	2 trif	38,986	40,946	3,149	3,075
Raptor	4 fl oz/a					
NIS	0.25 % v/v					
LSD (P=.05)			5,938	3,381	1,112	797
CV (%)			10.3	5.4	21.9	17.9
Treatment Prob(F)			0.9279	0.3449	0.0001	0.0001

¹ Treatment included COC at 1% v/v.

² Treatment included UAN (28-0-0) at 2.5% v/v.

³ GN = Great Northern, P = Pinto.

F9310-7 PRE and POST for weed control and crop safety in dry bean (2013_DB04)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate pre design of F9310-7 alone PRE and POST versus competitive standards in group 6C - pulse crops - dry and peas. Pinto ('Othello') and Great Northern ('Orion') beans were planted in 30-inch rows at a rate of 65,000 sees per acre on June 5. Soil at the site was Heldt clay/Haverson and McCook loams (43% sand, 38% silt, 19% clay, 1.7% organic matter, pH 7.9, CEC 16.7). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 7.5 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3, 18, and August 5. Weeds evaluated were redroot pigweed, common lambsquarters, hairy nightshade, and green foxtail. Weed populations were counted on July 10 (Table 2). Weed control was visually evaluated on July 3, 18 and August 5 (Table 3). Bean populations were counted on June 28. Bean yields were determined from 10 feet of row per plot harvested on October 1 (Table 4).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/05/13	06/27/13
Time of Day:	03:15 PM	10:35 AM
Application Method:	SPRAY	SPRAY
Application Timing:	PREMCR	2 TRIF
Application Placement:	BROADCAST - SOIL	FOLIAR
Air Temperature, Unit:	66 F	86 F
% Relative Humidity:	30	38
Wind Velocity, Unit:	2.0 MPH	1.9 MPH
Wind Direction:	NW	S
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	65 F	70 F
Soil Moisture:	FAIR	WET
% Cloud Cover:	10	0

Table 2a. Weed control of F9310-7 alone PRE and POST versus competitive standards.

Treatment	Rate	Timing	Weed control						
			----- Jul 03 -----			----- Jul 18 -----			
			AMARE	SOLSA	SETVI	AMARE	CHEAL	SOLSA	SETVI
			----- % -----						
Nontreated Check			0	0	0	0	0	0	0
F9310-7	0.084 lb ai/a	PRE	97	97	89	91	81	90	76
F9310-7	0.109 lb ai/a	PRE	96	97	93	90	85	93	78
F9310-7	0.143 lb ai/a	PRE	98	98	98	95	91	93	92
F9310-7	0.185 lb ai/a	PRE	96	98	98	98	95	96	96
BROADAXE	1.04 lb ai/a	PRE	99	97	93	96	96	93	94
PROWL H2O	0.71 lb ai/a	PRE	83	88	81	43	77	79	70
SONALAN	0.56 lb ai/a	PRE	45	51	44	11	21	15	13
F9314-3	0.16 lb ai/a	PRE	99	99	95	99	98	98	95
F9314-3	0.222 lb ai/a	PRE	98	98	94	99	99	98	94
F9310-7	0.092 lb ai/a	2 trif	94	94	73	83	78	85	72
BASAGRAN	0.5 lb ae/a	2 trif							
SELECT MAX	0.068 lb ai/a	2 trif							
Raptor	0.031 lb ai/a	2 trif	98	99	88	98	96	98	91
Basagran	0.5 lb ai/a	2 trif							
NIS	0.25 % v/v	2 trif							
UAN (28-0-0)	2.5 % v/v	2 trif							
LSD (P=.05)			18	18	18	17	18	14	15
CV (%)			13.9	13.2	14.5	14.7	15.0	11.7	13.1
Treatment Prob(F)			0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001

Table 2b. Weed control of F9310-7 alone PRE and POST versus competitive standards.

Treatment	Rate	Timing	Weed control (Aug 5)			
			AMARE	CHEAL	SOLSA	SETVI
Nontreated Check			0	0	0	0
F9310-7	0.084 lb ai/a	PRE	85	85	85	60
F9310-7	0.109 lb ai/a	PRE	84	83	96	82
F9310-7	0.143 lb ai/a	PRE	92	86	95	89
F9310-7	0.185 lb ai/a	PRE	96	93	98	96
BROADAXE	1.04 lb ai/a	PRE	94	96	96	92
PROWL H2O	0.71 lb ai/a	PRE	38	75	78	45
SONALAN	0.56 lb ai/a	PRE	8	10	14	10
F9314-3	0.16 lb ai/a	PRE	99	98	99	90
F9314-3	0.222 lb ai/a	PRE	99	98	98	89
F9310-7	0.092 lb ai/a	2 trif	69	74	83	53
BASAGRAN	0.5 lb ae/a	2 trif				
SELECT MAX	0.068 lb ai/a	2 trif				
Raptor	0.0313 lb ai/a	2 trif	97	97	98	82
Basagran	0.5 lb ai/a	2 trif				
NIS	0.25 % v/v	2 trif				
UAN (28-0-0)	2.5 % v/v	2 trif				
LSD (P=.05)			18	13	16	22
CV (%)			16.1	11.1	12.9	20.8
Treatment Prob(F)			0.0001	0.0001	0.0001	0.0001

Table 3. Crop injury of F9310-7 alone PRE and POST versus competitive standards.

Treatment	Rate		Timing	Crop injury ¹					
				---- Jul 03 ----		---- Jul 18 ----		---- Aug 05 ----	
				GN	P	GN	P	GN	P
Nontreated Check				0	0	0	0	0	0
F9310-7	0.084	lb ai/a	PRE	8	2	3	0	0	1
F9310-7	0.109	lb ai/a	PRE	9	6	1	1	1	1
F9310-7	0.143	lb ai/a	PRE	19	4	5	1	0	1
F9310-7	0.185	lb ai/a	PRE	33	14	5	4	3	3
BROADAXE	1.04	lb ai/a	PRE	4	1	0	1	0	1
PROWL H2O	0.71	lb ai/a	PRE	8	1	0	0	0	0
SONALAN	0.56	lb ai/a	PRE	6	0	0	0	0	0
F9314-3	0.16	lb ai/a	PRE	6	3	0	0	0	2
F9314-3	0.222	lb ai/a	PRE	12	6	1	1	1	1
F9310-7	0.092	lb ai/a	2 trif	27	19	2	1	0	1
BASAGRAN	0.5	lb ae/a	2 trif						
SELECT MAX	0.068	lb ai/a	2 trif						
Raptor	0.031	lb ai/a	2 trif	6	3	1	0	0	1
Basagran	0.5	lb ai/a	2 trif						
NIS	0.25	% v/v	2 trif						
UAN (28-0-0)	2.5	% v/v	2 trif						
LSD (P=.05)				19	8	4	2	2	3
CV (%)				104.3	103.7	185.8	183.2	268.2	181.0
Treatment Prob(F)				0.0530	0.0004	0.1410	0.0050	0.0200	0.5170

¹ GN = Great Northern, P = Pinto.

Table 4. Bean response to F9310-7 alone PRE and POST versus competitive standards- population and yield.

Treatment	Rate	Timing	Population ¹		Yield ¹	
			GN	P	GN	P
			----- plants/A -----		----- lbs/A -----	
Nontreated Check			41,818	35,066	0	0
F9310-7	0.084 lb ai/a	PRE	42,907	36,155	2,396	2,156
F9310-7	0.109 lb ai/a	PRE	45,302	34,848	2,104	2,396
F9310-7	0.143 lb ai/a	PRE	43,124	34,848	2,762	2,670
F9310-7	0.185 lb ai/a	PRE	42,035	35,719	2,988	2,439
BROADAXE	1.04 lb ai/a	PRE	45,085	38,333	3,524	3,672
PROWL H2O	0.71 lb ai/a	PRE	41,818	37,026	2,008	1,464
SONALAN	0.56 lb ai/a	PRE	43,124	39,422	474	401
F9314-3	0.16 lb ai/a	PRE	44,431	38,551	3,328	3,128
F9314-3	0.222 lb ai/a	PRE	45,956	35,501	3,123	2,766
F9310-7	0.092 lb ai/a	2 trif	43,996	37,679	1,664	1,734
BASAGRAN	0.5 lb ae/a	2 trif				
SELECT MAX	0.068 lb ai/a	2 trif				
Raptor	0.031 lb ai/a	2 trif	46,391	39,204	3,637	3,223
Basagran	0.5 lb ai/a	2 trif				
NIS	0.25 % v/v	2 trif				
UAN (28-0-0)	2.5 % v/v	2 trif				
LSD (P=.05)			6,261	7,303	1,174	759
CV (%)			9.9	13.7	31.8	22.2
Treatment Prob(F)			0.8697	0.9043	0.0002	0.0001

¹ GN = Great Northern, P = Pinto.

Weed control and sugarbeet tolerance of a new Sequence formulation (2013_SB04)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2012 to evaluate weed control and sugarbeet tolerance of a new Sequence formulation. Sugarbeet ('60RR27') was planted in 30-inch rows at a rate of 65,000 seeds per acre on May 6. Soils at the site were Haverson and McCook loams (42% sand, 37% silt, 21% clay, 1.4% organic matter, pH 7.8, and CEC 19.6). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 21, July 3 and 29. Weeds evaluated were common lambsquarters, redroot pigweed, hairy nightshade, and green foxtail. Weed control was visually evaluated on June 21 and July 3 and 29 (Table 2). Sugarbeet yield data were not collected. Crop injury results are shown in Table 3.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	6/11/13
Time of Day:	10:20 AM
Application Method:	SPRAY
Application Timing:	8-10 TL
Application Placement:	FOLIAR
Air Temperature, Unit:	76 F
% Relative Humidity:	53
Wind Velocity, Unit:	2.8 MPH
Wind Direction:	W
Dew Presence (Y/N):	N
Soil Temperature, Unit:	67 F
Soil Moisture:	GOOD
% Cloud Cover:	40

Table 2a. Weed control and sugarbeet tolerance of a new Sequence formulation applied at 6" weeds.

Treatment ¹	Rate	Weed control						
		----- Jun 21 -----			----- Jul 03 -----			
		CHEAL	SOLSA	SETVI	AMARE	CHEAL	SOLSA	SETVI
Nontreated Check		0	0	0	0	0	0	0
Sequence	3 pt/a	88	71	96	95	83	70	95
Sequence	6 pt/a	94	87	98	93	86	83	98
Roundup PowerMax	22 fl oz/a	95	85	98	97	92	78	98
Outlook	14 fl oz/a							
Roundup PowerMax	44 fl oz/a	98	97	99	99	98	95	74
Outlook	28 fl oz/a							
A20009-I	3.7 pt/a	88	74	95	94	84	73	97
A20009-I	7.4 pt/a	94	82	96	82	82	68	97
A20009-J	3.7 pt/a	94	91	99	93	85	80	98
A20009-J	7.4 pt/a	92	86	98	93	89	85	99
A20009-K	3.7 pt/a	79	73	92	92	74	64	97
A20009-K	7.4 pt/a	94	90	97	95	92	87	99
A20009-L	3.7 pt/a	83	71	87	96	76	67	99
A20009-L	7.4 pt/a	91	74	98	91	92	79	99
LSD (P=.05)		7	9	4	11	11	14	21
CV (%)		5.3	7.4	3.2	8.2	9.1	12.3	15.5
Treatment Prob(F)		0.0001	0.0001	0.0003	0.3252	0.0053	0.0014	0.5798

¹ All herbicides treatments included N Pak AMS Liquid at 2.5% v/v.

Table 2b. Weed control and sugarbeet tolerance of a new Sequence formulation applied at 6" weeds.

Treatment ¹	Rate		Weed control			
			----- Jul 29 -----			
			AMARE	CHEAL	SOLSA	SETVI
			----- % -----			
Nontreated Check			0	0	0	0
Sequence	3	pt/a	86	61	6	96
Sequence	6	pt/a	91	86	34	99
Roundup PowerMax	22	fl oz/a	91	94	36	98
Outlook	14	fl oz/a				
Roundup PowerMax	44	fl oz/a	98	98	73	99
Outlook	28	fl oz/a				
A20009-I	3.7	pt/a	86	85	15	96
A20009-I	7.4	pt/a	89	86	18	98
A20009-J	3.7	pt/a	89	86	14	98
A20009-J	7.4	pt/a	90	83	11	98
A20009-K	3.7	pt/a	87	57	13	95
A20009-K	7.4	pt/a	93	80	58	99
A20009-L	3.7	pt/a	87	39	24	97
A20009-L	7.4	pt/a	69	69	19	98
LSD (P=.05)			10	21	18	3
CV (%)			8.2	19.2	47.9	1.9
Treatment Prob(F)			0.0029	0.0001	0.0001	0.0375

¹ All herbicides treatments included N Pak AMS Liquid at 2.5% v/v.

Table 3. Weed control and sugarbeet tolerance of a new Sequence formulation applied at 6" weeds.

Treatment ¹	Rate		Crop injury		
			Jun 21	Jul 03	Jul 29
			----- % -----		
Nontreated Check			0	0	0
Sequence	3	pt/a	3	0	3
Sequence	6	pt/a	5	1	0
Roundup PowerMax	22	fl oz/a	4	0	1
Outlook	14	fl oz/a			
Roundup PowerMax	44	fl oz/a	5	1	2
Outlook	28	fl oz/a			
A20009-I	3.7	pt/a	6	1	0
A20009-I	7.4	pt/a	5	0	0
A20009-J	3.7	pt/a	2	0	0
A20009-J	7.4	pt/a	3	0	1
A20009-K	3.7	pt/a	3	0	0
A20009-K	7.4	pt/a	6	0	1
A20009-L	3.7	pt/a	3	0	0
A20009-L	7.4	pt/a	8	0	0
LSD (P=.05)			4	1	3
CV (%)			70.5	373.3	336.6
Treatment Prob(F)			0.2508	0.5177	0.687

¹ All herbicides treatments included N Pak AMS Liquid at 2.5% v/v.

Warrant Best Management Practices in Roundup Ready Sugarbeet (2013_SB05)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2012 to evaluate Warrant best management practices in Roundup Ready sugarbeets. Sugarbeet ('60RR27') was planted in 30-inch rows at a rate of 65,000 seeds per acre on May 6. Soils at the site were Haverson and McCook loams (42% sand, 37% silt, 21% clay, 1.4% organic matter, pH 7.8, and CEC 19.6). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 11, and July 3. Weeds evaluated were kochia, common lambsquarters, redroot pigweed, hairy nightshade, and green foxtail. Weed control was visually evaluated on July 3 and August 19 (Table 2). Sugarbeet yields were determined from 50 ft of row per plot on October 1 (Table 3). Crop injury results are shown in Table 3.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/6/13	5/24/13	6/11/13	6/27/13
Time of Day:	06:45 PM	10:45 AM	10:55 AM	09:50 AM
Application Method:	SPRAY	SPRAY	SPRAY	SPRAY
Application Timing:	PRE	2 TL	8-10 TL	12-15 TL
Application Placement:	BROADCAST -SOIL	FOLIAR	FOLIAR	FOLIAR
Air Temperature, Unit:	68 F	70 F	87 F	86 F
% Relative Humidity:	16	33	37	45
Wind Velocity, Unit:	7.8 MPH	3.7 MPH	2.9 MPH	0.7 MPH
Wind Direction:	SE	W	ESE	SW
Dew Presence (Y/N):	N	N	N	N
Soil Temperature, Unit:	61 F	60 F	69 F	66 F
Soil Moisture:	FAIR	DRY	DRY	WET
% Cloud Cover:	10	85	20	0

Table 2a. Weed control from Warrant best management practices in Roundup Ready sugarbeets.

Treatment ¹	Rate		Timing	Weed control (Jul 3)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	32	fl oz/a	2 TL	99	98	99	97	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	98	99	99	98	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
UpBeet	0.48	oz wt/a	6 TL					
Stinger	4	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	97
UpBeet	0.48	oz wt/a	2 TL					
Stinger	4	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Betamix	7.7	pt/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Nortron SC	36	fl oz/a	PRE	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Nortron SC	36	fl oz/a	PRE	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Outlook	21	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Outlook	21	fl oz/a	6 TL					
Untreated Check				0	0	0	0	0
LSD (P=.05)				1	1	0	1	2
CV (%)				1.0	0.7	0.0	0.7	1.4
Treatment Prob(F)				0.4984	0.0601	1.0000	0.0001	0.4635

¹ Roundup PowerMax applications included ammonium sulfate at 16.7 lb/100gal.

Table 2b. Weed control from Warrant best management practices in Roundup Ready sugarbeets.

Treatment ¹	Rate		Timing	Weed control (Aug 19)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	98	99	99	99
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
UpBeet	0.48	oz wt/a	6 TL					
Stinger	4	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
UpBeet	0.48	oz wt/a	2 TL					
Stinger	4	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	97	97	99	98	97
Betamix	7.7	pt/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Nortron SC	36	fl oz/a	PRE	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Nortron SC	36	fl oz/a	PRE	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Outlook	21	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Outlook	21	fl oz/a	6 TL					
Untreated Check				0	0	0	0	0
LSD (P=.05)				2	1	0	0	1
CV (%)				1.5	1.0	0.0	0.3	0.9
Treatment Prob(F)				0.5370	0.1360	1.0000	0.0001	0.0790

¹ Roundup PowerMax applications included ammonium sulfate at 16.7 lb/100gal.

Table 3. Crop response to Warrant best management practices in Roundup Ready sugarbeets.

Treatment ¹	Rate		Timing	Crop injury		Yield	Sugar	SLM
				Jun 11	Jul 03			
				----- % -----		tons/A	----- % -----	
Roundup PowerMax	32	fl oz/a	2 TL	0	0	28.4	12.3	2.2
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	4	2	29.0	12.6	2.2
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	1	0	29.5	12.4	2.3
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	7	2	28.9	12.5	2.3
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
UpBeet	0.48	oz wt/a	6 TL					
Stinger	4	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	1	0	25.8	12.5	2.2
UpBeet	0.48	oz wt/a	2 TL					
Stinger	4	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	28	8	25.3	12.6	2.2
Betamix	7.7	pt/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Nortron SC	36	fl oz/a	PRE	8	1	30.6	12.3	2.3
Roundup PowerMax	32	fl oz/a	2 TL					
Warrant	48	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Nortron SC	36	fl oz/a	PRE	1	1	28.4	12.3	2.3
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	2	1	28.7	12.2	2.2
Outlook	21	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	32	fl oz/a	2 TL	2	0	28.6	12.3	2.2
Roundup PowerMax	21.3	fl oz/a	6 TL					
Outlook	21	fl oz/a	6 TL					
Untreated Check				0	0	2.8	12.1	2.2
LSD (P=.05)				3	2	3.9	0.8	0.2
CV (%)				39.9	102.2	9.5	4.5	5.2
Treatment Prob(F)				0.0001	0.0001	0.2265	0.9517	0.675

¹ Roundup PowerMax applications included ammonium sulfate at 16.7 lb/100gal.

Weed Resistance Management in Roundup Ready Sugarbeet (2013_SB06)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2012 to evaluate weed resistance management in Roundup Ready sugarbeets. Sugarbeet ('60RR27') was planted in 30-inch rows at a rate of 65,000 seeds per acre on May 6. Soils at the site were Haverson and McCook loams (43% sand, 37% silt, 20% clay, 1.8% organic matter, pH 7.8, and CEC 16.7). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 3 and 21 and July 10. Weeds evaluated were kochia, common lambsquarters, redroot pigweed, hairy nightshade, and green foxtail. Weed control was visually evaluated on June 21, July 10 and August 19 (Table 2). Sugarbeet yields were determined from 10 ft of row per plot on October 1 (Table 3). Crop injury results are shown in Table 3.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/7/13	5/24/13	6/3/13	6/11/13	7/12/13
Time of Day:	01:00 PM	09:30 AM	10:45 AM	09:30 AM	08:35 AM
Application Method:	SPRAY	SPRAY	SPRAY	SPRAY	SPRAY
Application Timing:	PRE	2 TL	4-6 TL	8-10 TL	ROW CLOSE
Application Placement:	BROADCAST -SOIL	FOLIAR	FOLIAR	FOLIAR	FOLIAR
Air Temperature, Unit:	68 F	68 F	75 F	76 F	78 F
% Relative Humidity:	34	33	36	56	51
Wind Velocity, Unit:	2.8 MPH	3.3 MPH	6.4 MPH	1.2 MPH	2.6 MPH
Wind Direction:	N	SW	NW	N	NW
Dew Presence (Y/N):	N	N	N	N	N
Soil Temperature, Unit:	58 F	60 F	62 F	67 F	70 F
Soil Moisture:	FAIR	DRY	DRY	DRY	WET
% Cloud Cover:	10	85	40	15	65

Table 2a. Weed Resistance Management in Roundup Ready Sugarbeet - weed control.

Treatment ¹	Rate			Weed control (Jun 21)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	21.3	fl oz/a	2 TL	97	96	98	95	98
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	97	96	99	98	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	97	91	99	96	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	97	93	99	97	98
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	98	97	99	99	99
Nortron SC	1.5	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	99	99	99	99	99
Nortron SC	4	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	4 TL					
UpBeet	0.5	oz/a	4 TL					
Stinger	8	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	99	98	99	98	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	99	99	99	99	99

Table 2a. Weed Resistance Management in Roundup Ready Sugarbeet - weed control.

Treatment ¹	Rate			Weed control (Jun 21)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	98	99	99	99
Betamix	1.5	pt/a	2 TL					
Nortron SC	0.33	pt/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	98	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Outlook	21	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
LSD (P=.05)				1	2	1	2	1
CV (%)				0.9	1.3	0.4	1.5	0.5
Treatment Prob(F)				0.0014	0.0001	0.1204	0.0063	0.1609

¹ Ammonium sulfate was added to Roundup PowerMax and Liberty 280SL at 16.7 lbs/100 gal and 3 lbs/A, respectively.

Table 2b. Weed Resistance Management in Roundup Ready Sugarbeet - weed control.

Treatment ¹	Rate			Weed control (Jul 10)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	21.3	fl oz/a	2 TL	93	91	98	92	98
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	95	94	99	91	95
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	95	85	99	90	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	95	93	99	94	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	96	94	99	99	99
Nortron SC	1.5	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	99	99	99	99	99
Nortron SC	4	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	98	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	4 TL					
UpBeet	0.5	oz/a	4 TL					
Stinger	8	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	98	99	99	98	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	99	98	99	99	99

Table 2b. Weed Resistance Management in Roundup Ready Sugarbeet - weed control.

Treatment ¹	Rate			Weed control (Jul 10)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	96	99	99	99
Betamix	1.5	pt/a	2 TL					
Nortron SC	0.33	pt/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	98	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Outlook	21	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
LSD (P=.05)				5	4	1	5	1
CV				3.32	2.69	0.55	3.83	0.94
Treatment Prob(F)				0.0630	0.0001	0.6110	0.0020	0.0001

¹ Ammonium sulfate was added to Roundup PowerMax and Liberty 280SL at 16.7 lbs/100 gal and 3 lbs/A, respectively.

Table 2c. Weed Resistance Management in Roundup Ready Sugarbeet - weed control.

Treatment ¹	Rate			Weed control (Jul 18)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	21.3	fl oz/a	2 TL	99	96	99	95	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	98	94	97	97	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	99	93	99	98	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	99	98	99	99	99
Nortron SC	1.5	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	99	99	99	99	99
Nortron SC	4	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	4 TL					
UpBeet	0.5	oz/a	4 TL					
Stinger	8	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	99	99	99	99	99

Table 2c. Weed Resistance Management in Roundup Ready Sugarbeet - weed control.

Treatment ¹	Rate			Weed control (Jul 18)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	98	99	99	99
Betamix	1.5	pt/a	2 TL					
Nortron SC	0.33	pt/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Outlook	21	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
LSD (P=.05)				1	3	1	3	0
CV (%)				0.9	2.0	0.9	2.1	0.0
Treatment Prob(F)				0.5260	0.0002	0.0110	0.1100	1.0000

¹ Ammonium sulfate was added to Roundup PowerMax and Liberty 280SL at 16.7 lbs/100 gal and 3 lbs/A, respectively

Table 3. Sugarbeet response to weed resistance management in roundup ready sugarbeets.

Treatment ¹	Rate			Crop injury			Yield tons/A	Sugar ----- % -----	SLM
				Jun 03	Jun 21	Jul 10			
					----- % -----				
Roundup PowerMax	21.3	fl oz/a	2 TL	2	0	0	19.0	12.2	2.1
Roundup PowerMax	21.3	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Roundup PowerMax	32	fl oz/a	2 TL	4	1	0	19.5	12.7	2.0
Roundup PowerMax	21.3	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Liberty 280 SL	29	fl oz/a	PREPLA	0	1	0	18.5	12.2	2.2
Roundup PowerMax	32	fl oz/a	4 TL						
Warrant	48	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Liberty 280 SL	36	fl oz/a	PREPLA	0	1	0	17.7	12.8	1.8
Roundup PowerMax	32	fl oz/a	4 TL						
Warrant	48	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Liberty 280 SL	29	fl oz/a	PREPLA	1	3	0	21.4	11.9	2.2
Nortron SC	1.5	pt/a	PREPLA						
Roundup PowerMax	32	fl oz/a	4 TL						
Warrant	48	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Liberty 280 SL	36	fl oz/a	PREPLA	5	5	1	18.5	12.4	2.1
Nortron SC	4	pt/a	PREPLA						
Roundup PowerMax	32	fl oz/a	4 TL						
Warrant	48	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Nortron SC	4	pt/a	PREPLA	1	4	1	21.7	12.2	2.1
Roundup PowerMax	32	fl oz/a	2 TL						
Roundup PowerMax	21.3	fl oz/a	6 TL						
Warrant	48	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Nortron SC	4	pt/a	PREPLA	3	5	0	18.8	12.1	2.1
Roundup PowerMax	32	fl oz/a	2 TL						
Roundup PowerMax	21.3	fl oz/a	4 TL						
UpBeet	0.5	oz/a	4 TL						
Stinger	8	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Nortron SC	2	pt/a	PREPLA	3	3	1	17.5	11.9	2.3
Roundup PowerMax	32	fl oz/a	4 TL						
Warrant	48	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Nortron SC	2	pt/a	PREPLA	2	2	0	17.8	13.0	1.8

Table 3. Sugarbeet response to weed resistance management in roundup ready sugarbeets.

Treatment ¹	Rate			Crop injury			Yield tons/A	Sugar ----- % -----	SLM
				Jun 03	Jun 21	Jul 10			
Roundup PowerMax	32	fl oz/a	2 TL						
Roundup PowerMax	21.3	fl oz/a	6 TL						
Warrant	48	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Roundup PowerMax	32	fl oz/a	2 TL	11	7	2	18.1	12.5	2.0
Betamix	1.5	pt/a	2 TL						
Nortron SC	0.33	pt/a	2 TL						
Roundup PowerMax	21.3	fl oz/a	6 TL						
Warrant	48	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Roundup PowerMax	32	fl oz/a	2 TL	1	0	1	21.4	12.9	1.9
Roundup PowerMax	21.3	fl oz/a	6 TL						
Outlook	21	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
LSD (P=.05)				3	4	1	4.3	1.1	0.3
CV (%)				89.7	104.7	239.3	15.5	6.1	10.8
Treatment Prob(F)				0.0001	0.0155	0.1968	0.4324	0.4112	0.1448

¹ Ammonium sulfate was added to Roundup PowerMax and Liberty 280SL at 16.7 lbs/100 gal and 3 lbs/A, respectively.

Table 2d. Weed Resistance Management in Roundup Ready Sugarbeets - weed control.

Treatment ¹	Rate			Weed control (Aug 19)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	21.3	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	98	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	99	98	99	99	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	29	fl oz/a	PREPLA	99	99	99	99	99
Nortron SC	1.5	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Liberty 280 SL	36	fl oz/a	PREPLA	99	99	99	99	99
Nortron SC	4	pt/a	PREPLA					
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	4	pt/a	PREPLA	99	99	99	99	99
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	4 TL					
UpBeet	0.5	oz/a	4 TL					
Stinger	8	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	99	98	99	99	99
Roundup PowerMax	32	fl oz/a	4 TL					
Warrant	48	fl oz/a	4 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Nortron SC	2	pt/a	PREPLA	99	99	99	99	99

Table 2d. Weed Resistance Management in Roundup Ready Sugarbeets - weed control.

Treatment ¹	Rate			Weed control (Aug 19)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
				----- % -----				
Roundup PowerMax	32	fl oz/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Betamix	1.5	pt/a	2 TL					
Nortron SC	0.33	pt/a	2 TL					
Roundup PowerMax	21.3	fl oz/a	6 TL					
Warrant	48	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
Roundup PowerMax	32	fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	21.3	fl oz/a	6 TL					
Outlook	21	fl oz/a	6 TL					
Roundup PowerMax	21.3	fl oz/a	rowclose					
LSD (P=.05)				0	1	0	0	0
CV (%)				0.0	1.0	0.0	0.0	0.0
Treatment Prob(F)				1	0.732	1	1	1

¹ Ammonium sulfate was added to Roundup PowerMax and Liberty 280SL at 16.7 lbs/100 gal and 3 lbs/A, respectively.

Table 3. Sugarbeet response to weed resistance management in roundup ready sugarbeet.

Treatment ¹	Rate		Crop injury			Yield tons/A	Sugar %	SLM
			Jun 03	Jun 21	Jul 10			
			----- % -----					
Roundup PowerMax	21.3 fl oz/a	2 TL	2	0	0	19.0	12.2	2.1
Roundup PowerMax	21.3 fl oz/a	6 TL						
Roundup PowerMax	21.3 fl oz/a	rowclose						
Roundup PowerMax	32 fl oz/a	2 TL	4	1	0	19.5	12.7	2.0
Roundup PowerMax	21.3 fl oz/a	6 TL						
Roundup PowerMax	21.3 fl oz/a	rowclose						
Liberty 280 SL	29 fl oz/a	PREPLA	0	1	0	18.5	12.2	2.2
Roundup PowerMax	32 fl oz/a	4 TL						
Warrant	48 fl oz/a	4 TL						
Roundup PowerMax	21.3 fl oz/a	rowclose						
Liberty 280 SL	36 fl oz/a	PREPLA	0	1	0	17.7	12.8	1.8
Roundup PowerMax	32 fl oz/a	4 TL						
Warrant	48 fl oz/a	4 TL						
Roundup PowerMax	21.3 fl oz/a	rowclose						
Liberty 280 SL	29 fl oz/a	PREPLA	1	3	0	21.4	11.9	2.2
Nortron SC	1.5 pt/a	PREPLA						
Roundup PowerMax	32 fl oz/a	4 TL						
Warrant	48 fl oz/a	4 TL						
Roundup PowerMax	21.3 fl oz/a	rowclose						
Liberty 280 SL	36 fl oz/a	PREPLA	5	5	1	18.5	12.4	2.1
Nortron SC	4 pt/a	PREPLA						
Roundup PowerMax	32 fl oz/a	4 TL						
Warrant	48 fl oz/a	4 TL						
Roundup PowerMax	21.3 fl oz/a	rowclose						
Nortron SC	4 pt/a	PREPLA	1	4	1	21.7	12.2	2.1
Roundup PowerMax	32 fl oz/a	2 TL						
Roundup PowerMax	21.3 fl oz/a	6 TL						
Warrant	48 fl oz/a	6 TL						
Roundup PowerMax	21.3 fl oz/a	rowclose						

Table 3. Sugarbeet response to weed resistance management in roundup ready sugarbeet.

Treatment ¹	Rate			Crop injury			Yield tons/A	Sugar ----- % -----	SLM
				Jun 03	Jun 21	Jul 10			
				----- % -----					
Nortron SC	4	pt/a	PREPLA	3	5	0	18.8	12.1	2.1
Roundup PowerMax	32	fl oz/a	2 TL						
Roundup PowerMax	21.3	fl oz/a	4 TL						
UpBeet	0.5	oz/a	4 TL						
Stinger	8	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Nortron SC	2	pt/a	PREPLA	3	3	1	17.5	11.9	2.3
Roundup PowerMax	32	fl oz/a	4 TL						
Warrant	48	fl oz/a	4 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Nortron SC	2	pt/a	PREPLA	2	2	0	17.8	13.0	1.8
Roundup PowerMax	32	fl oz/a	2 TL						
Roundup PowerMax	21.3	fl oz/a	6 TL						
Warrant	48	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Roundup PowerMax	32	fl oz/a	2 TL	11	7	2	18.1	12.5	2.0
Betamix	1.5	pt/a	2 TL						
Nortron SC	0.33	pt/a	2 TL						
Roundup PowerMax	21.3	fl oz/a	6 TL						
Warrant	48	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
Roundup PowerMax	32	fl oz/a	2 TL	1	0	1	21.4	12.9	1.9
Roundup PowerMax	21.3	fl oz/a	6 TL						
Outlook	21	fl oz/a	6 TL						
Roundup PowerMax	21.3	fl oz/a	rowclose						
LSD (P=.05)				3	4	1	4.3	1.1	0.3
CV (%)				89.7	104.7	239.3	15.5	6.1	10.8
Treatment Prob(F)				0.0001	0.016	0.197	0.432	0.411	0.145

¹ Ammonium sulfate was added to Roundup PowerMax and Liberty 280SL at 16.7 lbs/100 gal and 3 lbs/A, respectively.

Ethofumesate use in Roundup Ready sugarbeet (2013_SB07)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2012 to evaluate Ethofumesate use in RR sugarbeet. Sugarbeet ('60RR27') was planted in 30-inch rows at a rate of 65,000 seeds per acre on May 6. Soils at the site were Haverson and McCook loams (42% sand, 37% silt, 21% clay, 1.4% organic matter, pH 7.8, and CEC 19.6). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 3 and 21, July 10 and August 5. Weeds evaluated were kochia, common lambsquarters, redroot pigweed, hairy nightshade, and green foxtail. Weed control was visually evaluated on June 21, July 10 and August 5 (Table 2). Sugarbeet yields were determined from 50 ft of row per plot on October 1 (Table 3). Crop injury results are shown in Table 3.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/7/13	5/24/13	6/11/13	6/27/13
Time of Day:	11:00 AM	11:30 AM	12:00 PM	09:30 AM
Application Method:	SPRAY	SPRAY	SPRAY	SPRAY
Application Timing:	PRE	2 TL	8-10 TL	12-15 TL
Application Placement:	BROADCAST -SOIL	FOLIAR	FOLIAR	FOLIAR
Air Temperature, Unit:	61 F	76 F	80 F	86 F
% Relative Humidity:	40	28	45	45
Wind Velocity, Unit:	2.3 MPH	5.4 MPH	2.3 MPH	0.7 MPH
Wind Direction:	SE	NW	SE	SW
Dew Presence (Y/N):	N	N	N	N
Soil Temperature, Unit:	51 F	62 F	72 F	66 F
Soil Moisture:	FAIR	DRY	DRY	WET
% Cloud Cover:	25	85	5	0

Table 2a. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	Weed control (Jun 21)			
			CHEAL	KCHSC	SOLSA	SETVI
Nontreated Check			0	0	0	0
Roundup PowerMax	22 fl oz/a	WeedFree	94	95	95	99
Roundup PowerMax	32 fl oz/a	2 TL	97	99	99	99
Roundup PowerMax	22 fl oz/a	14 DAB				
Roundup PowerMax	22 fl oz/a	14 DAC				
Roundup PowerMax	6 fl oz/a	2 TL	36	24	80	73
Roundup PowerMax	6 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Roundup PowerMax	6 fl oz/a	2 TL	65	53	88	87
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Roundup PowerMax	6 fl oz/a	2 TL	68	56	87	81
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Stinger	2 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Stinger	2 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Stinger	2 fl oz/a	14 DAC				
Roundup PowerMax	6 fl oz/a	2 TL	64	75	93	88
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Stinger	2 fl oz/a	2 TL				
UpBeet	0.5 oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Stinger	2 fl oz/a	14 DAB				
UpBeet	0.5 oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Stinger	2 fl oz/a	14 DAC				
UpBeet	0.5 oz/a	14 DAC				
Ethofumesate 4 SC	16 fl oz/a	PRE	60	40	88	91
Roundup PowerMax	6 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				

Table 2a. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	Weed control (Jun 21)			
			CHEAL	KCHSC	SOLSA	SETVI
				----- % -----		
Ethofumesate 4 SC	16 fl oz/a	PRE	80	71	95	96
Roundup PowerMax	6 fl oz/a	2 TL				
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Ethofumesate 4 SC	16 fl oz/a	PRE	88	80	97	94
Roundup PowerMax	6 fl oz/a	2 TL				
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Stinger	2 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Stinger	2 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Stinger	2 fl oz/a	14 DAC				
Ethofumesate 4 SC	16 fl oz/a	PRE	95	95	98	99
Roundup PowerMax	6 fl oz/a	2 TL				
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Stinger	2 fl oz/a	2 TL				
UpBeet	0.5 oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Stinger	2 fl oz/a	14 DAB				
UpBeet	0.5 oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Stinger	2 fl oz/a	14 DAC				
UpBeet	0.5 oz/a	14 DAC				
Ethofumesate 4 SC	48 fl oz/a	PRE	68	83	97	99
Roundup PowerMax	6 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	48 fl oz/a	PRE	90	90	98	99
Roundup PowerMax	6 fl oz/a	2 TL				
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				

Table 2a. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	Weed control (Jun 21)			
			CHEAL	KCHSC	SOLSA	SETVI
				-----%-----		
Ethofumesate 4 SC	48 fl oz/a	PRE	93	91	98	98
Roundup PowerMax	6 fl oz/a	2 TL				
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Stinger	2 fl oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Stinger	2 fl oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Stinger	2 fl oz/a	14 DAC				
Ethofumesate 4 SC	48 fl oz/a	PRE	97	98	99	99
Roundup PowerMax	6 fl oz/a	2 TL				
Ethofumesate 4 SC	24 fl oz/a	2 TL				
Stinger	2 fl oz/a	2 TL				
UpBeet	0.5 oz/a	2 TL				
Roundup PowerMax	6 fl oz/a	14 DAB				
Ethofumesate 4 SC	24 fl oz/a	14 DAB				
Stinger	2 fl oz/a	14 DAB				
UpBeet	0.5 oz/a	14 DAB				
Roundup PowerMax	6 fl oz/a	14 DAC				
Ethofumesate 4 SC	24 fl oz/a	14 DAC				
Stinger	2 fl oz/a	14 DAC				
UpBeet	0.5 oz/a	14 DAC				
LSD (P=.05)			19	15	7	9
CV (%)			16.7	14.4	5.1	6.5
Treatment Prob(F)			0.0001	0.0001	0.0001	0.0001

¹ All postemergence treatments included Destiny HC at 1.5 pt/A.

Table 2b. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	Weed control (July 10)				
			AMARE	CHEAL	KCHSC	SOLSA	SETVI
Nontreated Check			0	0	0	0	0
Roundup PowerMax	22 fl oz/a	WeedFree	99	98	99	99	99
Roundup PowerMax	32 fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	22 fl oz/a	14 DAB					
Roundup PowerMax	22 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	94	54	33	64	98
Roundup PowerMax	6 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	98	96	88	96	99
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	99	96	85	98	99
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	99	95	98	97	99
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
UpBeet	0.5 oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
UpBeet	0.5 oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
UpBeet	0.5 oz/a	14 DAC					
Ethofumesate 4 SC	16 fl oz/a	PRE	98	84	25	95	99
Roundup PowerMax	6 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					

Table 2b. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	Weed control (July 10)				
			AMARE	CHEAL	KCHSC	SOLSA	SETVI
			-----%-----				
Ethofumesate 4 SC	16 fl oz/a	PRE	99	95	92	96	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Ethofumesate 4 SC	16 fl oz/a	PRE	99	96	90	98	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
Ethofumesate 4 SC	16 fl oz/a	PRE	99	99	98	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
UpBeet	0.5 oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
UpBeet	0.5 oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
UpBeet	0.5 oz/a	14 DAC					
Ethofumesate 4 SC	48 fl oz/a	PRE	99	85	87	97	99
Roundup PowerMax	6 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	48 fl oz/a	PRE	99	96	97	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					

Table 2b. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	Weed control (July 10)				
			AMARE	CHEAL	KCHSC	SOLSA	SETVI
			-----%-----				
Ethofumesate 4 SC	48 fl oz/a	PRE	99	98	97	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
Ethofumesate 4 SC	48 fl oz/a	PRE	99	98	99	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
UpBeet	0.5 oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
UpBeet	0.5 oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
UpBeet	0.5 oz/a	14 DAC					
LSD (P=.05)			2	15	15	8	0
CV (%)			1.2	11.1	12.1	5.6	0.3
Treatment Prob(F)			0.0001	0.0001	0.0001	0.0001	0.0320

¹ All postemergence treatments included Destiny HC at 1.5 pt/A.

Table 2c. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	AMARE	Weed control (Aug 5)			
				CHEAL	KCHSC	SOLSA	SETVI
				----- % -----			
Nontreated Check			0	0	0	0	0
Roundup PowerMax	22 fl oz/a	WeedFree	99	99	98	99	99
Roundup PowerMax	32 fl oz/a	2 TL	99	99	99	99	99
Roundup PowerMax	22 fl oz/a	14 DAB					
Roundup PowerMax	22 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	98	77	58	98	99
Roundup PowerMax	6 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	99	98	88	99	99
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	99	97	92	98	99
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
Roundup PowerMax	6 fl oz/a	2 TL	98	97	98	99	99
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
UpBeet	0.5 oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
UpBeet	0.5 oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
UpBeet	0.5 oz/a	14 DAC					
Ethofumesate 4 SC	16 fl oz/a	PRE	98	90	63	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					

Table 2c. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	AMARE	Weed control (Aug 5)			
				CHEAL	KCHSC	SOLSA	SETVI
				----- % -----			
Ethofumesate 4 SC	16 fl oz/a	PRE	99	96	90	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Ethofumesate 4 SC	16 fl oz/a	PRE	99	99	96	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
Ethofumesate 4 SC	16 fl oz/a	PRE	99	99	97	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
UpBeet	0.5 oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
UpBeet	0.5 oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
UpBeet	0.5 oz/a	14 DAC					
Ethofumesate 4 SC	48 fl oz/a	PRE	99	96	88	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	48 fl oz/a	PRE	99	98	96	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					

Table 2c. Ethofumesate use in RR sugarbeet - weed control.

Treatment ¹	Rate	Timing	AMARE	Weed control (Aug 5)			
				CHEAL	KCHSC	SOLSA	SETVI
				----- % -----			
Ethofumesate 4 SC	48 fl oz/a	PRE	99	99	95	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
Ethofumesate 4 SC	48 fl oz/a	PRE	99	99	99	99	99
Roundup PowerMax	6 fl oz/a	2 TL					
Ethofumesate 4 SC	24 fl oz/a	2 TL					
Stinger	2 fl oz/a	2 TL					
UpBeet	0.5 oz/a	2 TL					
Roundup PowerMax	6 fl oz/a	14 DAB					
Ethofumesate 4 SC	24 fl oz/a	14 DAB					
Stinger	2 fl oz/a	14 DAB					
UpBeet	0.5 oz/a	14 DAB					
Roundup PowerMax	6 fl oz/a	14 DAC					
Ethofumesate 4 SC	24 fl oz/a	14 DAC					
Stinger	2 fl oz/a	14 DAC					
UpBeet	0.5 oz/a	14 DAC					
LSD (P=.05)			1	7	11	1	0
CV (%)			0.9	5.1	8.9	0.7	0.2
Treatment Prob(F)			0.5334	0.0001	0.0001	0.6101	0.4697

¹ All postemergence treatments included Destiny HC at 1.5 pt/A.

Table 3. Sugarbeet response to Ethofumesate use in RR sugarbeet.

Treatment ¹	Rate	Timing	Crop injury				Yield tons/A	Sugar ----- % -----	SLM
			Jun 03	Jun 21	Jul 10	Aug 05			
Nontreated Check			0	0	0	0	1.8	11.7	2.5
Roundup PowerMax	22 fl oz/a	WeedFree	0	0	0	0	31.3	11.8	2.3
Roundup PowerMax	32 fl oz/a	2 TL	0	2	0	0	29.0	11.9	2.3
Roundup PowerMax	22 fl oz/a	14 DAB							
Roundup PowerMax	22 fl oz/a	14 DAC							
Roundup PowerMax	6 fl oz/a	2 TL	0	1	0	0	18.3	11.9	2.3
Roundup PowerMax	6 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Roundup PowerMax	6 fl oz/a	2 TL	1	9	0	0	30.2	11.4	2.3
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Roundup PowerMax	6 fl oz/a	2 TL	1	10	1	0	30.0	11.6	2.2
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Stinger	2 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Stinger	2 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Stinger	2 fl oz/a	14 DAC							
Roundup PowerMax	6 fl oz/a	2 TL	2	7	0	0	31.9	11.5	2.4
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Stinger	2 fl oz/a	2 TL							
UpBeet	0.5 oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Stinger	2 fl oz/a	14 DAB							
UpBeet	0.5 oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Stinger	2 fl oz/a	14 DAC							
UpBeet	0.5 oz/a	14 DAC							
Ethofumesate 4 SC	16 fl oz/a	PRE	1	2	0	0	24.1	11.6	2.4
Roundup PowerMax	6 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							

Table 3. Sugarbeet response to Ethofumesate use in RR sugarbeet.

Treatment ¹	Rate	Timing	Crop injury				Yield tons/A	Sugar ----- % -----	SLM
			Jun 03	Jun 21	Jul 10	Aug 05			
Ethofumesate 4 SC	16 fl oz/a	PRE	2	9	1	0	30.9	11.9	2.4
Roundup PowerMax	6 fl oz/a	2 TL							
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Ethofumesate 4 SC	16 fl oz/a	PRE	1	6	0	0	29.3	11.5	2.4
Roundup PowerMax	6 fl oz/a	2 TL							
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Stinger	2 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Stinger	2 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Stinger	2 fl oz/a	14 DAC							
Ethofumesate 4 SC	16 fl oz/a	PRE	1	9	0	0	29.8	11.8	2.4
Roundup PowerMax	6 fl oz/a	2 TL							
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Stinger	2 fl oz/a	2 TL							
UpBeet	0.5 oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Stinger	2 fl oz/a	14 DAB							
UpBeet	0.5 oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Stinger	2 fl oz/a	14 DAC							
UpBeet	0.5 oz/a	14 DAC							
Ethofumesate 4 SC	48 fl oz/a	PRE	0	4	0	0	33.9	11.7	2.4
Roundup PowerMax	6 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	48 fl oz/a	PRE	3	10	0	0	28.9	11.9	2.4
Roundup PowerMax	6 fl oz/a	2 TL							
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							

Table 3. Sugarbeet response to Ethofumesate use in RR sugarbeet.

Treatment ¹	Rate	Timing	Crop injury				Yield tons/A	Sugar ----- % -----	SLM
			Jun 03	Jun 21	Jul 10	Aug 05			
Ethofumesate 4 SC	48 fl oz/a	PRE	2	13	0	0	31.0	11.3	2.4
Roundup PowerMax	6 fl oz/a	2 TL							
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Stinger	2 fl oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Stinger	2 fl oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Stinger	2 fl oz/a	14 DAC							
Ethofumesate 4 SC	48 fl oz/a	PRE	2	10	0	0	30.9	12.0	2.3
Roundup PowerMax	6 fl oz/a	2 TL							
Ethofumesate 4 SC	24 fl oz/a	2 TL							
Stinger	2 fl oz/a	2 TL							
UpBeet	0.5 oz/a	2 TL							
Roundup PowerMax	6 fl oz/a	14 DAB							
Ethofumesate 4 SC	24 fl oz/a	14 DAB							
Stinger	2 fl oz/a	14 DAB							
UpBeet	0.5 oz/a	14 DAB							
Roundup PowerMax	6 fl oz/a	14 DAC							
Ethofumesate 4 SC	24 fl oz/a	14 DAC							
Stinger	2 fl oz/a	14 DAC							
UpBeet	0.5 oz/a	14 DAC							
LSD (P=.05)			2	4	1	0	3.7	0.8	0.1
CV (%)			117.4	46.0	535.9	0.0	8.8	4.7	4.3
Treatment Prob(F)			.010	.000	.560	1.000	.000	.790	.320

¹ All postemergence treatments included Destiny HC at 1.5 pt/A.

Effect of Warrant on sugarbeet when applied PRE and PPI (2013_SB09)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2012 to evaluate the effect of Warrant on sugarbeet when applied PRE and PPI. Sugarbeet ('60RR27') was planted in 30-inch rows at a rate of 65,000 seeds per acre on May 6. Soils at the site were Haverson and McCook loams (42% sand, 37% silt, 21% clay, 1.4% organic matter, pH 7.8, and CEC 19.6). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 5. Weeds evaluated were kochia, common lambsquarters, redroot pigweed, hairy nightshade, and green foxtail. Weed control was visually evaluated on August 19 (Table 2). Sugarbeet yields were determined from 50 ft of row per plot on October 1 (Table 3). Crop injury results are shown in Table 3.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/6/13	5/6/13
Time of Day:	04:00 PM	04:30 PM
Application Method:	SPRAY	SPRAY
Application Timing:	PPI	PRE
Application Placement:	BROADCAST - SOIL	BROADCAST - SOIL
Air Temperature, Unit:	70 F	70 F
% Relative Humidity:	25	25
Wind Velocity, Unit:	8.9 MPH	8.9 MPH
Wind Direction:	SSE	SSE
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	58 F	58 F
Soil Moisture:	FAIR	FAIR
% Cloud Cover:	20	20

Table 2. Weed control effect of Warrant on sugarbeet when applied PRE and PPI.

Treatment	Rate fl oz/a	Timing	Weed control				
			CHEAL	AMARE	KCHSC	SOLSA	SETVI
No Warrant			98	99	99	99	99
Warrant	48	PPI	99	99	99	99	99
Warrant	48	PRE	99	99	99	99	99
Warrant	96	PPI	99	99	99	99	99
Warrant	96	PRE	99	99	99	99	99
LSD (P=.05)			1	0	0	0	0
CV (%)			0.8	0.0	0.0	0.0	0.0
Treatment Prob(F)			0.6310	1.0000	1.0000	1.0000	1.0000

Table 3. Effect of Warrant on sugarbeet population, crop injury, and yield when applied PRE and PPI.

Treatment	Rate	Timing	Population			Crop		Sugar	SLM
			Jun 03	Jun 11	Jun 28	injury	Yield		
	fl oz/a		-----	plants/A	-----	%	tons/A	-----	%
No Warrant			43,778	45,520	42,689	0	30.6	12.0	2.3
Warrant	48	PPI	40,293	40,075	36,373	3	29.2	12.9	2.3
Warrant	48	PRE	34,848	31,145	31,363	23	28.2	12.5	2.2
Warrant	96	PPI	31,363	30,710	30,710	28	26.8	12.5	2.2
Warrant	96	PRE	22,869	23,958	23,087	55	24.8	12.8	2.1
LSD (P=.05)			4,855	4,109	5,291	9	4.2	0.8	0.2
CV (%)			9.4	8.2	10.9	21.7	9.6	3.9	7.0
Treatment Prob(F)			0.0001	0.0001	0.0023	0.0001	0.1743	0.5518	0.3642

Glyphosate plus micronutrients and AMS replacement products in sugarbeet (2013_SB10)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2012 to evaluate Glyphosate plus micronutrients and AMS replacement products in sugarbeet. Sugarbeet ('60RR27') was planted in 30-inch rows at a rate of 65,000 seeds per acre on May 6. Soils at the site were Haverson and McCook loams (43% sand, 37% silt, 20% clay, 1.8% organic matter, pH 7.8, and CEC 16.7). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 3. Weeds evaluated were kochia, common lambsquarters, redroot pigweed, hairy nightshade, and green foxtail. Weed control was visually evaluated on July 3, 10, and 18 (Table 2). Sugarbeet yields were determined from 20 ft of row per plot on October 1 (Table 3). Crop injury results are shown in Table 3.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	6/17/13
Time of Day:	10:35 AM
Application Method:	SPRAY
Application Timing:	POST
Application Placement:	FOLIAR
Air Temperature, Unit:	70 F
% Relative Humidity:	47
Wind Velocity, Unit:	5.6 MPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	66 F
Soil Moisture:	DRY
% Cloud Cover:	10

Table 2a. Weed control of Glyphosate plus micronutrients and AMS replacement products in sugarbeet.

Treatment	Rate	Unit	Timing	Weed control (July 3)			
				AMARE	CHEAL	SOLSA	SETVI
Roundup Original	0.75	lb ae/a	POST	99	94	90	99
Roundup Original Class Act NG	0.75 2.5	lb ae/a % v/v	POST	99	97	90	98
Roundup Original Class Act NG AGM 09026	0.75 2.5 1	lb ae/a % v/v qt/a	POST	98	95	88	98
Roundup Original AG 08034	0.75 2	lb ae/a % v/v	POST	99	97	92	99
Roundup Original AG 08034 AGM 09026	0.75 2 1	lb ae/a % v/v qt/a	POST	99	97	89	99
Roundup Original AG 08034	0.75 1	lb ae/a % v/v	POST	98	95	88	99
Roundup Original AG 08034 AGM 09026	0.75 1 1	lb ae/a % v/v qt/a	POST	98	94	86	99
Roundup Original AG 07043	0.75 1	lb ae/a % v/v	POST	97	94	86	97
Roundup Original AG 07043 AGM 09026	0.75 1 1	lb ae/a % v/v qt/a	POST	99	93	88	99
Roundup Original AG 11011	0.75 1	lb ae/a % v/v	POST	98	97	92	99
Roundup Original AG 11011 AGM 09026	0.75 1 1	lb ae/a % v/v qt/a	POST	99	96	89	99
Roundup Original AG 11011 AGM 09026	0.75 1.25 1	lb ae/a % v/v qt/a	POST	97	97	83	99
Nontreated check				0	0	0	0
LSD (P=.05)				2	4	5	2
CV (%)				1.4	2.5	3.7	1.4
Treatment Prob(F)				0.3785	0.1561	0.0339	0.4322

Table 2b. Weed control of Glyphosate plus micronutrients and AMS replacement products in sugarbeet.

Treatment	Rate	Unit	Timing	Weed control (July 10)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
Roundup Original	0.75	lb ae/a	POST	92	87	99	79	98
Roundup Original Class Act NG	0.75 2.5	lb ae/a % v/v	POST	92	91	99	85	97
Roundup Original Class Act NG AGM 09026	0.75 2.5 1	lb ae/a % v/v qt/a	POST	93	92	99	82	93
Roundup Original AG 08034	0.75 2	lb ae/a % v/v	POST	93	93	99	90	95
Roundup Original AG 08034 AGM 09026	0.75 2 1	lb ae/a % v/v qt/a	POST	97	92	99	80	98
Roundup Original AG 08034	0.75 1	lb ae/a % v/v	POST	96	93	99	81	96
Roundup Original AG 08034 AGM 09026	0.75 1 1	lb ae/a % v/v qt/a	POST	93	91	99	78	98
Roundup Original AG 07043	0.75 1	lb ae/a % v/v	POST	90	90	98	78	96
Roundup Original AG 07043 AGM 09026	0.75 1 1	lb ae/a % v/v qt/a	POST	94	86	99	82	99
Roundup Original AG 11011	0.75 1	lb ae/a % v/v	POST	92	91	99	81	96
Roundup Original AG 11011 AGM 09026	0.75 1 1	lb ae/a % v/v qt/a	POST	95	92	99	75	95
Roundup Original AG 11011 AGM 09026	0.75 1.25 1	lb ae/a % v/v qt/a	POST	95	93	99	68	96
Nontreated check				0	0	0	0	0
LSD (P=.05)				6	5	1	15	6
CV (%)				4.7	4.2	0.5	12.7	4.0
Treatment Prob(F)				0.7448	0.2136	0.5259	0.4042	0.7193

Table 2c. Weed control of Glyphosate plus micronutrients and AMS replacement products in sugarbeet.

Treatment	Rate	Unit	Timing	Weed control (July 18)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
Roundup Original	0.75	lb ae/a	POST	86	83	99	76	96
Roundup Original	0.75	lb ae/a	POST	94	91	99	82	91
Class Act NG	2.5	% v/v						
Roundup Original	0.75	lb ae/a	POST	90	85	99	66	91
Class Act NG	2.5	% v/v						
AGM 09026	1	qt/a						
Roundup Original	0.75	lb ae/a	POST	90	89	99	82	94
AG 08034	2	% v/v						
Roundup Original	0.75	lb ae/a	POST	88	86	99	68	94
AG 08034	2	% v/v						
AGM 09026	1	qt/a						
Roundup Original	0.75	lb ae/a	POST	88	88	99	78	92
AG 08034	1	% v/v						
Roundup Original	0.75	lb ae/a	POST	91	82	99	65	96
AG 08034	1	% v/v						
AGM 09026	1	qt/a						
Roundup Original	0.75	lb ae/a	POST	88	86	99	58	90
AG 07043	1	% v/v						
Roundup Original	0.75	lb ae/a	POST	91	75	98	72	93
AG 07043	1	% v/v						
AGM 09026	1	qt/a						
Roundup Original	0.75	lb ae/a	POST	89	85	99	80	93
AG 11011	1	% v/v						
Roundup Original	0.75	lb ae/a	POST	91	84	99	71	92
AG 11011	1	% v/v						
AGM 09026	1	qt/a						

Table 2c. Weed control of Glyphosate plus micronutrients and AMS replacement products in sugarbeet.

Treatment	Rate	Unit	Timing	Weed control (July 18)				
				AMARE	CHEAL	KCHSC	SOLSA	SETVI
Roundup Original	0.75	lb ae/a	POST	91	89	99	56	94
AG 11011	1.25	% v/v						
AGM 09026	1	qt/a						
Nontreated check				0	0	0	0	0
LSD (P=.05)				7	9	1	12	6
CV (%)				5.5	7.1	0.8	11.4	4.3
Treatment Prob(F)				0.7390	0.0700	0.8370	0.0003	0.5660

Table 3. Sugarbeet response to Glyphosate plus micronutrients and AMS replacement products.

Treatment	Rate		Timing	Crop injury	Yield	Sugar	SLM
				%	tons/A	%	%
Roundup Original	0.75	lb ae/a	POST	0	13.7	11.8	2.2
Roundup Original	0.75	lb ae/a	POST	0	12.2	12.2	2.2
Class Act NG	2.5	% v/v					
Roundup Original	0.75	lb ae/a	POST	1	14.6	12.1	2.1
Class Act NG	2.5	% v/v					
AGM 09026	1	qt/a					
Roundup Original	0.75	lb ae/a	POST	0	15.0	12.3	2.2
AG 08034	2	% v/v					
Roundup Original	0.75	lb ae/a	POST	0	14.7	12.2	2.2
AG 08034	2	% v/v					
AGM 09026	1	qt/a					
Roundup Original	0.75	lb ae/a	POST	0	13.6	12.5	2.2
AG 08034	1	% v/v					
Roundup Original	0.75	lb ae/a	POST	1	15.6	12.6	2.1
AG 08034	1	% v/v					
AGM 09026	1	qt/a					
Roundup Original	0.75	lb ae/a	POST	0	10.9	11.8	2.2
AG 07043	1	% v/v					
Roundup Original	0.75	lb ae/a	POST	1	13.9	11.9	2.2
AG 07043	1	% v/v					
AGM 09026	1	qt/a					
Roundup Original	0.75	lb ae/a	POST	1	14.6	11.6	2.2
AG 11011	1	% v/v					
Roundup Original	0.75	lb ae/a	POST	0	15.1	11.7	2.3
AG 11011	1	% v/v					
AGM 09026	1	qt/a					

Table 3. Sugarbeet response to Glyphosate plus micronutrients and AMS replacement products.

Treatment	Rate		Timing	Crop injury	Yield	Sugar	SLM
				%	tons/A	%	%
Roundup Original	0.75	lb ae/a	POST	0	14.1	12.1	2.1
AG 11011	1.25	% v/v					
AGM 09026	1	qt/a					
Nontreated check				0	0.0	11.6	2.3
LSD (P=.05)				1	5.3	1.0	0.2
CV (%)				365.6	26.0	5.7	7.6
Treatment Prob(F)				0.6726	0.8724	0.5657	0.839

POST green foxtail control in spring wheat with pyroxsulam (2013_SW01)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2013 to evaluate POST green foxtail control in spring wheat with pyroxsulam. Spring wheat ('Goliad') was drilled in 7.5-inch rows at a rate of 60 lbs per acre on April 29. Soils at the site were Haverson & McCook loams (56% sand, 31% silt, 13% clay, 1.8% organic matter, pH 8.0, CEC 11.4). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 12. Weeds evaluated were green foxtail. Weed control was visually evaluated on June 12 and August 7. Wheat yields were determined from a 5x25 ft area harvested on August 20. Results are shown in Table 2.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/24/13
Time of Day:	01:00 PM
Application Method:	SPRAY
Application Timing:	POSPOS
Application Placement:	FOLIAR
Air Temperature, Unit:	78 F
% Relative Humidity:	15
Wind Velocity, Unit:	10 MPH
Wind Direction:	NNW
Dew Presence (Y/N):	N
Soil Temperature, Unit:	63 F
Soil Moisture:	DRY
% Cloud Cover:	85

Table 2. POST Grass control, crop injury, and spring wheat yield in spring wheat with pyroxsulam.

Treatment	Rate		Timing	Weed control		Crop injury	Yield
				Jun 12	Aug 07		
				----- % -----			bu/A
Axial XL	16.4	fl oz/a	POSPOS	96	59	0	47.1
Sierra ^{1,2}	1	fl oz/a	POSPOS	94	70	1	52.7
Olympus ^{1,2}	0.9	oz/a	POSPOS	5	8	3	40.1
Powerflex HL ^{1,2}	2	oz/a	POSPOS	77	26	5	44.2
Powerflex ^{1,2}	3.5	oz/a	POSPOS	85	33	5	46.6
Thifensulfuron ¹	0.48	oz/a	POSPOS	82	44	1	48.5
Tribenuron	0.12	oz/a	POSPOS				
Axial XL	16.4	fl oz/a	POSPOS				
Thifensulfuron ^{1,2}	0.48	oz/a	POSPOS	93	86	1	53.4
Tribenuron	0.12	oz/a	POSPOS				
Sierra	1	fl oz/a	POSPOS				
Thifensulfuron ^{1,2}	0.48	oz/a	POSPOS	5	6	4	42.4
Tribenuron	0.12	oz/a	POSPOS				
Olympus	0.9	oz/a	POSPOS				
Thifensulfuron ^{1,2}	0.48	oz/a	POSPOS	73	26	6	47.4
Tribenuron	0.12	oz/a	POSPOS				
Powerflex HL	2	oz/a	POSPOS				
Untreated Check				0	0	0	36.9
LSD (P=.05)				12	14	2	6.5
CV (%)				12.1	24.4	59.5	9.5
Treatment Prob(F)				0.0001	0.0001	0.0001	0.005

¹ Treatment included ammonium sulfate at 9.4 lb/100 gal.

² Treatment included non-ionic surfactant at 0.25% v/v.

Weed control in spring wheat (2013_SW02)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2013 to evaluate in-crop low rate MSM High Plains. Spring wheat ('Goliad') was drilled in 7.5-inch rows at a rate of 60 lbs per acre on April 29. Soils at the site were Haverson & McCook loams (56% sand, 31% silt, 13% clay, 1.8% organic matter, pH 8.0, CEC 11.4). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on June 12. Weeds evaluated were green foxtail. Weed control was visually evaluated on June 12 and August 7. Wheat yields were determined from a 5x25 ft area harvested on August 20. Results are shown in Table 2.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/24/13
Time of Day:	01:30 PM
Application Method:	SPRAY
Application Timing:	POSPOS
Application Placement:	FOLIAR
Air Temperature, Unit:	78 F
% Relative Humidity:	15
Wind Velocity, Unit:	5.3 MPH
Wind Direction:	NNW
Dew Presence (Y/N):	N
Soil Temperature, Unit:	63 F
Soil Moisture:	DRY
% Cloud Cover:	85

Table 2. Weed control and spring wheat response to herbicides.

Treatment	Rate		Timing	Weed control		Crop injury	Yield
				Jun 12	Aug 07		
				----- % -----			bu/A
Thifensulfuron ^{1,2}	0.15	oz/a	POSPOS	67	25	0	54.2
Tribenuron	0.15	oz/a	POSPOS				
Thifensulfuron ^{1,2}	0.25	oz/a	POSPOS	68	28	0	48.4
Tribenuron	0.25	oz/a	POSPOS				
Thifensulfuron ^{1,2}	0.25	oz/a	POSPOS	95	37	6	52.0
Tribenuron	0.25	oz/a	POSPOS				
Metribuzin	4	oz/a	POSPOS				
Metsulfuron ^{1,2}	0.02	oz/a	POSPOS	73	12	1	47.2
Tribenuron ^{1,2}	0.15	oz/a	POSPOS	61	14	1	48.0
Metsulfuron	0.02	oz/a	POSPOS				
Thifensulfuron ^{1,2}	0.15	oz/a	POSPOS	71	39	0	57.1
Tribenuron	0.15	oz/a	POSPOS				
Metsulfuron	0.02	oz/a	POSPOS				
Thifensulfuron ^{1,2}	0.25	oz/a	POSPOS	86	26	1	57.2
Tribenuron	0.25	oz/a	POSPOS				
Metsulfuron	0.02	oz/a	POSPOS				
Metribuzin ^{1,2}	4	oz/a	POSPOS	92	21	7	43.8
Huskie Complete ¹	13.7	fl oz/a	POSPOS	96	83	2	63.1
Untreated Check				65	0	0	47.0
LSD (P=.05)				46	27	2	12.1
CV (%)				40.3	58.8	75.2	15.7
Treatment Prob(F)				0.6772	0.0009	0.0001	0.066

¹ Treatment included ammonium sulfate at 9.4 lb/100 gal.

² Treatment included non-ionic surfactant at 0.25% v/v.

BroadAxe rate and timing comparison in Sunflower (2013_SF01)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate BroadAxe treatments and timing comparison in sunflowers. Sunflowers ('Triumph 664') was planted in 30-inch rows at a rate of 18,000 seeds per acre on June 20. Soil at the site was Mitchell silt loam (61% sand, 24% silt, 15% clay, 1.7% organic matter, pH 8.3, CEC 15.2). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on July 10, 18, 26, and August 5 and 20. Weeds evaluated were kochia and Russian thistle. Weed control was visually evaluated on July 18 and 26 and August 5 and 20 (Table 2). Extensive wildlife damage prohibited the collection of yield data.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/21/13
Time of Day:	10:55:00 AM
Application Method:	SPRAY
Application Timing:	PRE
Application Placement:	BROADCAST - SOIL
Air Temperature, Unit:	74 F
% Relative Humidity:	37
Wind Velocity, Unit:	3.3 MPH
Wind Direction:	NE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	74 F
Soil Moisture:	DRY
% Cloud Cover:	95

Table 2a. Weed control of BroadAxe rates and timings.

Treatment ¹	Rate		Timing	Weed control				
				----- Jul 18 -----		----- Jul 26 -----		
				SASKR	KCHSC	SASKR	GRASS	EPHSU
BroadAxe	20	fl oz/a	EARPRE	85	99	71	73	74
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
BroadAxe	22	fl oz/a	EARPRE	99	99	99	99	99
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
BroadAxe	20	fl oz/a	ATPLAN	99	99	99	96	99
Aim	0.75	fl oz/a	ATPLAN					
Roundup PowerMax	28	fl oz/a	ATPLAN					
BroadAxe	22	fl oz/a	ATPLAN	97	99	99	99	99
Aim	0.75	fl oz/a	ATPLAN					
Roundup PowerMax	28	fl oz/a	ATPLAN					
BroadAxe	20	fl oz/a	EARPRE	99	99	99	97	99
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Select	6	fl oz/a	POSPOS					
COC	1	% v/v	POSPOS					
BroadAxe	20	fl oz/a	EARPRE	99	99	99	99	99
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Select	6	fl oz/a	POSPOS					
COC	1	% v/v	POSPOS					
Prowl H2O	3	pt/a	EARPRE	74	78	41	50	50
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Spartan Charge	5	fl oz/a	EARPRE	79	93	74	74	74
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Select	6	fl oz/a	POSPOS					
COC	1	% v/v	POSPOS					

Table 2a. Weed control of BroadAxe rates and timings.

Treatment ¹	Rate	Timing	Weed control						
			---- Jul 18 ----		----- Jul 26 -----				
			SASKR	KCHSC	SASKR	GRASS	EPHSU		
----- % -----									
Prowl H2O	3 pt/a	EARPRE	99	99	99	99	99		
Spartan Charge	5 fl oz/a	EARPRE							
Aim	0.75 fl oz/a	EARPRE							
Roundup PowerMax	28 fl oz/a	EARPRE							
Untreated Check			0	0	13	5	10		
LSD (P=.05)			25	19	38	41	40		
CV (%)			18.9	13.7	30.0	32.1	31.1		
Treatment Prob(F)			0.2814	0.3853	0.039	0.188	0.1466		

¹ All early PRE treatments included AMS at 17 lb/100gal.

Table 2b. Weed control of BroadAxe rates and timings.

Treatment ¹	Rate		Timing	Weed Control			
				----- Aug 05 -----		----- Aug 20 -----	
				SASKR	KCHSC	SASKR	KCHSC
				----- % -----			
BroadAxe	20	fl oz/a	EARPRE	72	74	70	73
Aim	0.75	fl oz/a	EARPRE				
Roundup PowerMax	28	fl oz/a	EARPRE				
BroadAxe	22	fl oz/a	EARPRE	99	99	99	99
Aim	0.75	fl oz/a	EARPRE				
Roundup PowerMax	28	fl oz/a	EARPRE				
BroadAxe	20	fl oz/a	ATPLAN	98	99	97	99
Aim	0.75	fl oz/a	ATPLAN				
Roundup PowerMax	28	fl oz/a	ATPLAN				
BroadAxe	22	fl oz/a	ATPLAN	97	99	89	99
Aim	0.75	fl oz/a	ATPLAN				
Roundup PowerMax	28	fl oz/a	ATPLAN				
BroadAxe	20	fl oz/a	EARPRE	97	98	312	99
Aim	0.75	fl oz/a	EARPRE				
Roundup PowerMax	28	fl oz/a	EARPRE				
Select	6	fl oz/a	POSPOS				
COC	1	% v/v	POSPOS				
BroadAxe	20	fl oz/a	EARPRE	99	99	98	99
Aim	0.75	fl oz/a	EARPRE				
Roundup PowerMax	28	fl oz/a	EARPRE				
Select	6	fl oz/a	POSPOS				
COC	1	% v/v	POSPOS				
Prowl H2O	3	pt/a	EARPRE	44	50	21	74
Aim	0.75	fl oz/a	EARPRE				
Roundup PowerMax	28	fl oz/a	EARPRE				
Spartan Charge	5	fl oz/a	EARPRE	86	99	82	99
Aim	0.75	fl oz/a	EARPRE				
Roundup PowerMax	28	fl oz/a	EARPRE				
Select	6	fl oz/a	POSPOS				
COC	1	% v/v	POSPOS				

Table 2b. Weed control of BroadAxe rates and timings.

Treatment ¹	Rate		Timing	Weed Control			
				----- Aug 05 -----		----- Aug 20 -----	
				SASKR	KCHSC	SASKR	KCHSC
Prowl H2O	3	pt/a	EARPRE	99	99	98	99
Spartan Charge	5	fl oz/a	EARPRE				
Aim	0.75	fl oz/a	EARPRE				
Roundup PowerMax	28	fl oz/a	EARPRE				
Untreated Check				44	70	26	32
LSD (P=.05)				37	38	213	34
CV (%)				29.2	28.9	135.7	25.3
Treatment Prob(F)				0.0709	0.1316	0.3293	0.5444

¹ All early PRE treatments included AMS at 17 lb/100gal.

Table 3. Sunflower response to BroadAxe rates and timings.

Treatment ¹	Rate		Timing	Crop injury				
				Jul 10	Jul 18	Jul 26	Aug 05	Aug 20
				----- % -----				
BroadAxe	20	fl oz/a	EARPRE	83	41	44	26	51
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
BroadAxe	22	fl oz/a	EARPRE	98	78	69	38	76
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
BroadAxe	20	fl oz/a	ATPLAN	96	60	51	30	58
Aim	0.75	fl oz/a	ATPLAN					
Roundup PowerMax	28	fl oz/a	ATPLAN					
BroadAxe	22	fl oz/a	ATPLAN	92	48	41	24	46
Aim	0.75	fl oz/a	ATPLAN					
Roundup PowerMax	28	fl oz/a	ATPLAN					
BroadAxe	20	fl oz/a	EARPRE	86	45	35	18	50
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Select	6	fl oz/a	POSPOS					
COC	1	% v/v	POSPOS					
BroadAxe	20	fl oz/a	EARPRE	94	57	58	34	61
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Select	6	fl oz/a	POSPOS					
COC	1	% v/v	POSPOS					
Prowl H2O	3	pt/a	EARPRE	58	16	18	9	34
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Spartan Charge	5	fl oz/a	EARPRE	87	53	46	19	45
Aim	0.75	fl oz/a	EARPRE					
Roundup PowerMax	28	fl oz/a	EARPRE					
Select	6	fl oz/a	POSPOS					
COC	1	% v/v	POSPOS					

Table 3. Sunflower response to BroadAxe rates and timings.

Treatment ¹	Rate	Timing	Crop injury				
			Jul 10	Jul 18	Jul 26	Aug 05	Aug 20
			----- % -----				
Prowl H2O	3 pt/a	EARPRE	94	56	46	24	59
Spartan Charge	5 fl oz/a	EARPRE					
Aim	0.75 fl oz/a	EARPRE					
Roundup PowerMax	28 fl oz/a	EARPRE					
Untreated Check			64	0	6	10	8
LSD (P=.05)			23	23	33	19	26
CV (%)			17.8	31.6	49.9	52.2	33.3
Treatment Prob(F)			0.04	0.002	0.177	0.107	0.12

¹ All early PRE treatments included AMS at 17 lb/100gal.

Weed control in winter wheat with Anthem (2013_WW01)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2013 to evaluate weed control in winter wheat with Anthem. Winter wheat ('Goodstreak') was drilled in 7.5-inch rows at a rate of 70 lbs per acre on October 2, 2012. Soil at the site was Mitchell silt loam (43% sand, 39% silt, 18% clay, 1.7% organic matter, pH 7.8, CEC 18.4). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Visual crop injury evaluations were made on May 24 and June 12. Weed evaluated was downy brome. Weed control was visually evaluated on May 24 and June 12 (Table 2). Wheat yields were determined from a 5x22.5 ft area harvested on July 22 (Table 3).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	9/20/12	10/9/12	11/6/12	4/3/12
Time of Day:	11:15 AM	02:20 PM	10:30 AM	09:50 AM
Application Method:	SPRAY	SPRAY	SPRAY	SPRAY
Application Timing:	PREPRE	ATPLAN	POEMAE	POEMSE
Application Placement:	BROADCAST-SOIL	BROADCAST-SOIL	FOLIAR	FOLIAR
Air Temperature, Unit:	71 F	44 F	57 F	44 F
% Relative Humidity:	21	45	53	60
Wind Velocity, Unit:	7.5 MPH	9.0 MPH	5.4 MPH	2.0 MPH
Wind Direction:	N	N	N	NE
Dew Presence (Y/N):	N	N	N	N
Soil Temperature, Unit:	63 F	51 F	46 F	44 F
Soil Moisture:	DRY	DRY	DRY	DRY
% Cloud Cover:	40	50	5	0

Table 2. Downy brome control in winter wheat with Anthem

Treatment	Rate		Timing	Weed control	
				May 24	Jun 12
Untreated Check				10	5
Anthem	0.084	lb ai/a	ATPLAN	78	66
Anthem	0.109	lb ai/a	ATPLAN	74	66
Anthem	0.134	lb ai/a	ATPLAN	89	74
Anthem	0.109	lb ai/a	ATPLAN	94	95
Anthem	0.084	lb ai/a	ATPLAN	73	80
Powerflex ¹	0.0117	lb ai/a	POEMAE		
Anthem	0.109	lb ai/a	ATPLAN	79	75
Cadet ¹	0.00533	lb ai/a	POEMSE		
2,4-D amine	0.375	lb ai/a	POEMSE		
Clarity	0.0625	lb ae/a	POEMSE		
Powerflex ¹	0.0164	lb ai/a	POEMAE	56	44
LSD (P=.05)				36	27
CV (%)				30.9	24.7
Treatment Prob(F)				0.4365	0.0384

¹ Treatment included NIS at 0.25% v/v and AMS at 17 lb/100 gal.

Table 3. Crop response to Anthem treatments.

Treatment	Rate		Timing	Crop injury		Yield	Test Weight	1000 seed weight
				May 24	Jun 12			
Untreated Check				----- % ----- 2	0	bu/A 5.3	lbs/bu 61.2	g 22.1
Anthem	0.084	lb ai/a	ATPLAN	5	2	5.8	60.7	23.0
Anthem	0.109	lb ai/a	ATPLAN	5	1	5.9	61.5	22.5
Anthem	0.134	lb ai/a	ATPLAN	5	2	5.7	62.0	22.0
Anthem	0.109	lb ai/a	ATPLAN	3	0	7.3	61.0	23.1
Anthem	0.084	lb ai/a	ATPLAN	5	2	8.0	60.9	23.2
Powerflex ¹	0.0117	lb ai/a	POEMAE					
Anthem	0.109	lb ai/a	ATPLAN	5	2	5.9	61.8	22.6
Cadet ¹	0.00533	lb ai/a	POEMSE					
2,4-D amine	0.375	lb ai/a	POEMSE					
Clarity	0.0625	lb ae/a	POEMSE					
Powerflex ¹	0.0164	lb ai/a	POEMAE	2	0	6.8	58.3	22.5
LSD (P=.05)				3	2	3.5	1.5	1.2
CV (%)				55.9	119.1	36.8	1.7	3.5
Treatment Prob(F)				0.5090	0.5428	0.7434	0.0014	0.4175

¹ Treatment included non-ionic surfactant at 0.25% v/v and ammonium sulfate at 17 lb/100 gal.

Herbicides for PRE burndown and downy brome control in winter wheat (2013_WW02)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2013 to evaluate herbicides for PRE burndown and downy brome control in winter wheat. Winter wheat ('Goodstreak') was drilled in 7.5-inch rows at a rate of 70 lbs per acre on October 2, 2012. Soil at the site was Mitchell silt loam (43% sand, 39% silt, 18% clay, 1.7% organic matter, pH 7.8, CEC 18.4). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed evaluated was downy brome. Weed control was visually evaluated on May 24 and June 12 (Table 2). Visual crop injury evaluations were made on May 29 and June 12 (Table 2).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	9/20/12	11/6/12	4/3/12
Time of Day:	11:00 AM	11:00 AM	11:00 AM
Application Method:	SPRAY	SPRAY	SPRAY
Application Timing:	PREPLANT	POST	SPRING
Application Placement:	BROADCAST-SOIL	FOLIAR	FOLIAR
Air Temperature, Unit:	71 F	57 F	44 F
% Relative Humidity:	21	53	60
Wind Velocity, Unit:	7.5 MPH	5.4 MPH	2.0 MPH
Wind Direction:	N	N	NE
Dew Presence (Y/N):	N	N	N
Soil Temperature, Unit:	63 F	46 F	44 F
Soil Moisture:	DRY	DRY	DRY
% Cloud Cover:	40	5	0

Table 2. Weed control and crop injury response to herbicides for PRE burndown and downy brome control in winter wheat.

Treatment	Rate		Timing	BROTE control		Crop injury	
				May 24	Jun 12	May 29	Jun 12
				----- % -----			
Roundup WeatherMax ¹	0.56	lb ae/a	PRE	15	17.5	0	0
Roundup WeatherMax ¹ Olympus ²	0.56 0.0263	lb ae/a lb ai/a	PRE FALL	67.5	71.8	1.5	0
Roundup WeatherMax ¹ Olympus ²	0.56 0.0394	lb ae/a lb ai/a	PRE FALL	65	64.3	4.8	0.5
Roundup WeatherMax ¹ Olympus	0.56 0.0394	lb ae/a lb ai/a	PRE	93.3	93.8	8.5	3
Roundup WeatherMax ¹ Olympus	0.56 0.0263	lb ae/a lb ai/a	PRE	88	90.5	3.8	0.5
Roundup WeatherMax ¹ Olympus ² Olympus ²	0.56 0.0263 0.0263	lb ae/a lb ai/a lb ai/a	PRE SPRING	90	91.8	8	0.5
Roundup WeatherMax ¹ Olympus ²	0.56 0.0263	lb ae/a lb ai/a	PRE SPRING	66.3	77.5	3.3	0.5
Roundup WeatherMax ¹ Olympus ²	0.56 0.0394	lb ae/a lb ai/a	PRE SPRING	81.3	85	6.5	1.3
Roundup WeatherMax ¹ Olympus Rimfire Max MSO	0.56 0.0263 0.0393 1.5	lb ae/a lb ai/a lb ai/a pt/a	PRE SPRING	93.3	94.5	11	0.8
Roundup WeatherMax ¹ Osprey ² Olympus UAN (28-0-0)	0.56 0.04 0.0263 4	lb ae/a lb ai/a lb ai/a pt/a	PRE SPRING PRE	93.8	93.8	10.5	2.5
Roundup WeatherMax ¹ Powerflex HL	0.56 0.0163	lb ae/a lb ai/a	PRE	90.8	89.3	11.3	1.3
Roundup WeatherMax ¹ Powerflex ^{1,2}	0.56 0.0164	lb ae/a lb ai/a	PRE FALL	82.1	68.2	4.2	0
Roundup WeatherMax ¹ Powerflex ^{1,2}	0.56 0.0164	lb ae/a lb ai/a	PRE SPRING	67.5	56.3	3.3	0.5

Table 2. Weed control and crop injury response to herbicides for PRE burndown and downy brome control in winter wheat.

Treatment	Rate		Timing	BROTE control		Crop injury	
				May 24	Jun 12	May 29	Jun 12
Roundup WeatherMax ¹	0.56	lb ae/a	PRE	89.5	86.3	6.3	1.3
Olympus ²	0.0263	lb ai/a	FALL				
Olympus ²	0.0263	lb ai/a	SPRING				
Untreated Check				0	0	0	0
LSD (P=.05)				18	19	5	2
CV (%)				16.1	17.4	56.9	136.7
Treatment Prob(F)				0.0001	0.0001	0.0001	0.0306

¹ Treatment included ammonium sulfate at 17 lb/100gal.

² Treatment included non-ionic surfactant at 0.25% v/v.

Finesse for weed control in winter wheat (2013_WW04)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2013 to evaluate Finesse for weed control in winter wheat. Soils at the site were Haverson & McCook loams (49% sand, 33% silt, 18% clay, 1.4% organic matter, pH 8.0, CEC 18.1). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weeds evaluated were blue mustard, pinnate tansy mustard, and downy brome. Weed control was visually evaluated on June 12 (Table 2).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/24/13
Time of Day:	04:40 PM
Application Method:	SPRAY
Application Timing:	POSPOS
Application Placement:	FOLIAR
Air Temperature, Unit:	83 F
% Relative Humidity:	27
Wind Velocity, Unit:	1.8 MPH
Wind Direction:	ESE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	77 F
Soil Moisture:	DRY
% Cloud Cover:	75

Table 2. Weed control with herbicide treatments.

Treatment	Rate	Unit	Timing	Weed control		
				COBTE	DESPI	BROTE
				----- % -----		
Telar XP ^{1,2}	0.167	oz/a	POSPOS	26	39	28
Metsulfuron	0.0417	oz/a	POSPOS			
Telar XP ^{1,2}	0.167	oz/a	POSPOS	76	73	65
Metsulfuron	0.0417	oz/a	POSPOS			
Thifensulfuron	0.166	oz/a	POSPOS			
Tribenuron	0.026	oz/a	POSPOS			
Telar XP ^{1,2}	0.167	oz/a	POSPOS	88	86	86
Metsulfuron	0.0417	oz/a	POSPOS			
Thifensulfuron	0.166	oz/a	POSPOS			
Tribenuron	0.026	oz/a	POSPOS			
2,4-D Ester	8	fl oz/a	POSPOS			
Telar XP ^{1,2}	0.167	oz/a	POSPOS	88	92	76
Metsulfuron	0.0417	oz/a	POSPOS			
Thifensulfuron	0.166	oz/a	POSPOS			
Tribenuron	0.026	oz/a	POSPOS			
MCPA-Ester	16	fl oz/a	POSPOS			
Telar XP ^{1,2}	0.167	oz/a	POSPOS	86	94	66
Metsulfuron	0.0417	oz/a	POSPOS			
Thifensulfuron	0.166	oz/a	POSPOS			
Tribenuron	0.026	oz/a	POSPOS			
Clarity	4	fl oz/a	POSPOS			
Telar XP ^{1,2}	0.167	oz/a	POSPOS	83	81	69
Metsulfuron	0.0417	oz/a	POSPOS			
Thifensulfuron	0.166	oz/a	POSPOS			
Tribenuron	0.026	oz/a	POSPOS			
Metribuzin	4	oz/a	POSPOS			
Telar XP ^{1,2}	0.167	oz/a	POSPOS	84	76	69
Metsulfuron	0.0417	oz/a	POSPOS			
Thifensulfuron	0.166	oz/a	POSPOS			
Tribenuron	0.026	oz/a	POSPOS			
Starane Ultra	6	fl oz/a	POSPOS			
Telar XP ^{1,2}	0.333	oz/a	POSPOS	80	68	63
Metsulfuron	0.083	oz/a	POSPOS			
Telar XP ^{1,2}	0.333	oz/a	POSPOS	86	68	58
Metsulfuron	0.083	oz/a	POSPOS			
Thifensulfuron	0.326	oz/a	POSPOS			
Tribenuron	0.05	oz/a	POSPOS			
Telar XP ^{1,2}	0.333	oz/a	POSPOS	88	84	60
Metsulfuron	0.083	oz/a	POSPOS			
Thifensulfuron	0.326	oz/a	POSPOS			
Tribenuron	0.05	oz/a	POSPOS			
2,4-D Ester	8	fl oz/a	POSPOS			

Table 2. Weed control with herbicide treatments.

Treatment	Rate	Unit	Timing	Weed control		
				COBTE	DESPI	BROTE
				----- % -----		
Telar XP ^{1,2}	0.333	oz/a	POSPOS	71	90	48
Metsulfuron	0.083	oz/a	POSPOS			
Thifensulfuron	0.326	oz/a	POSPOS			
Tribenuron	0.05	oz/a	POSPOS			
MCPA-Ester	16	fl oz/a	POSPOS			
Telar XP ^{1,2}	0.333	oz/a	POSPOS	83	81	65
Metsulfuron	0.083	oz/a	POSPOS			
Thifensulfuron	0.326	oz/a	POSPOS			
Tribenuron	0.05	oz/a	POSPOS			
Clarity	4	fl oz/a	POSPOS			
Telar XP ^{1,2}	0.333	oz/a	POSPOS	79	84	73
Metsulfuron	0.083	oz/a	POSPOS			
Thifensulfuron	0.326	oz/a	POSPOS			
Tribenuron	0.05	oz/a	POSPOS			
Metribuzin	4	oz/a	POSPOS			
Telar XP ^{1,2}	0.333	oz/a	POSPOS	62	89	55
Metsulfuron	0.083	oz/a	POSPOS			
Thifensulfuron	0.326	oz/a	POSPOS			
Tribenuron	0.05	oz/a	POSPOS			
Starane Ultra	6	fl oz/a	POSPOS			
Untreated Check				0	0	0
LSD (P=.05)				25	29	30
CV (%)				23.1	25.6	32.9
Treatment Prob(F)				0.0016	0.05	0.078

¹ Treatment included non-ionic surfactant at 0.25% v/v.

² Treatment included ammonium sulfate at 9.4 lb/100 gal.

Huskie Complete + Olympus efficacy on downy brome in winter wheat (2013_WW05)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming, in 2013 to evaluate Huskie Complete + Olympus efficacy on downy brome in winter wheat. Winter wheat ('Goodstreak') was drilled in 7.5-inch rows at a rate of 70 lbs per acre on October 2, 2012. Soil at the site was Mitchell silt loam (43% sand, 39% silt, 18% clay, 1.7% organic matter, pH 7.8, CEC 18.4). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed evaluated was downy brome. Weed control was visually evaluated on June 3 (Table 2). Visual crop injury evaluations were made on June 3 and wheat yields were determined from a 5x23 ft area harvested on July 22 (Table 2).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	5/6/13
Time of Day:	05:30 PM
Application Method:	SPRAY
Application Timing:	POSPOS
Application Placement:	FOLIAR
Air Temperature, Unit:	70 F
% Relative Humidity:	24
Wind Velocity, Unit:	9.4 MPH
Wind Direction:	N
Dew Presence (Y/N):	N
Soil Temperature, Unit:	62 F
Soil Moisture:	DRY
% Cloud Cover:	0

Table 2. Weed and crop response to Huskie Complete + Olympus efficacy on downy brome in winter wheat.

Treatment	Rate	Unit	Timing	BROTE	Crop	Wheat	Test	1000 seed
				control	injury			
				Jun 03	Jun 03			
				----- % -----		bu/A	lbs/bu	g
Untreated check				0	0	12.7	59.3	23.4
Huskie Complete ¹	13.69	fl oz/a	POSPOS	21	1	11.0	60.7	23.7
Huskie Complete ¹	13.69	fl oz/a	POSPOS	6	5	12.5	60.6	23.9
Olympus	0.2	oz/a	POSPOS					
Rimfire Max	3	oz/a	POSPOS	11	3	11.3	61.2	23.2
Huskie	11	fl oz/a	POSPOS					
MSO	1.3	pt/a	POSPOS					
Rimfire Max	3	oz/a	POSPOS	13	5	9.7	60.0	23.5
Olympus	0.2	oz/a	POSPOS					
Huskie	11	fl oz/a	POSPOS					
MSO	1.3	pt/a	POSPOS					
Varro ¹	6.85	fl oz/a	POSPOS	15	5	12.3	59.6	23.5
Huskie	11	fl oz/a	POSPOS					
Varro ¹	6.85	fl oz/a	POSPOS	23	4	9.8	60.6	23.9
Huskie	11	fl oz/a	POSPOS					
Olympus	0.2	oz/a	POSPOS					
Powerflex ¹	4.5	oz/a	POSPOS	11	3	10.7	60.1	23.6
NIS	0.5	% v/v	POSPOS					
LSD (P=.05)				26	5	4.5	2.9	1.2
CV (%)				120.3	103.2	27.4	3.2	3.3
Treatment Prob(F)				0.8305	0.6687	0.7894	0.9369	0.8845

¹ Treatment included ammonium sulfate at 0.5 lb/A.

Efficacy of various BCS products applied to fallow (2013_FA01)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate efficacy of various BCS products applied to fallow. Soil at the site was Mitchell silt loam (50% sand, 30% silt, 20% clay, 2.1% organic matter, pH 8.2, CEC 17.26). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed control of kochia and Russian thistle was visually evaluated on June 27, and August 5.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	03/20/13	5/24/13
Time of Day:	11:45 AM	02:50 PM
Application Method:	SPRAY	SPRAY
Application Timing:	PREPRE	POSPOS
Application Placement:	BROSOI	FOLIAR
Air Temperature, Unit:	52 F	82 F
% Relative Humidity:	45	29
Wind Velocity, Unit:	5.2 MPH	3.8 MPH
Wind Direction:	SE	NW
Dew Presence (Y/N):	N	N
Soil Temperature, Unit:	36 F	69 F
Soil Moisture:	DRY	DRY
% Cloud Cover:	50	80

Table 2. Weed control of various BCS products applied to fallow.

Treatment ¹	Rate	Timing	----- Jun 27 -----		----- Aug 5 -----	
			KCHSC	SASKR	KCHSC	SASKR
			----- % -----			
Untreated Check			0	0	9	19
Corvus ^{1,2}	3 oz/a	PREPRE	88	93	64	78
Sencor	8 oz/a	PREPRE				
Roundup PowerMax	22 oz/a	PREPRE				
Corvus ^{1,2}	3 oz/a	PREPRE	96	94	93	88
Atrazine	16 oz/a	PREPRE				
Roundup PowerMax	22 oz/a	PREPRE				
Corvus ^{1,2}	4 oz/a	PREPRE	83	89	55	63
Atrazine	1 oz/a	PREPRE				
Roundup PowerMax	22 oz/a	PREPRE				
Corvus ^{1,2}	3 oz/a	PREPRE	88	91	64	63
Sencor	8 oz/a	PREPRE				
Banvel	16 oz/a	PREPRE				
Roundup PowerMax	22 oz/a	PREPRE				
Corvus ^{1,2}	4 oz/a	PREPRE	92	91	70	65
Sencor	8 oz/a	PREPRE				
Roundup PowerMax	22 oz/a	PREPRE				
Corvus ^{1,2}	4 oz/a	PREPRE	90	89	75	71
Sencor	8 oz/a	PREPRE				
Banvel	16 oz/a	PREPRE				
Roundup PowerMax	22 oz/a	PREPRE				
Laudis ^{2,3}	3 oz/a	POSPOS	97	96	98	94
Atrazine	16 oz/a	POSPOS				
Laudis ^{2,3}	3 oz/a	POSPOS	98	98	99	97
Atrazine	16 oz/a	POSPOS				
Banvel	8 oz/a	POSPOS				
Huskie ^{2,4}	16 oz/a	POSPOS	98	98	98	98
Atrazine	16 oz/a	POSPOS				
Banvel	8 oz/a	POSPOS				
Laudis ^{2,3}	3 oz/a	POSPOS	96	97	90	89
Starane NXT	14 oz/a	POSPOS				
Huskie ^{2,4}	16 oz/a	POSPOS	98	98	99	98
Atrazine	16 oz/a	POSPOS				
Huskie ^{2,4}	16 oz/a	POSPOS	98	98	98	99
Sencor	8 oz/a	POSPOS				

Table 2. Weed control of various BCS products applied to fallow.

Treatment ¹	Rate	Timing	----- Jun 27 -----		----- Aug 5 -----	
			KCHSC	SASKR	KCHSC	SASKR
Huskie ^{2,4}	16 oz/a	POSPOS	95	96	90	88
Starane Ultra	4 oz/a	POSPOS				
LSD (P=.05)			5	4	14	12
CV (%)			3.8	3.2	11.6	9.9
Treatment Prob(F)			0.0001	0.0001	0.0001	0.0001

Treatments included : ¹ Destiny HC at 1% v/v.; ² Ammonium sulfate at 17 lbs/100 gal.;

³ MSO at 1% v/v.; ⁴ NIS at 0.3% v/v.

Authority & Spartan Charge combinations for kochia and broadleaf weed control in fallow (2013_FA02)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate Authority & Spartan Charge combinations for kochia and broadleaf weed control in fallow. Soil at the site was Mitchell silt loam (55% sand, 22% silt, 23% clay, 2.1% organic matter, pH 8.2, CEC 17.26). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed control of kochia and Russian thistle was visually evaluated on June 27, and August 5.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	03/20/13
Time of Day:	12:15 PM
Application Method:	SPRAY
Application Timing:	PREPLANT
Application Placement:	BROSOI
Air Temperature, Unit:	52 F
% Relative Humidity:	45
Wind Velocity, Unit:	5.2 MPH
Wind Direction:	SE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	36 F
Soil Moisture:	DRY
% Cloud Cover:	50

Table 2. Weed control of Authority & Spartan Charge combinations in fallow.

Treatment ¹	Rate		----- Jun 27 -----		----- Aug 5 -----	
			KCHSC	SASKR	KCHSC	SASKR
			----- % -----			
Authority MTZ	8	oz/a	60	49	48	52
2,4-D Ester	1	pt/a				
Banvel	8	fl oz/a				
Authority MTZ	10	oz/a	74	66	56	54
2,4-D Ester	1	pt/a				
Banvel	8	fl oz/a				
Authority MTZ	12	oz/a	70	59	61	56
2,4-D Ester	1	pt/a				
Banvel	8	fl oz/a				
Authority MTZ	10	oz/a	95	96	96	87
2,4-D Ester	1	qt/a				
Banvel	8	fl oz/a				
AAtrex	1	pt/a				
Authority Assist	6	fl oz/a	73	64	61	55
2,4-D Ester	1	pt/a				
Banvel	8	fl oz/a				
Spartan Charge	6	fl oz/a	60	46	60	44
2,4-D Ester	1	pt/a				
Banvel	8	fl oz/a				
Anthem	8	fl oz/a	97	92	93	76
AAtrex	1	pt/a				
2,4-D Ester	1	pt/a				
Banvel	8	fl oz/a				
Aim	0.75	fl oz/a	33	36	49	58
2,4-D Ester	1	pt/a				
Banvel	8	fl oz/a				
Untreated Check			0	0	0	0
LSD (P=.05)			17	15	27	19
CV (%)			16.4	16.6	27.9	21.6
Treatment Prob(F)			0.0001	0.0001	0.01	0

¹ All herbicide treatments included crop oil concentrate at 1% v/v.

Winfield adjuvants for glyphosate efficacy in fallow (2013_FA03)

Materials & Methods

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate Winfield adjuvants for glyphosate efficacy in fallow. Soil at the site was Mitchell silt loam (64% sand, 22% silt, 14% clay, 2.4% organic matter, pH 7.9, EC 0.800). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed control of kochia and Russian thistle was visually evaluated on June 27, and August 5 (Table 2).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/17/13
Time of Day:	01:00 PM
Application Method:	SPRAY
Application Timing:	POST
Application Placement:	FOLIAR
Air Temperature, Unit:	79 F
% Relative Humidity:	33
Wind Velocity, Unit:	7.3 MPH
Wind Direction:	SW
Dew Presence (Y/N):	N
Soil Temperature, Unit:	73 F
Soil Moisture:	DRY
% Cloud Cover:	10

Table 2. Weed control of Winfield adjuvants for glyphosate efficacy in fallow.

Treatment	Rate	----- Jun 27 -----		----- Jul 03 -----		----- Jul 18 -----	
		KCHSC	SASKR	KCHSC	SASKR	KCHSC	SASKR
		----- % -----					
Roundup PowerMax	0.75 lb ae/a	41	14	58	40	75	65
Roundup PowerMax N Pak AMS Liquid	0.75 lb ae/a 2.5 % v/v	30	10	45	38	65	71
Roundup PowerMax N Pak AMS Liquid	0.75 lb ae/a 5 % v/v	37	12	59	51	76	81
Roundup PowerMax Class Act NG	0.75 lb ae/a 2.5 % v/v	47	17	76	65	78	78
Roundup PowerMax Class Act NG	0.75 lb ae/a 1.25 % v/v	38	13	56	55	69	79
Roundup PowerMax AG 08034	0.75 lb ae/a 2 % v/v	48	18	71	68	82	86
Roundup PowerMax AG 08034	0.75 lb ae/a 1 % v/v	39	14	60	56	73	69
Roundup PowerMax AG 07043	0.75 lb ae/a 1 % v/v	33	9	44	25	59	59
Roundup PowerMax AG 11011	0.75 lb ae/a 1 % v/v	41	15	56	50	76	73
Roundup PowerMax AG 11011	0.75 lb ae/a 1.25 % v/v	51	28	73	79	85	91
Roundup PowerMax AG 13061	0.75 lb ae/a 0.5 % v/v	53	23	73	70	83	74
Roundup PowerMax AG 13062	0.75 lb ae/a 0.5 % v/v	51	24	76	86	82	86
Roundup PowerMax AG 13063	0.75 lb ae/a 0.5 % v/v	51	20	70	60	76	70
Nontreated check		0	0	0	0	0	0
LSD (P=.05)		11	6	14	21	11	16
CV (%)		18.7	24.9	15.3	25.3	10.2	14.7
Treatment Prob(F)		0.0014	0.0001	0.0001	0.0001	0.0009	0.0114

Broadleaf weed control in fallow with 2,4-D and small grain herbicides (2013_FA04)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate broadleaf weed control in fallow with 2,4-D and small grain herbicides. Soil at the site was Mitchell silt loam (69% sand, 17% silt, 4% clay, 2.4% organic matter, pH 8.1). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed control of kochia and Russian thistle were visually evaluated on June 27 and July 3 and 18. Weed control for each treatment is shown in Table 2.

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/17/13
Time of Day:	12:30 PM
Application Method:	SPRAY
Application Timing:	POST
Application Placement:	FOLIAR
Air Temperature, Unit:	75 F
% Relative Humidity:	35
Wind Velocity, Unit:	6.4 MPH
Wind Direction:	S
Dew Presence (Y/N):	N
Soil Temperature, Unit:	73 F
Soil Moisture:	DRY
% Cloud Cover:	10

Table 2. Broadleaf weed control in fallow with 2,4-D and small grain herbicides.

Treatment	Rate	Jun 27		Jul 03		Jul 18	
		KCHSC	SASKR	KCHSC	SASKR	KCHSC	SASKR
		----- % -----					
AGH 02007	0.67 pt/a	30	51	53	65	25	45
2,4-D LV6	0.67 pt/a	19	36	40	59	16	40
2,4-D amine	1 pt/a	6	15	13	14	10	11
AGH 09008	1 pt/a	9	24	34	48	10	20
AGH 09008 Preference Interlock	1 pt/a 0.25 % v/v 4 fl oz/a	9	26	39	56	13	29
AGH 09008 AG 8050	1 pt/a 6.4 fl oz/a	10	24	46	55	23	45
Nontreated check		1	0	11	15	0	0
AGH 09035	1.5 pt/a	26	26	43	45	20	10
AGH 09035 Interlock	1.5 pt/a 4 fl oz/a	41	31	60	50	43	25
AGH 09035 AG 8050	1.5 pt/a 6.4 fl oz/a	35	33	59	39	34	25
AGH 08032	1.5 pt/a	70	76	88	92	87	65
AGH 08032 Interlock	1.5 pt/a 4 fl oz/a	50	51	74	58	51	34
AGH 08032 AG 8050	1.5 pt/a 6.4 fl oz/a	69	74	88	95	83	66
LSD (P=.05)		13	19	16	22	18	25
CV (%)		28.4	34.5	21.6	26.9	36.9	50.5
Treatment Prob(F)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0004

AGH 11021 plus glyphosate or oil adjuvants for weed control in fallow (2013_FA05)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate AGH 11021 plus glyphosate or oil adjuvants for weed control in fallow. Soil at the site was Mitchell silt loam (64% sand, 22% silt, 14% clay, 2.4% organic matter, pH 7.9). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed control of kochia and Russian thistle were visually evaluated on June 27 and July 3 and 18 (Table 2).

Table 1. Environmental conditions at the time of herbicide application.

Application Date:	06/17/13
Time of Day:	01:35 PM
Application Method:	SPRAY
Application Timing:	POST
Application Placement:	FOLIAR
Air Temperature, Unit:	77 F
% Relative Humidity:	34
Wind Velocity, Unit:	6.3 MPH
Wind Direction:	S
Dew Presence (Y/N):	N
Soil Temperature, Unit:	73 F
Soil Moisture:	DRY
% Cloud Cover:	15

Table 2. AGH 11021 plus glyphosate or oil adjuvants for weed control in fallow.

Treatment	Rate	Jun 27		Jul 03		Jul 18	
		KCHSC	SASKR	KCHSC	SASKR	KCHSC	SASKR
AGH 11021 Roundup PowerMax	1.5 pt/a 22 fl oz/a	26	11	45	40	73	75
AGH 11021 Roundup PowerMax N Pak AMS Liquid	1.5 pt/a 22 fl oz/a 2.5 % v/v	49	29	68	78	84	88
AGH 11021 Roundup PowerMax Class Act NG	1.5 pt/a 22 fl oz/a 2.5 % v/v	30	14	60	53	82	83
AGH 11021 Roundup PowerMax Class Act Flex Interlock	1.5 pt/a 22 fl oz/a 1 % v/v 4 fl oz/a	26	16	51	53	78	71
AGH 11021 Roundup PowerMax AG 07043	1.5 pt/a 22 fl oz/a 1 % v/v	18	11	48	40	65	56
AGH 11021 Roundup PowerMax AG 11011	1.5 pt/a 22 fl oz/a 1 % v/v	33	20	58	58	73	73
Nontreated check		0	0	0	0	0	0
AGH 11021	2 pt/a	14	6	34	35	38	41
AGH 11021 Prime Oil	2 pt/a 1 % v/v	19	9	38	48	48	49
AGH 11021 Superb HC	2 pt/a 1 pt/a	18	11	35	38	40	49
AGH 11021 Superb HC Interlock	2 pt/a 1 pt/a 4 fl oz/a	20	14	40	40	52	49
AGH 11021 Superb HC AG 8050	2 pt/a 1 pt/a 6.4 fl oz/a	13	13	33	34	36	40
AGH 11021 MSO	2 pt/a 1 % v/v	25	16	50	49	49	48
AGH 11021 Destiny HC	2 pt/a 1 pt/a	23	10	45	39	44	46

Table 2. AGH 11021 plus glyphosate or oil adjuvants for weed control in fallow.

Treatment	Rate	Jun 27		Jul 03		Jul 18	
		KCHSC	SASKR	KCHSC	SASKR	KCHSC	SASKR
AGH 11021	2 pt/a	20	10	35	33	54	54
AG 03015	0.5 pt/a						
Interlock	4 fl oz/a						
LSD (P=.05)		14	10	14	20	18	21
CV (%)		40.7	51.5	21.5	31.5	21.5	25.1
Treatment Prob(F)		0	0.01	0.0001	0	0.0001	0.0001

Kochia and Russian thistle control with Linex in fallow prior to winter wheat (2013_FA06)

MATERIALS AND METHODS

A field study was conducted at the Sustainable Agriculture Research and Extension Center near Lingle, Wyoming in 2013 to evaluate kochia and Russian thistle control with Linex in fallow prior to winter wheat. Soil at the site was Mitchell silt loam (69% sand, 17% silt, 14% clay, 2.4% organic matter, pH 8.1). Herbicide treatments were applied with a CO₂-pressurized knapsack sprayer delivering 16.8 gallons of total volume per acre at 30 psi with TeeJet 11002DG nozzles. Application dates and environmental conditions are provided in Table 1. Plots were 10 feet wide by 30 feet long and arranged in a randomized complete block design with 4 replications. Weed control of kochia and Russian thistle were visually evaluated on June 27 and July 3 and 18, and August 5 (Table 2).

Table 1. Environmental conditions at the time of herbicide application.

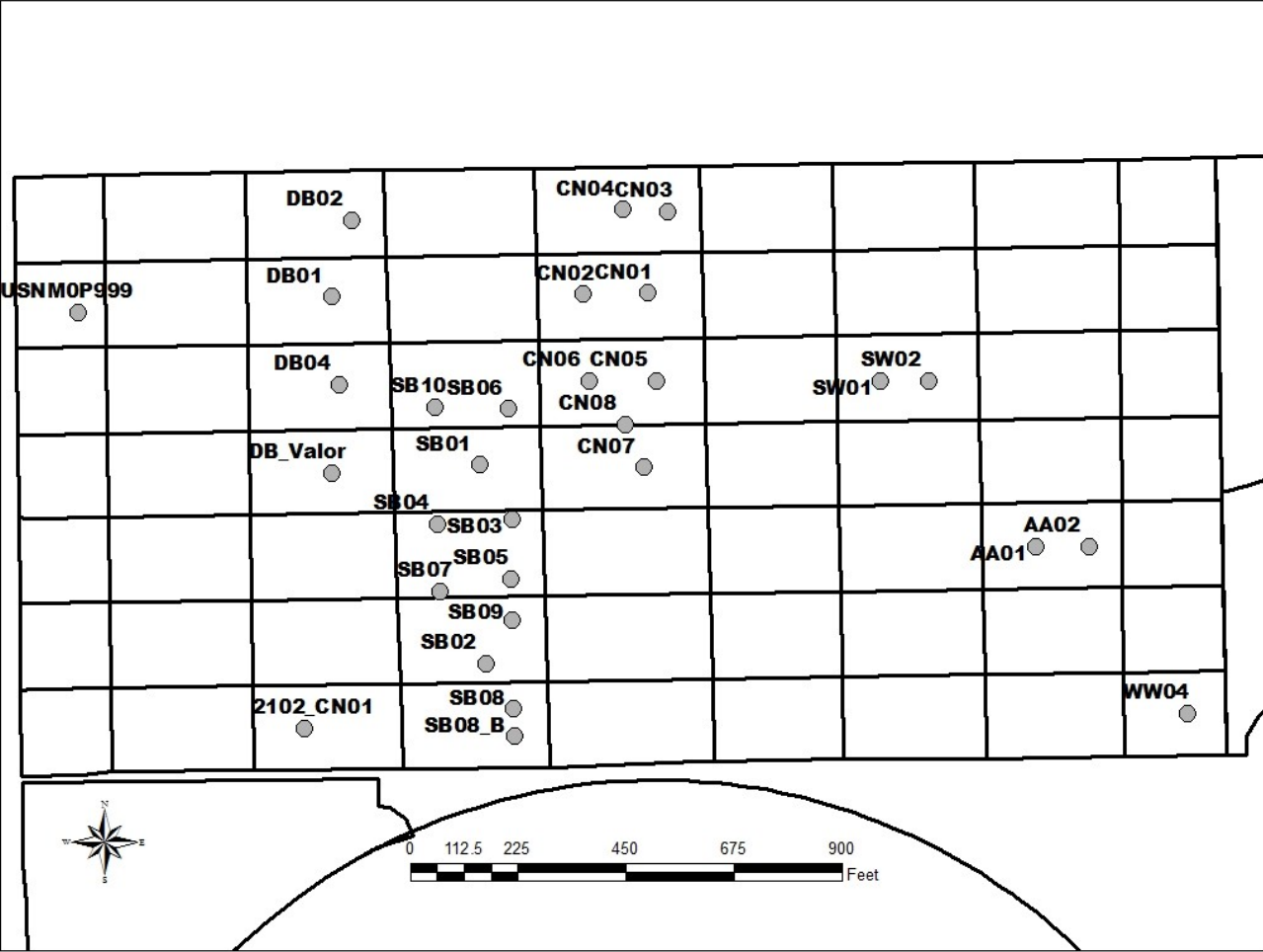
Application Date:	06/21/13
Time of Day:	11:42 AM
Application Method:	SPRAY
Application Timing:	POST
Application Placement:	FOLIAR
Air Temperature, Unit:	83 F
% Relative Humidity:	64
Wind Velocity, Unit:	1.6 MPH
Wind Direction:	SE
Dew Presence (Y/N):	N
Soil Temperature, Unit:	71 F
Soil Moisture:	DRY
% Cloud Cover:	75

Table 2. Kochia and Russian thistle control with Linex in fallow prior to winter wheat.

Treatment	Rate fl oz/a	---- Jun 27----		---- Jul 03 ----		---- Jul 18 ----		---- Aug 05 ----	
		KCHSC	SASKR	KCHSC	SASKR	KCHSC	SASKR	KCHSC	SASKR
		----- % -----							
Gramoxone SL ¹	32	91	92	90	96	81	89	46	58
Linex 4L	8								
Gramoxone SL ¹	40	93	95	94	97	87	92	66	83
Linex 4L	8								
Gramoxone SL ¹	32	91	95	89	96	82	87	55	64
Linex 4L	16								
Gramoxone SL ¹	40	97	97	97	99	92	95	83	86
Linex 4L	16								
Gramoxone SL ¹	32	89	92	97	97	89	91	74	51
Linex 4L	24								
Gramoxone SL ¹	40	94	96	98	97	94	94	89	83
Linex 4L	24								
Gramoxone SL ¹	32	90	94	89	97	60	78	28	39
Gramoxone SL ¹	40	95	97	94	98	83	93	66	76
Gramoxone SL ¹	48	93	96	98	99	87	93	81	84
Linex 4L	24								
Nontreated		0	0	0	0	0	0	0	0
Gramoxone SL ¹	40	94	96	95	99	87	95	80	85
Linex 4L	16								
Sharpen	2								
Gramoxone SL ¹	40	92	94	98	99	91	93	85	85
Linex 4L	16								
Buctril	16								
Gramoxone SL ¹	40	92	93	99	98	97	93	93	92
Linex 4L	16								
Sencor 75DF	4								
Gramoxone SL ¹	40	93	94	99	99	95	94	92	88
Linex 4L	16								
Clarity	4								
Gramoxone SL ²	40	92	94	96	99	88	89	74	70
Linex 4L	16								
LSD (P=.05)		4	4	5	3	9	12	21	21
CV (%)		3.1	2.6	3.7	2.1	7.4	8.9	20.4	20.2
Treatment Prob(F)		0.03	0.07	0	0.25	0.0001	0.28	0.0001	0.0001

¹ Treatment included non-ionic surfactant at 0.25% v/v.² Treatment included methylated seed oil at 1% v/v.

APPENDIX 1: 2013 Irrigated Trial Locations, SAREC - Lingle, Wyoming.



APPENDIX 2: 2013 Dryland Trial Locations, SAREC - Lingle, Wyoming.

