Yellow section: **Alfalfa, Canola, Chickling Pea, Dry Bean, Dry Pea, Fallow, Flax, Lentil, Onion, Potato, Safflower, Sunflower.**

Dandelions control with preplant herbicide applications, Kindred, ND, 2010. (Stachler) Research plots 11 feet wide and 40 feet long were established in a cooperator's field without a crop planted. Treatments were applied 4:00 pm May 21 when the air temperature was 76F, relative humidity was 39%, six inch soil temperature was 60F, wind velocity was 12 mph, cloud cover was 10% and soil moisture was good. Two sizes of dandelion were present, those having 3-14 leaves (majority had 6 leaves) with 2 to 16 inches in diameter (majority 9 inches), and a density of 18 plants per M^2. The other size of dandelion had 7-70 flowers (majority had 35 flowers) with 18 to 24 inches in diameter (majority 21 inches), and had a density of 5 plants per M^2. Common lambsquarters was 2-3 inches tall (average height was 2.33 inches) with a density of 3 plants per M^2. Biennial wormwood was 1-7 inches tall (average height was 3 inches) with a density of 1 plant per M^2. All treatments were applied in 17 gpa water at 40 psi through XR8002 nozzles to the center 6.67 feet of each plot. Common dandelion, common lambsquarters and biennial wormwood control were evaluated June 5 and June 30. All evaluations are a visual estimate of percent weed control in the treated plot compared to the adjacent untreated strips and plots.

Summary: Express mixed with Roundup PowerMAX and/or Latigo (2,4-D formulation) most effectively controlled dandelion of the replicated treatments on June 30th. Glyphosate and 2,4-D formulations ineffectively controlled dandelion at this location. Of the singe-strip treatments, Express plus Ignite controlled the most dandelion. Dandelion is difficult to control. The use of Express in pre-plant applications should improve dandelion control compared to glyphosate and/or 2,4-D.

Lambsquarters and biennial wormwood were only effectively controlled on June 5th with treatments containing glyphosate at 1.5 lb ae/A or greater or Express.

Experiment continued on next page.

Table. Dandelions and preplant applications, Kindred, ND, 2010. (Stachler)

Treatment[1]	Rate	June 5			June 30		
		Dali Cntl	Colq Cntl	Biww Cntl	Dali Cntl	Colq Cntl	Biww Cntl
	product/A	%					
Weedone LV4	8 oz	19	50	43	13	76	38
Weedone LV4	12 oz	27	53	53	24	79	53
Weedone LV4	16 oz	26	54	57	34	94	67
Outlaw	24 oz	31	60	65	40	91	83
Latigo	18 oz	22	61	61	27	95	59
Latigo	24 oz	27	63	64	40	95	80
RUPowerMAX+AMS	0.375 lb ae/A + 2.5% v/v	29	44	36	13	36	25
RUPowerMAX+AMS	0.75 lb ae/A + 2.5% v/v	36	56	67	36	44	60
RUPowerMAX+AMS	1.5 lb ae/A + 2.5% v/v	61	95	98	62	79	74
RUPowerMAX+AMS	2.25 lb ae/A + 2.5% v/v	67	99	98	68	74	83
RUPowerMAX+Outlaw+AMS	0.375 lb ae/A + 16 oz + 2.5% v/v	30	65	67	36	85	75
RUPowerMAX+Latigo+AMS	0.375 lb ae/A + 12 oz + 2.5% v/v	31	63	64	40	84	69
RUPowerMAX+Latigo+AMS	0.375 lb ae/A + 16 oz + 2.5% v/v	33	63	70	48	92	86
RUPowerMAX+Latigo+AMS	0.75 lb ae/A + 12 oz + 2.5% v/v	44	77	76	48	95	81
RUPowerMAX+Weedone LV4+AMS	0.75 lb ae/A + 16 oz + 2.5% v/v	33	70	73	45	92	86
RUPowerMAX+Latigo+AMS	1.5 lb ae/A + 12 oz + 2.5% v/v	40	90	82	60	87	82
Express SG +RUPowerMAX+Premier 90+AMS	0.5 oz + 0.75 lb ae/A + 0.25% v/v + 2.5% v/v	46	95	93	90	87	87
Express SG +RUPowerMAX+Latigo+AMS	0.5 oz + 0.75 lb ae/A + 12 oz + 2.5% v/v	46	92	88	86	92	83
LSD (5%)		9	10	10	10	19	12
Extra treatments not replicated:							
Gramoxone Inteon+Express SG + Dimetric+Soy-Stik	3 pt + 0.5 oz + 5.33 oz + 1.25 pt	68	98	95	60	70	75
Ignite 280+AMS	29 oz + 0.89 gallon	75	97	97	35	35	60
Express SG+Ignite 280+Soy-Stik+AMS	0.5 oz + 29 oz + 1.25 pt + 0.89 gal	80	98	90	88	88	68
RUPowerMAX+Stinger+AMS	0.75 lb ae/A + 3 oz + 2.5% v/v	40	70	75	50	60	78
UpBeet+Destiny HC+RUPowerMAX + AMS	0.5 oz ai/A + 1% v/v + 0.75 lb ae/A + 2.5% v/v	50	70	88	55	75	65

[1]AMS=N-Pak AMS (liquid ammonium sulfate from Winfield Solutions), RUPowerMAX=Roundup PowerMAX, Premier 90=non-ionic surfactant from West Central, Soy-Stik=methylated seed oil from West Central, Destiny HC=high surfactant methylated seed oil from Winfield Solutions.

Weed control with SU Ratios. Howatt, Roach, and Harrington. 'Faller' hard red spring wheat was seeded April 28. Treatments were applied to 3 to 4 leaf wheat, 6 to 12 inch wild buckwheat and common lambsquarters, 1 to 2.5 ft wild mustard, 3 to 10 inch redroot pigweed, 2 to 4 inch common mallow and 3 to 6 inch common ragweed on June 14 with 66°F, 60% relative humidity, 30% cloud cover, 5 mph wind at 360° and moist soil at 60°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10- by 30-ft plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	Volunteer wheat 6/22	Wild mustard 6/22	Wild buckwheat 6/22	Common lambsquarters 6/22	Venice mallow 6/22	Redroot pigweed 6/22	Volunteer wheat 6/29	Wild mustard 6/29	Wild buckwheat 6/29	Common lambsquarters 6/29
	oz ai/A	%	%	%	%	%	%	%	%	%	%
Glyphosate+NIS+AMS	4.5+0.25%+24	90	94	75	85	72	91	99	99	85	97
Glyphosate+NIS+AMS	9+0.25%+24	95	92	77	86	74	90	99	99	97	98
Glufosinate+NIS+AMS	6.4+0.5%+48	84	95	86	92	80	91	91	98	81	89
Glufosinate+NIS+AMS	9.6+0.5%+48	86	95	89	91	85	91	91	98	89	92
Imazamox+NIS+UAN	0.5+0.25%+32	69	75	62	61	45	62	76	95	64	74
Thif-sg+Clet-SM+NIS	0.14+1.5+0.25%	80	76	72	75	59	77	85	85	86	82
Thif-sg+Trib-sg+Clet-SM+NIS	0.14+0.035+1.5+0.25%	80	76	74	76	62	80	85	89	82	84
Thif-sg+Trib-sg+Clet-SM+NIS	0.14+0.048+1.5+0.25%	80	76	66	71	56	74	85	87	86	84
Thif-sg+Trib-sg+Clet-SM+NIS	0.14+0.071+1.5+0.25%	80	74	76	70	60	76	85	95	80	84
Thif-sg+Clet-SM+NIS	0.3+1.5+0.25%	80	75	71	75	66	80	85	95	86	91
Thif-sg+Trib-sg+Clet-SM+NIS	0.3+0.075+1.5+0.25%	80	75	72	75	52	74	85	95	84	85
Thif-sg+Trib-sg+Clet-SM+NIS	0.3+0.1+1.5+0.25%	80	76	72	75	55	71	85	95	82	87
Thif-sg+Trib-sg+Clet-SM+NIS	0.3+0.15+1.5+0.25%	80	74	69	71	62	72	85	94	81	89
Thif-sg+Clet-SM+NIS	0.45+1.5+0.25%	80	76	71	70	52	75	85	95	86	84
Thif-sg+Trib-sg+Clet-SM+NIS	0.45+0.053+1.5+0.25%	80	72	70	69	50	66	85	93	87	91
Thif-sg+Trib-sg+Clet-SM+NIS	0.45+0.088+1.5+0.25%	80	79	75	77	59	81	85	94	87	89
Thif-sg+Trib-sg+Clet-SM+NIS	0.45+0.124+1.5+0.25%	80	80	74	72	64	75	85	92	85	89
Untreated	0	0	0	0	0	0	0	0	0	0	0
CV		2	4	7	5	13	5	1	2	3	3
LSD 5%		2	4	7	5	11	5	1	2	4	4

Glufosinate provided better overall weed control 7 DAT than other herbicides. Glufosinate gave better control of broadleaf weeds present than glyphosate; however, most broadleaf species present are known difficulties for glyphosate. By 14 DAT, pigweed was removed from all herbicide-treated plots. At this evaluation, glyphosate clearly gave the best overall control as the brown rectangles from glyphosate activity were obvious from the field edge. Imazamox was not as effective with the whole weed spectrum as combinations of SUs with clethodim. Increasing the SU total rate three-fold generally gave 4 to 6% better control. Minor differences among SU rate combinations were detected but likely would not have given practical differences in a production field. As the summer progressed, redroot pigweed began emerging in glyphosate and glufosinate plots, whereas areas treated with ALS inhibitors remained clean of this species.

Table cont.

Treatment	Rate	Venice mallow	Redroot pigweed	Volunteer wheat	Wild mustard	Wild buckwheat	Common lambsquarters	Venice mallow	Redroot pibweed
		6/29	6/29	7/12	7/12	7/12	7/12	7/12	7/12
	oz ai/A	%	%	%	%	%	%	%	%
Glyphosate+NIS+AMS	4.5+0.25%+24	94	96	99	98	91	87	70	42
Glyphosate+NIS+AMS	9+0.25%+24	97	96	99	98	95	94	85	50
Glufosinate+NIS+AMS	6.4+0.5%+48	91	87	55	97	30	74	25	47
Glufosinate+NIS+AMS	9.6+0.5%+48	90	94	77	99	57	86	47	52
Imazamox+NIS+UAN	0.5+0.25%+32	45	93	93	96	15	79	22	97
Thif-sg+Clet-SM+NIS	0.14+1.5+0.25%	64	89	91	86	89	97	74	99
Thif-sg+Trib-sg+Clet-SM+NIS	0.14+0.035+1.5+0.25%	65	92	85	99	91	96	57	98
Thif-sg+Trib-sg+Clet-SM+NIS	0.14+0.048+1.5+0.25%	61	87	88	97	89	97	61	99
Thif-sg+Trib-sg+Clet-SM+NIS	0.14+0.071+1.5+0.25%	66	89	87	99	86	97	64	99
Thif-sg+Clet-SM+NIS	0.3+1.5+0.25%	74	94	89	93	89	94	71	99
Thif-sg+Trib-sg+Clet-SM+NIS	0.3+0.075+1.5+0.25%	72	91	85	98	93	97	76	99
Thif-sg+Trib-sg+Clet-SM+NIS	0.3+0.1+1.5+0.25%	71	94	86	99	89	97	80	99
Thif-sg+Trib-sg+Clet-SM+NIS	0.3+0.15+1.5+0.25%	62	92	84	98	90	97	80	99
Thif-sg+Clet-SM+NIS	0.45+1.5+0.25%	72	90	88	85	90	97	72	99
Thif-sg+Trib-sg+Clet-SM+NIS	0.45+0.053+1.5+0.25%	71	94	85	95	92	96	75	98
Thif-sg+Trib-sg+Clet-SM+NIS	0.45+0.088+1.5+0.25%	73	92	87	98	93	97	84	99
Thif-sg+Trib-sg+Clet-SM+NIS	0.45+0.124+1.5+0.25%	71	94	86	95	93	97	86	99
Untreated	0	0	0	0	0	0.0	0	0	0
CV		6	2	3	4	9	8	14	7
LSD 5%		5	3	3	5	10	10	13	8

Alfalfa response to sulfentrazone. Howatt, Roach, and Harrington. An established alfalfa crop was treated following the first cutting at Fargo on June 5 with 60°F air temperature, 74% relative humidity, 100% cloud cover, 0 to 2 mph variable wind and damp soil. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 flat fan nozzles to a 7-ft wide area the length of 10- by 30-ft plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	Alfalfa 6/10/10	Alfalfa 6/19/10	Alfalfa 6/30/10	Alfalfa 7/12/10	Alfalfa 8/1/10
	oz ai/A			% control		
Suen&Carf+PO	2.2+1%	37	0	0	0	0
Suen&Carf+PO	4.4+1%	57	0	0	0	0
Flumioxazin+PO	2+1%	17	0	0	0	0
Suen&Metr+PO	6.75+1%	20	0	0	0	0
Suen&Metr+PO	9+1%	45	0	0	0	0
Suen&Imazethapyr+PO	2.5+1%	17	0	0	0	0
Untreated	0	0	0	0	0	0
CV		239	0	0	0	0
LSD 5%		9	0	0	0	0

Alfalfa injury 4 d after treatment was quite noticeable for all herbicides because there was so little tissue present. New tissue emerging after treatment did not exhibit injury even though all herbicide combinations included at least one product that could translocate. None of the cosmetic injury was noticed 2 w after treatment, and lingering effects such as stunting or chlorosis were never observed in this study. The healthy alfalfa stand precluded subsequent weed control ratings because consistent weed pressure did not emerge.

Volunteer Roundup Ready canola control. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. Experiments were conducted near Casselton, ND, to evaluate control of volunteer Roundup Ready canola at two plant stages. Dekalb 'DKC52-41' Roundup Ready canola was planted on April 21, 2010. POST treatments, at canola stage 3.2, were applied on June 7 at 10:00 am with 72 F air, 90 F soil surface, 27% relative humidity, 0% cloud cover, 1 to 3 mph SE wind, dry soil surface, damp subsoil, excellent crop vigor, and no dew present to V6 to V8 (0 to 15% bolting) canola. LPOST treatments, at canola stage 4.1, were applied on June 14 at 2:20 pm with 76 F air, 98 F soil surface, 23% relative humidity, 40% cloud cover, 4 to 8 mph NE wind, dry soil surface, moist subsoil, excellent crop vigor, and no dew present to V8 (10 to 20% flowering) canola. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

The purpose of this study was to evaluate herbicide activity on Roundup Ready canola applied at growth stage 3.2 (beginning bolting) and growth stage 4.1 (beginning flowering). Growers may not know they have volunteer RR canola in soybean fields, identify these plants as wild mustard, and assume that glyphosate will kill these plants. After application growers may correctly identify the Roundup Ready canola after plants bolt and herbicide effectiveness is reduced. There is almost no control data from herbicides applied after canola plant bolt. Flexstar was the most effective herbicide used in this study and gave near complete control. Most herbicides used in this study gave less canola control than when applied to pre-bolting plants. All ALS herbicides (Firstrate, Pursuit (in Extreme), and Raptor) did not give adequate canola control. Contact herbicides of Cadet, Sharpen, and Ignite also did not control canola, however Sharpen gave 96 control at 14 DAT but regrowth caused lower weed control at 28 DAT. Weed control was similar for some herbicides when applied at 3.2 or 4.1 growth stage, but Sharpen and Ignite gave greater canola control when applied at 4.1 compared to 3.2 growth stage at 28 DAT. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Volunteer Roundup Ready canola control (Zollinger, Ries, Kazmierczak).

Treatment	Rate	Canola Stage	14 DAT Canola	28 DAT Canola
	(product/A)	3.2 or 4.1	- - % control - -	- - % control - -
FirstRate+R-11+28%	0.2oz+0.25% v/v+2.5% v/v	3.2	45	58
		4.1	45	57
FirstRate+R-11+28%	0.3oz+0.25% v/v+2.5% v/v	3.2	58	70
		4.1	53	68
Flexstar+Soy-Stik+28%	0.5pt+1.25pt+1.125% v/v	3.2	99	99
		4.1	93	98
Flexstar+Soy-Stik+28%	0.75pt+1.25pt+1.125% v/v	3.2	99	99
		4.1	96	97
Cadet+R-11+28%	0.7fl oz+0.25% v/v+2.5% v/v	3.2	12	12
		4.1	27	23
Cadet+R-11+28%	0.9fl oz+0.25% v/v+2.5% v/v	3.2	23	23
		4.1	17	20
Sharpen+Soy-Stik+28%	1fl oz+1.25pt+2.5% v/v	3.2	96	75
		4.1	94	85
Ignite+AMS	22fl oz+3lb	3.2	60	25
		4.1	53	40
Ignite+AMS	33fl oz+3lb	3.2	70	37
		4.1	68	45
Extreme+R-11+28%	1.5pt+0.25% v/v+2.5% v/v	3.2	47	55
		4.1	57	72
Raptor+Soy-Stik+28%	2fl oz+1.25pt+2.5% v/v	3.2	55	65
		4.1	47	62
Raptor+Soy-Stik+28%	4fl oz+1.25pt+2.5% v/v	3.2	63	82
		4.1	55	77
LSD (0.05)			9	8

Chickpea tolerance to Sharpen applied preemergence. Jenks, Willoughby, and Hoefing. The objective of this study was to evaluate chickpea tolerance to higher rates of Sharpen and Pursuit. 'Frontier' chickpea was seeded on May 14. Glyphosate was applied to the entire study area on May 15. All treatments were applied PRE on May 19.

It should be noted that rates used in this study are 3-4 times current use rates. All treatments caused light to moderate crop injury. All treatments provided good to excellent control of biennial wormwood and prostrate pigweed. Given that glyphosate was applied prior to the PRE application, the weed control provided here was entirely from residual control.

Table. Chickpea tolerance to Sharpen applied preemergence. (1038)

		Crop injury				Weed Control[b]			
		Chickpea				Biww		Prpw	
Treatment[a]	Rate	Jun 5	Jun 23	Jul 8	Jul 19	Jun 23	Jul 8	Jun 23	Jul 8
		----------%----------				----------%----------			
Untreated		0	0	0	0	0	0	0	0
Sharpen	3 floz	0	13	9	5	93	87	91	89
Sharpen	4 floz	0	18	17	11	96	97	95	89
Optill[c]	3 oz	0	17	18	15	93	81	100	100
Pursuit	6 floz	0	23	26	23	93	81	100	100
LSD(0.10)		NS	4.6	6.1	12.5	5.2	10	5.5	5.2

[a] *All treatments applied PRE; Glphosate applied PRE across entire study.*

[b] *Biww=Biennial wormwood; Prpw=Prostrate pigweed*

[c] Optill at 3 oz is equivalent to 1.5 oz Sharpen + 6 floz Pursuit

Chickpea tolerance to Sharpen tank mixed with other PPO inhibitors. Jenks, Willoughby, and Hoefing.The 2010 Sharpen label prohibits tank mixing Sharpen with other PPO inhibitors such as Spartan and Valor. Previous NDSU research has shown that these combinations may provide better weed control than either herbicide applied alone. This study was conducted to confirm whether a tank mix of two PPO inhibitors is safe on peas and chickpeas. Glyphosate was applied PRE across the entire study.

Valor was the only treatment that caused significant chickpea injury. Tank mixing Sharpen with Valor did not significantly increase injury. There was essentially no injury with Sharpen alone or tank mixed with other PPO inhibitors such as Spartan and Reflex.

Sharpen and Spartan applied alone provided about 80% biennial wormwood control. Applied together as a tank mix, Sharpen + Spartan provided 99% biennial wormwood control. Similar increases were observed with Sharpen + Reflex and Sharpen + Valor.

Table. Chickpea tolerance to Sharpen tank mixed with other PPO inhibitors. (1018)

		Chickpea						Weed Control	
		Injury			Density	Height		Biww[a]	
Treatment[bc]	Rate	12 Jun	3 Jul	19 Jul	16 Jun	2 Jul	20 Jul	3 Jul	19 Jul
		----------%----------			m row	--------cm---------		---------%-------	
Sharpen	1 fl oz	0	0	0	2.5	28.3	37.5	83	81
Spartan	4.5 fl oz	0	0	0	2.4	27.0	35.3	78	80
Reflex	0.75 pt	0	0	0	3.1	27.5	37.2	43	45
Valor	2 oz	0	15	12	2.8	23.6	36.3	67	68
Prowl H20	3 pt	0	0	0	2.2	27.0	36.5	7	0
Sharpen + Spartan	1 oz + 4.5 fl oz	0	0	0	2.3	25.4	37.1	100	99
Sharpen + Reflex	1 oz + 0.75 pt	0	0	0	2.5	25.6	37.9	93	92
Sharpen + Valor	1 oz + 2 oz	0	14	14	3.3	23.1	35.9	98	98
Sharpen + Prowl	1 oz + 3 pt	0	0	0	1.8	27.8	35.3	86	83
Prowl	1.5 pt	0	0	0	2.8	29.0	37.9	10	7
Untreated		0	0	0	2.6	28.3	37.8	0	0
LSD (0.05)		NS	2	2	1	3	6	15	16
CV		0	54	51	32	7	9	15	16

[a]*Biww =Biennial wormwood*

[b]*All applications applied PRE; glyphosate applied PRE across entire study.*

[c]*Sharpen applied with MSO (1%) + AMS (2.5%); Prowl=Prowl H2O.*

Permit + Spartan on dry beans. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Thompson, ND, to evaluate crop response to dry bean tank-mixes. 'Stampede' pinto bean and 'T9905' navy bean were planted on May 27, 2010 followed by the application of PRE treatments at 1:40 pm with 78 F air, 61 F soil at a four inch depth, 38% relative humidity, 50% cloud cover, 5 to 8 mph SE wind, damp soil surface, and wet subsoil. Soil characteristics were: 6.7% sand, 70.5% silt, 22.8% clay, silt loam texture, 4.0% OM, and 8.1 pH. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

43 DAT PRE, all treatments gave 99% control of common lambsquarters, kochia, and redroot pigweed, and 0% dry bean variety injury, although Permit alone at 0.75 oz/A gave 72%, 62%, and 47% control of common lambsquarters, kochia, and redroot pigweed, respectively. Permit + Spartan can be an effective soil-applied treatment as Spartan controls many small-seeded broadleaf weeds and Permit controls common lambsquarters and many large-seeded broadleaf weeds. The wide spectrum of broadleaf weed control and residual weed control from both products may allow for season-long weed control. Addition of a PRE type grass control, Outlook or similar product may control most all grass and broadleaf weeds. No research has been conducted to determine dry bean response to combinations of these products. Data from this study shows excellent dry bean safety and excellent weed control. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Permit + Spartan on dry beans (Zollinger, Ries, Kazmierczak).

		14, 21, and 29 DAT - PRE				
Treatment	Rate	Navy	Pinto	Colq	Koch	Rrpw
	(product/A)	-- % injury --		----- % injury -----		
Permit+Spartan Charge	0.5oz+3.75fl oz	0	0	99	99	99
Permit+Spartan Charge	0.5oz+4.75fl oz	0	0	99	99	99
Permit+Spartan Charge	0.5oz+5.75fl oz	0	0	99	99	99
Permit+Spartan Charge	0.75oz+3.75fl oz	0	0	99	99	99
Permit+Spartan Charge	0.75oz+4.75fl oz	0	0	99	99	99
Permit+Spartan Charge	0.75oz+5.75fl oz	0	0	99	99	99
Permit+Spartan Charge+Outlook	0.5oz+3.75fl oz+18fl oz	0	0	99	99	99
Permit+Spartan Charge+Outlook	0.5oz+4.75fl oz+18fl oz	0	0	99	99	99
Permit+Spartan Charge+Outlook	0.5oz+5.75fl oz+18fl oz	0	0	99	99	99
Permit	0.75oz	0	0	99	43	99
Spartan Charge	5.75fl oz	0	0	99	99	99
LSD (0.05)		NS	NS	NS	9	NS

Dry bean tolerance. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Thompson, ND, to evaluate crop response and weed efficacy to dry bean weed control programs. On May 27, 2010, PPI treatments were applied and double incorporated with a field cultivator to a 1 to 2 inch depth, followed by the planting of 'Stampede' pinto bean and 'T9905' navy bean, followed by the application of PRE treatments. PPI and PRE treatments were applied at 1:20 and 1:25 pm, respectively, with 78 F air, 61 F soil at a four inch depth, 38% relative humidity, 50% cloud cover, 5 to 8 mph SE wind, damp soil surface, and wet subsoil. Soil characteristics were: 6.7% sand, 70.5% silt, 22.8% clay, silt loam texture, 4.0% OM, and 8.1 pH. POST treatments were applied on June 28 at 10:00 am with 64 F air, 78 F soil surface, 70% relative humidity, 0% cloud cover, 5 to 10 mph NW wind, dry soil surface, wet subsoil, excellent crop vigor, and no dew present to V2 to V3 dry bean. Weed species present at time of POST application without PPI treatments were: 1 to 4 inch (5 to 10/yd^2) common lambsquarters; 1 to 3 inch (1 to 5/yd^2) redroot pigwed; and 1 to 3 inch (0 to 1/yd^2) kochia. Weeds species present at time of application with PPI treatments were: 1inch (0 to 1/yd^2) common lambsquarters; 1inch (0 to 1/yd^2) redroot pigweed; and 1inch (0 to 1/yd^2) kochia. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for PPI and PRE and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for EPOST treatments. The experiment had a randomized complete block design with three replicates per treatment.

No dry bean variety injury was observed 14 DAT, and 21 DAT after PPI and PPI/PRE applications, and 99% control of common lambsquarters, redroot pigweed, and kochia (data not shown). This research supports the use of a PRE followed by POST approach to weed control in conventional crops. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Dry bean tolerance (Zollinger, Ries, Kazmierczak).

		32 DAT - PPI and PPI/PRE					7 DAT - POST					
Treatment	Rate	Navy	Pinto	Colq	Rrpw	Koch	Navy	Pinto	V Wht	Colq	Rrpw	Koch
	(product/A)	-- % injury --		---- % control ----			-- % injury --		------- % control -------			
PPI												
Eptam+Sonalan+Permit	3.5pt+2pt+0.67oz	0	2	99	99	83	0	1	87	93	99	65
PPI/PRE												
Eptam+Sonalan/Permit	3.5pt+2pt/0.67oz	0	3	66	99	63	0	2	90	96	99	63
PPI/POST												
Eptam+Sonalan/Permit+R-11+28%	3.5pt+2pt/0.67oz+0.25% v/v+1% v/v	0	0	88	99	72	2	0	92	87	99	62
POST												
Permit+R-11+28%	0.67oz+0.25% v/v+1% v/v						3	2	0	28	99	37
Permit+Rezult Basagran+Rezult Poast+ R-11+28%	0.67oz+0.8pt+0.8pt+ 0.25% v/v+1% v/v						3	3	65	60	91	52
Permit+Rezult Basagran+Rezult Poast+ R-11+28%	0.67oz+1.6pt+1.6pt+ 0.25% v/v+1% v/v						10	12	43	63	99	55
Permit+Raptor+R-11+28%	0.67oz+2fl oz+0.25% v/v+1% v/v						2	2	93	53	99	43
Permit+Raptor+Basagran+R-11+28%	0.67oz+2fl oz+1pt+0.25% v/v+1% v/v						2	0	80	62	99	47
Raptor+Basagran+R-11+28%	4fl oz+1pt+0.25% v/v+1% v/v						0	0	95	78	99	78
Untreated		0	0	0	0	0	0	0	0	0	0	0
LSD (0.05)		0	2	3	NS	8	4	3	10	9	5	12

Table cont. Dry bean tolerance (Zollinger, Ries, Kazmierczak).

Treatment	Rate	14 DAT - POST						28 DAT - POST						Yield	
		Navy	Pinto	V Wht	Colq	Rrpw	Koch	Navy	Pinto	V Wht	Colq	Rrpw	Koch	Navy	Pinto
	(product/A)	- % injury -		------ % control ------				- % injury -		------ % control ------				- cwt/A -	
PPI															
Eptam+Sonalan+Permit	3.5pt+2pt+0.67oz	0	1	87	93	99	65	0	0	90	93	99	78	16.7	10.6
PPI/PRE															
Eptam+Sonalan/Permit	3.5pt+2pt/0.67oz	0	2	90	96	99	63	0	0	90	96	99	63	14.6	10.3
PPI/POST															
Eptam+Sonalan/Permit+R-11+28%	3.5pt+2pt/0.67oz+0.25% v/v+1% v/v	2	0	92	87	99	62	0	0	90	83	99	73	19.2	9.4
POST															
Permit+R-11+28%	0.67oz+0.25% v/v+1% v/v	3	2	0	28	99	37	0	0	0	28	99	37	8.9	5.7
Permit+Rezult Basagran+Rezult Poast+ R-11+28%	0.67oz+0.8pt+0.8pt+ 0.25% v/v+1% v/v	3	3	65	60	99	52	0	0	65	52	99	47	13	6.3
Permit+Rezult Basagran+Rezult Poast+ R-11+28%	0.67oz+1.6pt+1.6pt+ 0.25% v/v+1% v/v	10	12	43	63	99	55	10	12	43	63	99	55	14.4	8
Permit+Raptor+R-11+28%	0.67oz+2fl oz+0.25% v/v+1% v/v	2	2	83	53	99	43	0	0	96	73	99	70	14.9	8.8
Permit+Raptor+Basagran+28%	0.67oz+2fl oz+1pt+0.25% v/v+1% v/v	2	0	80	62	99	47	0	0	88	70	99	72	14.6	8.6
Raptor+Basagran+R-11+28%	4fl oz+1pt+0.25% v/v+1% v/v	0	0	95	78	99	78	0	0	97	83	99	83	15.8	8.5
Untreated		0	0	0	0	0	0	0	0	0	0	0	0	0	0
LSD (0.05)		4	3	13	9	NS	12	2	3	10	7	NS	10	3.2	3.8

POST weed control with bentazon and imazamox tank mixtures in dry bean, Carrington, 2010. (Greg Endres and Blaine Schatz). The experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with BASF. Experimental design was a randomized complete block with four replicates. 'Lariat' pinto bean was planted May 26. Herbicide treatments were applied with a hand-held boom sprayer delivering 17 gal/A at 35 psi through TeeJet XR 80015 flat fan nozzles to the center 6.7 ft of 10- by 25-ft plots on June 20 with 71 F, 56% RH, and 8 mph wind to 1.5 trifoliate leaf bean, 3- to 5-leaf yellow and green foxtail, 4- to 6-inch tall common lambsquarters, and 2- to 4-inch tall wild buckwheat.

No crop response was noted. Weeds were suppressed with generally similar efficacy among treatments (Table).

Table.

Herbicide			Weed control (%)[1]							
Treatment[2]		Rate	30-Jun			9-Jul			4-Aug	
No.		fl oz product/A	fota	colq	wibw	fota	colq	wibw	fota	colq
1	untreated check	x	0	0	0	0	0	0	0	0
2	Raptor	4	69	69	36	71	70	69	70	67
3	Basagran + Raptor	16 + 4	72	75	57	73	74	68	70	71
4	Basagran + Raptor	21.4 + 4	71	75	58	72	73	69	66	72
5	BAS 762AC H	24	72	75	75	73	74	67	68	73
6	Basagran + Raptor	24 + 4	69	71	75	70	72	69	66	72
7	Basagran + Raptor	28 + 4	70	71	70	71	71	68	65	70
C.V. (%)			6.6	5.0	31.0	4.1	3.4	4.4	3.6	4.7
LSD (0.05)			5	4	22	3	3	3	3	4

[1]fota=green and yellow foxtail; colq=common lambsquarters; wibw=wild buckwheat.

[2]Treatments included COC (MES 100) at 1% v/v plus UAN at 2% v/v.

Basagran - Raptor ratios in dry bean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Prosper, ND, to evaluate crop injury and weed efficacy from Basagran and Raptor tank-mixes. 'Ensign' navy bean was planted on May 27, 2010. POST treatments were applied on June 23 at 9:15 am with 66 F air, 69 F soil surface, 99% relative humidity, 100% cloud cover, 8 to 12 mph N wind, dry soil surface, moist subsoil, good crop vigor, and no dew present to V2 to V3 dry bean. Weed species present at the time of POST applications were: cotyledon to 6 inch (15 to 40/ft^2) redroot pigweed; cotyledon to 4 inch (15 to 40/ft^2) hairy nightshade; 3 to 8 inch, tillering (5 to 10/ft^2) yellow foxtail; 3 to 7 inch (1 to 5/yd^2) common cocklebur; 2 to 5 inch (1 to 10/yd^2) common lambsquarters; and 3 to 6 inch (<1/yd^2) common ragweed. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

This research shows the antagonistic effect of the Na-Basagran on Raptor. The higher the Basagran rate to greater the antagonism. Basagran is formulated as a Na salt. Na is a known herbicide antagonist. The Na from the Basagran complexes with Raptor to reduce weed control. The research also shows the penalty in using oil adjuvants on a % volume basis instead of on an area basis. Weed control from Basagran + Raptor at 2 fl oz/A + PO at 1.25 pt/A was greater than Basagran + Raptor at 4 fl oz + PO at 1% v/v. The amount of oil adjuvant in the latter treatment (at 1% v/v) was 0.68 pt or 54% of the 1.25 pt/A rate. The research also shows the penalty of using MSO adjuvant at % volume compared to an area basis. Weed control from Basagran + Raptor + Destiny HC (HSOC type adjuvant) at 0.63 pt/A was much greater than the same herbicides applied with Destiny HC at 0.5%. The amount of oil adjuvant in the latter treatment (at 0.5% v/v) was 0.34 pt or 54% of the 0.63 pt/A rate. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Basagran - Raptor ratios in dry bean (Zollinger, Ries, Kazmierczak).

Treatment[1]	Rate	7 DAT	7 DAT						14 DAT	14 DAT					
		Navy	Yeft	Rrpw	Colq	Hans	Corw	Cocb	Navy	Yeft	Rrpw	Colq	Hans	Corw	Cocb
	(product/A)	% injury	% control						% injury	% control					
Raptor+PO+28%	4fl oz+1% v/v+2% v/v	10	50	50	43	50	33	75	10	70	88	50	90	37	88
Basagran+PO+28%	24fl oz+1% v/v+2% v/v	10	0	32	32	42	33	60	10	0	32	32	42	33	60
Basagran+Raptor+PO+28%	16fl oz+4fl oz+1% v/v+2% v/v	10	40	50	47	45	45	75	10	65	90	90	90	68	83
Basagran+Raptor+PO+28%	21.4fl oz+4fl oz+1% v/v+2% v/v	10	40	48	48	48	10	72	10	50	80	80	67	40	90
Basagran+Raptor+PO+28%	24fl oz+4fl oz+1% v/v+2% v/v	10	37	38	38	38	38	72	10	55	68	67	63	50	92
Basagran+Raptor+PO+28%	28fl oz+4fl oz+1% v/v+2% v/v	10	37	37	37	37	37	62	10	60	67	67	52	32	75
Basagran+Raptor+PO+28%	24fl oz+2fl oz+1.25pt+2% v/v	13	57	70	70	70	52	92	13	63	70	70	70	52	92
Basagran+Raptor+MSO+28%	24fl oz+2fl oz+1% v/v+2% v/v	10	43	42	42	42	42	72	10	82	72	70	67	47	95
Basagran+Raptor+Destiny HC+28%	24fl oz+2fl oz+0.5% v/v+2% v/v	12	40	40	40	40	0	70	12	40	40	40	37	40	70
Basagran+Raptor+Destiny HC+28%	24fl oz+2fl oz+0.63pt+2% v/v	17	60	70	70	70	62	78	15	67	82	82	77	63	95
LSD (0.05)		3	9	10	11	10	10	14	2	6	6	6	7	8	6

[1]PO = Herbimax; MSO = Soy-Stik.

Table cont. Basagran - Raptor ratios in dry bean (Zollinger, Ries, Kazmierczak).

Treatment[1]	Rate	28 DAT	28 DAT						42 DAT	42 DAT					
		Navy	Yeft	Rrpw	Colq	Hans	Corw	Cocb	Navy	Yeft	Rrpw	Colq	Hans	Corw	Cocb
	(product/A)	% injury	% control						% injury	% control					
Raptor+PO+28%	4fl oz+1% v/v+2% v/v	0	90	95	60	90	50	93	0	90	95	60	90	50	93
Basagran+PO+28%	24fl oz+1% v/v+2% v/v	0	0	32	32	42	33	60	0	0	32	32	42	33	60
Basagran+Raptor+PO+28%	16fl oz+4fl oz+1% v/v+2% v/v	0	62	99	90	90	68	99	0	72	99	88	90	70	93
Basagran+Raptor+PO+28%	21.4fl oz+4fl oz+1% v/v+2% v/v	0	50	99	80	80	50	99	0	50	93	80	80	50	99
Basagran+Raptor+PO+28%	24fl oz+4fl oz+1% v/v+2% v/v	0	75	88	67	63	50	99	0	75	85	67	63	50	99
Basagran+Raptor+PO+28%	28fl oz+4fl oz+1% v/v+2% v/v	0	60	93	73	58	32	99	0	60	93	73	58	32	99
Basagran+Raptor+PO+28%	24fl oz+2fl oz+1.25pt+2% v/v	0	77	87	80	85	77	99	0	77	85	80	85	77	99
Basagran+Raptor+MSO+28%	24fl oz+2fl oz+1% v/v+2% v/v	0	82	92	70	70	52	99	0	85	92	70	70	52	90
Basagran+Raptor+Destiny HC+28%	24fl oz+2fl oz+0.5% v/v+2% v/v	0	50	50	50	40	43	99	0	50	50	50	40	43	99
Basagran+Raptor+Destiny HC+28%	24fl oz+2fl oz+0.63pt+2% v/v	0	78	92	90	87	73	99	0	78	92	90	87	73	99
LSD (0.05)		NS	4	6	6	5	6	5	NS	4	6	6	5	6	5

[1]PO = Herbimax; MSO = Soy-Stik.

Sharpen and dry bean desiccation. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Hatton, ND, to evaluate dry bean desiccation from Sharpen. Hyland 'T9905' navy bean was planted on June 4, 2010. Desiccation treatments were applied on September 14 at 11:30 am with 59 F air, 69 F soil surface, 57% relative humidity, 90% cloud cover, 1 to 3 mph S wind, dry soil surface and moist subsoil. Applications were made at 75 to 85% leaf drop; 5 to 20% vine desiccation; 5 to 10% green pods; 25 to 30% yellow pods; and 70 to 75% brown/dry pods. Treatments were applied to the entire 6.7 by 30 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for all applications. The experiment had a randomized complete block design with three replicates per treatment.

Sharpen used as a dry bean desiccant has proven to be very effective. Sharpen at rates of 0.72 fl to 2 fl oz generally gave similar control. The high rate of Sharpen does speed up the initial desiccation at 3 and 7 DAT. At 10 and 14 DAT, leaf desiccation and pod color was is the same, although the highest rate of Sharpen is better on vine desiccation. Valor is also an effective desiccant, although the speed of the dry bean desiccation is slower than the high rate of Sharpen, at 3 and 7 DAT. Roundup and Aim applications are slow to desiccate. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Sharpen and dry bean desiccation. (Zollinger, Ries, and Kazmierczak).

Treatment[1]	Rate	3 DAT					7 DAT				
		leaf[2]	vine[3]	green[4]	yellow[5]	brown[6]	leaf	vine	green	yellow	brown
	(product/A)	% control					% control				
Sharpen+Scoil+AMS	0.72fl oz+1% v/v+17lb/100gal	73	27	1	31	68	87	67	0	13	87
Sharpen+Scoil+AMS	1fl oz+1% v/v+17lb/100gal	77	28	0	27	73	87	65	0	13	87
Sharpen+Scoil+AMS	2fl oz+1% v/v+17lb/100gal	82	32	0	28	72	93	72	0	10	90
RUPM+Scoil+AMS	22fl oz+1% v/v+17lb/100gal	67	12	5	37	58	72	17	5	28	67
Sharpen+RUPM+Scoil+AMS	0.72fl oz+22fl oz+1% v/v+17lb/100gal	73	27	0	28	72	85	55	0	17	83
Valor+Scoil	1.5oz+1% v/v	78	37	0	25	75	90	60	0	13	87
Valor+Scoil	2oz+1qt	75	28	0	27	73	87	53	0	12	88
Aim+Scoil+AMS	2.63fl oz+1% v/v+17lb/100gal	73	28	0	33	67	83	43	0	23	77
Untreated		58	7	5	38	57	65	13	5	33	62
LSD (0.05)		4	5	1	6	6	5	7	NS	5	5

[1]RUPM = Roundup PowerMax.
[2]Leaf = % leaf desiccation and leaf drop.
[3]Vine = % vine desiccation.
[4]Green = % green pods.
[5]Yellow = % yellow pods.
[6]Brown = % brown pods.

Table cont. Sharpen and dry bean desiccation. (Zollinger, Ries, and Kazmierczak).

Treatment[1]	Rate	7 DAT					10 DAT				
		leaf[2]	vine[3]	green[4]	yellow[5]	brown[6]	leaf	vine	green	yellow	brown
	(product/A)	% control					% control				
Sharpen+Scoil+AMS	0.72fl oz+1% v/v+17lb/100gal	96	75	0	3	96	99	82	0	0	99
Sharpen+Scoil+AMS	1fl oz+1% v/v+17lb/100gal	99	73	0	0	99	99	87	0	0	99
Sharpen+Scoil+AMS	2fl oz+1% v/v+17lb/100gal	99	83	0	0	99	99	98	0	0	99
RUPM+Scoil+AMS	22fl oz+1% v/v+17lb/100gal	82	32	0	17	83	92	53	0	3	96
Sharpen+RUPM+Scoil+AMS	0.72fl oz+22fl oz+1% v/v+17lb/100gal	95	72	0	10	90	99	88	0	0	99
Valor+Scoil	1.5oz+1% v/v	99	75	0	2	98	99	87	0	0	99
Valor+Scoil	2oz+1qt	98	72	0	0	99	99	85	0	0	99
Aim+Scoil+AMS	2.63fl oz+1% v/v+17lb/100gal	93	65	0	10	99	98	77	0	0	99
Untreated		70	20	5	23	72	75	27	0	13	87
LSD (0.05)		4	7	NS	4	4	4	6	NS	2	2

[1]RUPM = Roundup PowerMax.
[2]Leaf = % leaf desiccation and leaf drop.
[3]Vine = % vine desiccation.
[4]Green = % green pods.
[5]Yellow = % yellow pods.
[6]Brown = % brown pods.

Dry bean desiccation with Sharpen. Jenks, Willoughby, and Hoefing.The objective of this study was to evaluate dry bean desiccation with Sharpen compared to labeled products (glyphosate, Valor, and Aim). Treatments were applied on Sep 3 when about 80% of the dry bean pods had turned to a light green or yellow color. All treatments were applied at 10 gpa. Treatments were evaluated visually for percent desiccation of leaves, vines, and pods at 4, 7, 10, and 14 days after treatment.

Sharpen desiccated dry bean leaves, vines, and pods equivalent to or faster than labeled products. Glyphosate and Aim were generally somewhat slower than Sharpen and Valor.

Table. Dry bean desiccation with Sharpen. (1043)

		Dry bean desiccation (days after treatment)												Yield	TW
		Leaf				Vine				Pods					
Treatment[abc]	Rate	4	7	10	14	4	7	10	14	4	7	10	14	Sep 17	
		% desiccation								% green remaining				lb/A	lb/bu
Untreated		66	78	86	90	28	38	48	63	16	8	5	4	3065	59.8
Sharpen	0.75 oz	81	93	98	99	38	53	65	80	9	2	1	0	3316	59.7
Sharpen	1 oz	85	96	99	99	43	64	75	89	6	1	0	0	3283	59.6
Sharpen	2 oz	89	97	99	99	49	67	79	91	6	1	0	0	2976	59.5
Glyphosate	22 oz	68	90	98	99	29	41	55	79	14	7	3	1	3731	60.2
Sharpen + Gly	0.75 oz + 22 oz	82	97	99	99	34	50	64	84	10	3	1	0	3501	59.7
Valor	2 oz	82	94	98	99	36	51	63	80	8	3	2	1	3598	59.9
Aim	2.6 oz	76	89	98	99	31	48	58	75	11	5	3	1	3244	60.5
LSD (0.05)		6	8	4	4	5	8	10	8	4	2	2	2	NS	NS
CV		5	6	3	3	10	11	11	7	27	46	63	120	14	1

[a]*All treatments applied pre-harvest Sep 3; Sharpen, Glyphosate, and Aim applied with MSO (1%) + AMS (5%); Valor applied with MSO (1%).*

[b]*Glyphosate=Roundup Powermax*

[c]*All treatments applied at 10 gpa.*

Vida dry edible bean desiccation. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Hatton, ND, to evaluate dry bean desiccation from Vida. Hyland 'T9905' navy bean was planted on June 4, 2010. Desiccation treatments were applied on September 8 at 10:20 am with 62 F air, 72 F soil surface, 49% relative humidity, 5% cloud cover, 1 to 3 mph S wind, dry soil surface and moist subsoil. Applications were made at 60 to 80% leaf drop; 5 to 10% vine desiccation; 5 to 10% green pods; 90 to 95% yellow pods; and 5 to 10% brown/dry pods. Treatments were applied to the entire 6.7 by 30 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for all applications. The experiment had a randomized complete block design with three replicates per treatment.

All Vida treatments, the pH was lowered to 4.6 to 4.7. Generally, weather conditions were unfavorable for desiccation. Over two inches of rain, low temperatures in the high 30's and high temperatures in the low to upper 50's. Very little sunshine, several days of passing showers, and heavy dew in the mornings. All treatments performed similarly, although Valor generally performed better and at a quicker desiccation rate. Gramoxone Inteon was slower and had less desiccation than expected, probably because of poor desiccation weather. Vida treatments were similar to Gramoxone Inteon on leaf desiccation and pod color change, but had less desiccation to the dry bean vine. Tank-mixes of Gramoxone Inteon and Vida did not significantly increase desiccation. (Dept of Plant Sciences, North Dakota State University, Fargo).

Table. Vida dry edible bean desiccation (Zollinger, Ries, and Kazmierczak).

Treatment	Rate	5 DAT					7 DAT				
		leaf[1]	vine[2]	green[3]	yellow[4]	brown[5]	leaf	vine	green	yellow	brown
	(product/A)	% control					% control				
Vida+Herbimax+AMS	4.125fl oz+1% v/v+2.5lb	77	20	0	37	63	83	22	0	28	72
Vida+Gramoxone Inteon+Herbimax+AMS	4.125fl oz+1pt+1% v/v+2.5lb	77	18	0	37	63	82	22	0	27	73
Vida+Gramoxone Inteon+Herbimax+AMS	2.75fl oz+1pt+1% v/v+2.5lb	78	17	1	37	62	83	22	0	27	73
Valor+Scoil+AMS	1.5oz+1qt+2.5lb	82	50	0	27	72	92	67	0	18	82
Gramoxone Inteon+Herbimax+AMS	2pt+1% v/v+2.5lb	73	32	3	35	62	77	35	0	32	68
Untreated		62	7	7	65	28	62	5	5	58	37
LSD (0.05)		5	6	3	6	6	6	7	NS	6	6

[1]Leaf = % leaf desiccation and leaf drop.
[2]Vine = % vine desiccation.
[3]Green = % green pods.
[4]Yellow = % yellow pods.
[5]Brown = % brown pods.

Table cont. Vida dry edible bean desiccation (Zollinger, Ries, and Kazmierczak).

Treatment	Rate	10 DAT					14 DAT				
		leaf[1]	vine[2]	green[3]	yellow[4]	brown[5]	leaf	vine	green	yellow	brown
	(product/A)	% control					% control				
Vida+Herbimax+AMS	4.125fl oz+1% v/v+2.5lb	87	32	0	12	88	93	42	0	8	92
Vida+Gramoxone Inteon+Herbimax+AMS	4.125fl oz+1pt+1% v/v+2.5lb	85	28	0	12	88	90	35	0	8	92
Vida+Gramoxone Inteon+Herbimax+AMS	2.75fl oz+1pt+1% v/v+2.5lb	87	28	0	17	83	94	40	0	8	92
Valor+Scoil+AMS	1.5oz+1qt+2.5lb	96	82	0	5	95	98	95	0	0	99
Gramoxone Inteon+Herbimax+AMS	2pt+1% v/v+2.5lb	82	37	0	15	85	90	45	0	5	95
Untreated		67	5	4	47	49	62	5	0	48	52
LSD (0.05)		6	6	1	3	3	6	6	NS	7	7

[1]Leaf = % leaf desiccation and leaf drop.
[2]Vine = % vine desiccation.
[3]Green = % green pods.
[4]Yellow = % yellow pods.
[5]Brown = % brown pods.

Dry pea tolerance to clethodim and quizalofop. Jenks, Willoughby, and Hoefing.The objective of this study was to determine if the grass herbicides clethodim(Select) and quizalofop(Assure II) cause dry pea injury. Two formulations of clethodim (Select Max and Volunteer) and one quizalofop (Assure II) formulation were evaluated. Two rates of each herbicide were applied when peas were 5-6 inches tall (June 2) and 8-10 inches tall (just prior to flowering on June 9). Select Max applied just prior to flowering was the only treatment to show minor injury. Select Max turned the peas a darker shade of green for several days, but injury was not visible 2 weeks after treatment. No injury was observed from Assure II, Volunteer, or Select Max at the early stage.

Table. Dry pea tolerance to Select Max and Assure II. (1024)

			Dry Pea					
			Injury				Yield	TW
Treatment[a]	Rate	Timing	9 Jun	16 Jun	26 Jun	8 Jul	6 Aug	6 Aug
			----------%----------				lb/A	lb/bu
Untreated			0	0	0	0	4205	62.8
Select Max	12 fl oz	5-inch	0	0	0	0	3930	63.9
Select Max	16 fl oz	5-inch	0	0	0	0	3906	64.1
Volunteer	6 fl oz	5-inch	0	0	0	0	4199	63.3
Volunteer	8 fl oz	5-inch	0	0	0	0	4016	63.4
Assure II	8 fl oz	5-inch	0	0	0	0	4182	63.0
Select Max	12 fl oz	Pre-Flower	0	6	0	0	4194	63.0
Select Max	16 fl oz	Pre-Flower	0	11	0	0	3803	62.8
Volunteer	6 fl oz	Pre-Flower	0	0	0	0	4003	63.5
Volunteer	8 fl oz	Pre-Flower	0	0	0	0	4062	63.3
Assure II	8 fl oz	Pre-Flower	0	0	0	0	4157	63.5
LSD (0.05)			NS	1	NS	NS	NS	NS
CV			0	26	0	0	9	1

[a]*Treatments were applied on June 2 and June 9.*

Dry pea tolerance to Sharpen tank mixed with other PPO inhibitors. Jenks, Willoughby, and Hoefing. The 2010 Sharpen label prohibits tank mixing Sharpen with other PPO inhibitors such as Spartan and Valor. Previous NDSU research has shown that these combinations may provide better weed control than either herbicide applied alone. This study was conducted to confirm whether a tank mix of two PPO inhibitors is safe on peas and chickpeas. Glyphosate was applied PRE across the entire study.

Valor was the only treatment that caused significant dry pea injury. Tank mixing Sharpen with Valor did not significantly increase injury. There was essentially no injury with Sharpen alone or tank mixed with other PPO inhibitors such as Spartan and Reflex.

Table. Dry pea tolerance to Sharpen tank mixed with other PPO inhibitors. (1017)

		Dry Pea							
		Injury			Density	Height		Yield	TW
Treatment[ab]	Rate	Jun 9	Jul 3	Jul 19	Jun 16	Jul 2	Jul 20	Aug 16	Aug 16
		----------%---------			sq ft	------cm------		lb/A	lb/bu
Sharpen	1 fl oz	0	0	0	3.7	41.0	72.0	3797	65.6
Spartan	4.5 fl oz	0	1	0	2.5	39.7	73.4	3973	67.3
Reflex	0.75 pt	0	0	0	3.5	39.8	69.1	3533	66.9
Valor	2 oz	0	12	8	2.9	42.7	70.8	3725	65.3
Prowl	3 pt	0	1	0	3.2	44.5	72.7	3802	65.9
Sharpen + Spartan	1 oz + 4.5 fl oz	0	1	0	3.9	43.7	75.1	3882	65.4
Sharpen + Reflex	1 oz + 0.75 pt	0	0	0	3.5	44.9	71.8	3876	65.6
Sharpen + Valor	1 oz + 2 oz	0	14	9	3.6	40.6	66.6	3584	66.3
Sharpen + Prowl	1 oz + 3 pt	0	0	0	4.5	44.5	71.4	3886	68.1
Prowl	1.5 pt	0	0	0	3.2	42.9	68.9	3428	66.5
Untreated		0	0	0	2.7	42.0	71.9	3395	66.8
LSD (0.05)		NS	4	4	1	NS	NS	NS	1
CV		0	96	135	19	7	4	6	1

[a] *All treatments applied PRE; Glyphosate applied PRE across entire study.*

[b] *Sharpen applied with MSO (1%) + AMS(2%)*

Evaluation of weed control and dry pea tolerance to different Basagran:Raptor ratios. Jenks, Willoughby, and Hoefing. The objective of this study was to compare different ratios of Basagran:Raptorcombinations for dry pea tolerance and weed control. Basagran and Raptor were evaluated alone and as a tank mix with Basagran at four rates and Raptor always at 4 fl oz. Redroot pigweed was 0.5-1.0 inch with 25 plants/ft^2. Wild buckwheat was cotyledon to 2-leaf with 2 plants/ft^2. Common lambsquarters was 0.5-1.0 inch with 2 plants/ft^2. Treatments were applied on June 2 to 5- to 6-inch peas. Raptor caused moderate to severe crop injury within 2 weeks after treatment. Raptor injury was visible as chlorosis and stunting. However, by mid-July the crop recovered and the injury was no longer distinguishable from other treatments. Crop injury from Basagran:Raptor combinations caused 8% injury or less 2 weeks after treatment. No injury was visible with the combinations 4 weeks after treatment. The treatments provided similar weed control. All combinations of Basagran:Raptor provided excellent control of all weeds. Raptor and Basagran alone provided excellent control of pigweed and lambsquarters, but about 82% control of wild buckwheat. It should be noted that we believe wild buckwheat control was good to excellent due to the small weed size at application. Previous research has shown poor wild buckwheat control when it is larger than 2-leaf.

Table. Evaluation of weed control and dry pea tolerance to different Basagran:Raptor ratios. (1037)

		Weed Control[c]						Dry pea					
		Rrpw		Wibw		Colq		Injury				Yield	TW
Treatment[ab]	Rate	Jun 9	Jul 6	Jun 9	Jul 6	Jun 9	Jul 6	Jun 9	Jun 16	Jul 3	Jul 14	Aug 6	Aug 6
		----------%----------						----------%----------				lb/A	lb/bu
Untreated		0	0	0	0	0	0	0	0	0	0	4018	65.2
Raptor	4 oz	91	99	80	83	88	99	23	42	19	0	3806	64.7
Basagran	24 oz	97	99	88	82	97	99	3	3	0	0	3674	65.0
Basgran + Raptor	16 oz + 4 oz	95	99	90	96	97	99	6	8	0	0	4220	65.1
Basgran + Raptor	21 oz + 4 oz	97	99	91	96	97	99	4	7	0	0	4012	65.7
Basgran + Raptor	24 oz + 4 oz	97	99	92	99	98	99	4	6	0	0	3926	65.2
Basgran + Raptor	28 oz + 4 oz	97	99	92	99	97	99	4	5	0	0	4181	65.3
BAS 762	24 oz	97	99	91	96	97	99	4	5	0	0	4060	65.4
LSD (0.05)		4	NS	3	3	1	NS	1	2	1	NS	NS	NS
CV		3	0	2	2	1	0	13	15	35	0	10	1

[a] *All treatments applied to 5- to 6-inch peas*

[b] *All treatments applied with COC + 28% N (1% + 2%).*

[c] *Rrpw=Redroot pigweed; Wibw=Wild buckwheat; Colq=Common lambsquarters*

Japanese brome control in dry pea. Jenks, Willoughby, and Hoefing.The objective of this study was to 1) evaluate dry pea tolerance to various soil- and POST-applied herbicides and 2) evaluate Japanese brome control with these herbicides. Prowl H2O, Dual, Outlook, Axiom, Valor, and KIH-485 were applied PRE. Select Max, Assure II, and Raptor were applied when peas were 4-inches tall. Glyphosate was applied preplant and PRE as the Japanese brome density was very high. Therefore, the soil-applied herbicides were evaluated for their residual control.

Valor and KIH-485 caused slight to moderate dry pea injury. Raptor applied POST also caused significant crop injury. All of the herbicides provided good to excellent Japanese brome control. Note that some of these herbicides are experimental and are not currently labeled for use in dry pea. The study was not harvested due to rains that flooded part of the research plot.

Table. Japanese brome control in dry pea. (1031)

			Dry pea					Jabr[a]
			Injury		Density	Height		Control
Treatment[bc]	Rate	Timing	Jun 8	Jul 6	Jun 16	Jul 2	Jul 20	Jul 6
			----------%---------		m row	--------cm-------		---%----
Untreated			0	0	11.5	53.4	68.9	0
Prowl H2O	2.5 pt	PRE	0	0	9.9	49.6	68.6	89
Dual	1.67 pt	PRE	0	0	10.0	48.6	67.3	98
Outlook	14 fl oz	PRE	0	0	10.5	49.9	68.9	89
Axiom	13 oz	PRE	0	0	9.3	49.1	75.9	98
Valor	3 oz	PRE	0	21	10.1	48.7	72.7	98
KIH-485	0.15 lb	PRE	0	17	9.6	44.2	68.7	100
Select Max	9 fl oz	4-inch	0	0	10.0	49.0	69.1	100
Assure II	8 fl oz	4-inch	0	0	9.3	47.9	70.3	100
Raptor	4 fl oz	4-inch	0	22	8.7	37.3	67.4	100
LSD (0.05)			NS	3	NS	NS	NS	7
CV			0	28	13	12	16	5

[a]*Jabr=Japanese brome*

[b]*Glyphosate applied preplant and preemergence to all treatments*

[c]*Select Max and Assure II applied with COC (1%); Raptor applied with NIS and 28% N (0.25% + 2.5%).*

Dry pea desiccation with Sharpen. Jenks, Willoughby, and Hoefing.The objective of this study was to evaluate dry pea desiccation with Sharpen compared to Gramoxone. Treatments were applied on August 3 when about 80% of the dry pea pods had turned to a light green or yellow color. Sharpen and glyphosate treatments were applied at 10 gpa, while Gramoxone was applied at 20 gpa. Treatments were evaluated visually for percent desiccation of leaves, vines, and pods at 3, 7, 10, and 14 days after treatment (DAT).

Gramoxone provided faster overall desiccation 3 and 7 DAT; however, by 10 DAT Sharpen + Glyphosate was similar to Gramoxone in each category. Sharpen and glyphosate alone provided complete desiccation by 10-14 DAT.

Table. Dry pea desiccation with Sharpen. (1048)

		Dry pea desiccation (days after treatment)													
		Leaf				Stem				Pods				Yield	TW
Treatment[abc]	Rate	3	7	10	14	3	7	10	14	3	7	10	14	Aug 17	
		----------% desiccation----------								---% green remaining---				lb/A	lb/bu
Untreated		78	98	99	100	53	70	85	96	20	12	6	0	3787	64.4
Sharpen	1 oz	82	99	99	100	64	79	90	98	16	2	0	0	3625	63.9
Sharpen	2 oz	77	99	99	100	61	83	90	99	21	0	0	0	3194	63.9
Sharpen	4 oz	84	99	99	100	46	85	90	99	13	0	0	0	3344	63.8
Glyphosate	22 oz	84	99	99	100	68	80	91	100	15	3	0	0	3859	64.1
Sharpen + Gly	1 oz + 22 oz	82	99	99	100	66	82	95	100	18	0	0	0	3269	63.4
Gramoxone	1.5 pt	95	99	99	100	93	99	99	100	4	0	0	0	2785	63.9
LSD (0.05)		NS	NS	NS	NS	20	10	6	NS	NS	5	3	NS	NS	NS
CV		9	1	0	0	18	6	4	2	57	120	176	458	12	1

[a]*All treatments applied pre-harvest Aug 3; Sharpen and Glyphosate applied with MSO (1%) + AMS (5%); Gramoxone applied with NIS (0.25%).*

[b]*Glyphosate=Roundup Powermax*

[c]*GramoxoneInteon applied at 20 gpa; all other treatments applied at 10 gpa.*

POST weed control with bentazon and imazamox tank mixtures in field pea, Carrington, 2010. (Greg Endres and Rick Glatt). The experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with BASF. Experimental design was a randomized complete block with three replicates. Field pea was planted April 30. Herbicide treatments were applied with a hand-held boom sprayer delivering 10 gal/A at 35 psi through 8001 flat fan nozzles to the center 6.7 ft of 10- by 25-ft plots on May 28 with 86 F, 47% RH, 60% clear sky, and 3 mph wind to 2- to 4-inch height field pea, 1- to 3-leaf yellow and green foxtail, and 0.5- to 1.5-inch tall common lambsquarters. Average plant density (ft^2) in untreated plots on May 28: field pea=9, foxtail=44, and common lambsquarters=15. The trial was harvested with a plot combine on August 2.

Foxtail control was good to excellent (81-92%) among herbicide treatments with the exception of Basagran (Table). During the latest visual evaluation on July 19 (about 7 wk after application), Raptor, Basagran at 16 and 21.4 fl oz/A plus Raptor, and BAS 762AC H provided excellent (91-92%) control of foxtail. Control of common lambsquarters generally was excellent (88-99%) among treatments. Biomass reduction ranged from 15 to 63% with Raptor and Basagran at 16 and 21.4 fl oz/A plus Raptor, compared to minimal crop response with BAS 762AC H and Basagran at 24 and 28 fl oz/A plus Raptor. While significant crop response occurred with Raptor and Basagran at low rates plus Raptor, seed yield generally was similar among treatments. Yield was reduced due to no grass control with Basagran and was similar to yield of the untreated check.

Table.

Herbicide			Weed control (%)[1]								Field pea			
Treatment[2]		Rate	8-Jun		18-Jun		2-Jul		19-Jul		Biomass reduction (%)		Plant maturity	Seed yield
No.		fl oz product/A	fota	colq	fota	colq	fota	colq	fota	colq	4-Jun	18-Jun	Jday	bu/A
1	untreated check	x	0	0	0	0	0	0	0	0	0	0	196	17.3
2	Raptor	4	85	88	83	95	91	97	91	92	30	63	205	42.6
3	Basagran	24	0	97	0	99	0	99	0	99	8	3	196	24.4
4	Basagran + Raptor	16 + 4	90	99	88	97	84	97	91	97	22	15	201	44.2
5	Basagran + Raptor	21.4 + 4	90	98	89	99	92	99	92	99	25	45	204	47.2
6	BAS 762AC H	24	86	98	83	99	88	98	91	98	2	7	201	46.6
7	Basagran + Raptor	24 + 4	84	98	81	99	81	99	85	99	7	0	200	43.3
8	Basagran + Raptor	28 + 4	85	99	81	97	83	99	86	98	6	0	200	43.1
C.V. (%)			5.4	1.8	5.0	1.8	7.1	1.3	3.4	2.6	17.8	22.6	0.7	12.9
LSD (0.05)			6	3	6	3	8	2	4	4	4	7	2	8.7

[1]fota=green and yellow foxtail; colq=common lambsquarters.

[2]Treatments included COC (Destiny - WinField Solutions) at 1% v/v plus UAN at 2% v/v.

Field pea weed control with Sharpen, Carrington, 2010. (Greg Endres and Rick Glatt). The trial was conducted in cooperation with BASF to evaluate weed control and field pea response with soil-applied Sharpen. Experimental design was a randomized complete block with three replicates. The field trial was established on a Heimdal-Emrick loam soil with 3.9% organic matter, 5.9 pH, 38 lb N/A, 10 ppm P, and 187 ppm K. Inoculated 'Midas' field pea was direct-seeded in wheat stubble at 300,000 pls/A in 7-inch rows on May 3. Herbicide treatments were applied with a CO_2-hand-boom plot sprayer delivering 10 gal/A at 35 psi through 8001 flat-fan nozzles. PRE treatments were applied on May 3 with 54 F, 46% RH, 6 mph wind, 85% clear sky, and dry soil surface to 1- inch tall common lambsquarters. Rainfall totaled 0.9 inches during 4 d after application of herbicides. Crop residue measured using the line-transect method was 83% on May 17. Field pea emerged on May 21. Assure II at 7 fl oz/A plus MSO at 1% v/v were applied across the trial except the untreated check on June 2 with 65 F, 41% RH, and 6 mph wind to 3- to 4-inch tall field pea. POST treatment was applied on June 14 with 71 F, 41% RH, 8 mph wind, and 30% clear sky to 5- to 9-inch tall field pea and 1- to 6-inch tall common lambsquarters. The trial was harvested with a plot combine on August 2.

Common lambsquarters control was excellent (90 to 99%) with all Sharpen treatments when visually evaluated on May 10 and 20, and continued to be excellent with Sharpen plus Spartan on June 25 and July 27 (Table). No crop response was observed. Seed yield was greater than 50 bu/A with the 2x rate of Sharpen plus Spartan, indicating excellent crop tolerance.

Table.

			Weed control[1]				Field pea
Herbicide			5/10	5/20	6/25	7/27	Yield
Treatment[2]	Rate	Timing[3]	Colq	Colq	Colq	Colq	bu/A
	fl oz product/A		%				
Untreated check	x	x	0	0	0	0	19.6
Glyphosate + NIS	32	PRE	52	85	67	0	34.8
Sharpen + glyt	1+32	PRE	90	95	72	40	39.0
Sharpen + glyt	2+32	PRE	98	98	76	55	40.1
Sharpen + glyt	3+32	PRE	98	95	85	57	38.7
Sharpen + Spartan + glyt	1+4.5+32	PRE	96	99	97	98	43.6
Sharpen + Spartan + glyt	2+9+32	PRE	96	99	98	98	51.2
Reflex + glyt + NIS	12+32	PRE	40	70	40	13	47.6
Reflex + glyt + MSO	12+32+0.5%	PRE	57	82	58	27	43.5
Basagran + Raptor	16+2	POST	0	0	68	72	35.1
C.V. (%)			13.3	14.3	9.1	23.8	16.8
LSD (0.05)			14	18	10	19	11.4

[1]Colq=Common lambsquarters.

[2]Glyphosate=Roundup Original (Monsanto); Sharpen=saflufenacil (BASF); NIS=Preference (Winfield Solutions) at 0.25% v/v. All glyphosate tank mixtures include AMS=N-Pak (Agri-Solutions) at 64 fl oz/A. All Sharpen treatments and Basagran + Raptor include tank mixture of MSO=Destiny (Winfield Solutions) at 1% v/v.

[3]PRE=May 3; POST= June 14.

Herbicide performance for preharvest desiccation of field pea, Carrington, 2010. (Greg Endres and Blaine Schatz). The experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with Valent. Experimental design was a randomized complete block with three replicates. Inoculated field pea was planted on April 23. Herbicide treatments were applied with a hand-held boom sprayer delivering 17 gal/A at 35 psi through 8001 flat fan nozzles to the center 6.7 ft of 8- by 25-ft plots on July 26 with 70 F, 88% RH, 30% clear sky, and 7 mph wind to physiologically-mature plants. Trial was harvested with a plot combine on August 6.

Plant loss of green or yellow color (% brown) was similar among treatments when visually evaluated 4 and 7 days after application of desiccants (Table). Seed yield was similar among desiccants. Test weight with Valor plus Roundup PowerMax was less compared to other treatments.

Table.

		Field pea			
Herbicide		Plant desiccation		Yield	TW
Treatment[1]	Rate	30-Jul	2-Aug	bu/A	lb/bu
	product/A	%			
Untreated check	x	97	99	66.9	64.1
Valor + MSO	2 oz + 32 fl oz	93	99	71.8	64.3
Valor + MSO + Roundup PowerMax	2 oz + 32 fl oz + 22 fl oz	92	99	67.9	63.1
Roundup PowerMax	22 fl oz	94	99	67.0	63.9
Gramoxone Max + NIS	20.8 fl oz + 0.25% v/v	100	100	68.3	64.3
Sharpen + MSO + AMS	2 fl oz + 2% v/v + 64 fl oz	95	99	74.4	64.1
C.V. (%)		4.7	1.1	11.8	0.7
LSD (0.05)		NS	NS	NS	0.8

[1]NIS=Preference (Winfield Solutions); MSO=Destiny (Winfield Solutions); AMS=N-Pak (Agri-Solutions).

Sharpen field pea desiccation. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Carrington, ND, to evaluate field pea desiccation with Sharpen. 'Admiral' field pea was planted on April 22, 2010. Desiccation treatments were applied on July 23 at 10:30 am with 70 F air, 82 F soil surface, 85% relative humidity, 85% cloud cover, 0 to 3 mph SW wind, dry soil surface, moist subsoil, excellent crop vigor, and no dew present. Applications were made at 0% natural stem desiccation; 10 to 40% natural tendril desiccation; 40 to 75% natural leaf desiccation; 5 to 10% green pods; 10 to 20% yellow pods; and 50 to 75% brown pods. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

Before and after applications, weather was extremely favorable for desiccation, above 90 F temperatures during the day, no rain, very sunny, and windy; therefore, desiccation was faster and higher than expected and treatment separation was difficult. Little difference between Sharpen rates. On 3 and 7 DAT, Sharpen resulted in a quicker desiccation than other treatments. All treatments at 10 and 14 DAT are very similar. Little to no differences to tendrils, leaf, and pod color change. A difference in stem desiccation was observed early on.
(Department of Plant Sciences, North Dakota State University, Fargo).

Table. Sharpen field pea desiccation (Zollinger, Ries, Kazmierczak).

Treatment	Rate	3 DAT						7 DAT					
		Stem[1]	Tendril[2]	Leaf[3]	Green[4]	Yellow[5]	Brown[6]	Stem	Tendril	Leaf	Green	Yellow	Brown
	(product/A)	% control						% control					
Sharpen+Scoil+AMS	1fl oz+1% v/v+17lb/100gal	10	88	77	5	13	82	80	99	98	0	0	99
Sharpen+Scoil+AMS	2fl oz+1% v/v+17lb/100gal	13	88	78	2	13	85	80	99	99	0	0	99
Sharpen+Scoil+AMS	4fl oz+1% v/v+17lb/100gal	13	92	80	2	12	87	83	99	99	0	0	99
RUPM+Scoil+AMS	21fl oz+1% v/v+17lb/100gal	5	77	68	5	27	68	67	96	98	0	1	98
Sharpen+RUPM+ Scoil+AMS	0.72fl oz+21fl oz+ 1% v/v+17lb/100gal	5	80	65	5	25	72	78	99	99	0	0	99
Valor+Scoil	1.5oz+1% v/v	5	83	78	2	22	77	80	99	99	0	1	98
Valor+Scoil	2oz+1qt	5	77	75	3	32	65	80	99	99	0	0	99
Aim+Scoil+AMS	2.6fl oz+1% v/v+17lb/100gal	5	83	78	3	33	63	73	98	98	0	1	99
Untreated		5	70	57	12	17	72	52	92	88	0	4	96
LSD (0.05)		3	7	9	7	11	13	8	3	3	NS	2	1

[1]Stem = % stem desiccation.
[2]Tendril = % tendril desiccation.
[3]Leaf = % leaf desiccation.
[4]Green = % green pods.
[5]Yellow = % yellow pods.
[6]Brown = % brown (dry) pods.

Table cont. Sharpen field pea desiccation (Zollinger, Ries, Kazmierczak).

Treatment	Rate	10 DAT						14 DAT					
		Stem[1]	Tendril[2]	Leaf[3]	Green[4]	Yellow[5]	Brown[6]	Stem	Tendril	Leaf	Green	Yellow	Brown
	(product/A)	% control						% control					
Sharpen+Scoil+AMS	1fl oz+1% v/v+17lb/100gal	88	99	99	0	0	99	98	99	99	0	0	99
Sharpen+Scoil+AMS	2fl oz+1% v/v+17lb/100gal	88	99	99	0	0	99	99	99	99	0	0	99
Sharpen+Scoil+AMS	4fl oz+1% v/v+17lb/100gal	93	99	99	0	0	99	99	99	99	0	0	99
RUPM+Scoil+AMS	21fl oz+1% v/v+17lb/100gal	75	99	99	0	0	99	90	99	99	0	0	99
Sharpen+RUPM+ Scoil+AMS	0.72fl oz+21fl oz+ 1% v/v+17lb/100gal	87	99	99	0	0	99	93	99	99	0	0	99
Valor+Scoil	1.5oz+1% v/v	87	99	99	0	0	99	98	99	99	0	0	99
Valor+Scoil	2oz+1qt	90	99	99	0	0	99	99	99	99	0	0	99
Aim+Scoil+AMS	2.6fl oz+1% v/v+17lb/100gal	83	99	99	0	0	99	95	99	99	0	0	99
Untreated		68	99	99	0	0	99	86	99	99	0	0	99
LSD (0.05)		5	NS	NS	NS	NS	NS	3	NS	NS	NS	NS	NS

[1]Stem = % stem desiccation.
[2]Tendril = % tendril desiccation.
[3]Leaf = % leaf desiccation.
[4]Green = % green pods.
[5]Yellow = % yellow pods.
[6]Brown = % brown (dry) pods.

Vida field pea desiccation. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Carrington, ND, to evaluate field pea desiccation with Vida. 'Admiral' field pea was planted on April 22, 2010. Desiccation treatments were applied on July 23 at 10:30 am with 70 F air, 82 F soil surface, 85% relative humidity, 85% cloud cover, 0 to 3 mph SW wind, dry soil surface, moist subsoil, excellent crop vigor, and no dew present. Applications were made at 0% natural stem desiccation; 0 to 25% natural tendril desiccation; 20 to 50% natural leaf desiccation; 20 to 30% green pods; 20 to 30% yellow pods; and 50 to 70% brown pods. Treatments were applied to the center 6.7 feet of the 10 by 40 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles. The experiment had a randomized complete block design with three replicates per treatment.

All Vida treatments, the pH was lowered to 4.3 to 4.5. Before and after applications, weather was extremely favorable for desiccation, above 90 F temperatures during the day, no rain, very sunny, and windy, therefore natural desiccation was higher than expected. Gramoxone Inteon is highly active for field pea desiccation. Tank-mixing Gramoxone Inteon and Vida increased desiccation over Vida alone. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Vida field pea desiccation (Zollinger, Ries, Kazmierczak).

Treatment	Rate	3 DAT						7 DAT					
		Stem[1]	Tendril[2]	Leaf[3]	Green[4]	Yellow[5]	Brown[6]	Stem	Tendril	Leaf	Green	Yellow	Brown
	(product/A)	% control						% control					
Vida+Herbimax+AMS	4.125fl oz+1% v/v+2.5lb	5	60	57	10	48	42	42	90	88	0	8	92
Vida+Gramoxone Inteon+Herbimax+AMS	4.125fl oz+1pt+1% v/v+2.5lb	28	96	96	0	12	88	87	99	99	0	0	99
Vida+Gramoxone Inteon+Herbimax+AMS	2.75fl oz+1pt+1% v/v+2.5lb	27	97	95	0	5	95	92	99	99	0	0	99
Gramoxone Inteon+Herbimax+AMS	2pt+1% v/v+2.5lb	47	99	98	0	1	98	88	99	99	0	0	99
Untreated		2	55	43	10	48	42	32	87	87	0	7	96
LSD (0.05)		5	7	8	6	6	11	5	4	6	NS	4	5

[1]Stem = % stem desiccation.
[2]Tendril = % tendril desiccation.
[3]Leaf = % leaf desiccation.
[4]Green = % green pods.
[5]Yellow = % yellow pods.
[6]Brown = % brown (dry) pods.

Table cont. Vida field pea desiccation (Zollinger, Ries, Kazmierczak).

Treatment	Rate	10 DAT						14 DAT					
		Stem[1]	Tendril[2]	Leaf[3]	Green[4]	Yellow[5]	Brown[6]	Stem	Tendril	Leaf	Green	Yellow	Brown
	(product/A)	% control						% control					
Vida+Herbimax+AMS	4.125fl oz+1% v/v+2.5lb	57	98	98	0	3	97	82	99	99	0	0	99
Vida+Gramoxone Inteon+Herbimax+AMS	4.125fl oz+1pt+1% v/v+2.5lb	95	99	99	0	0	99	99	99	99	0	0	99
Vida+Gramoxone Inteon+Herbimax+AMS	2.75fl oz+1pt+1% v/v+2.5lb	96	99	99	0	0	99	99	99	99	0	0	99
Gramoxone Inteon+Herbimax+AMS	2pt+1% v/v+2.5lb	95	99	99	0	0	99	99	99	99	0	0	99
Untreated		47	93	93	0	3	96	72	99	99	0	0	99
LSD (0.05)		5	3	3	NS	3	2	4	NS	NS	NS	NS	NS

[1]Stem = % stem desiccation.
[2]Tendril = % tendril desiccation.
[3]Leaf = % leaf desiccation.
[4]Green = % green pods.
[5]Yellow = % yellow pods.
[6]Brown = % brown (dry) pods.

Weed control in field pea, Williston 2009. Neil Riveland

'K-2' green field pea was planted on May 11 into 2009 HRS wheat stubble using a JD 750 notill drill with 7 inch row spacing at 150 lbs/a. All treatments were applied PE on May 21 to a dry soil surface with 47 F air temperature, 55% RH, 60% clear sky and wind at 2-4 mph from 258 degrees with topsoil at 57 F. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply all treatments. PE treatments were applied through 8002 flat fan nozzles delivering 20 gals/a at 40 psi. Plot size was 6.67 ft wide area the length of 10 by 30 ft plots. Glyphosate was applied to the whole plot area on May 5 to control emerged weeds. First rain received after PE applications were 0.10 inch on May 20. The experiment was a randomized complete block design with three replications. Plots were evaluated for crop injury and weed control June 14 and June 27 and again on August 10 for weed control. Russian thisle density was 3-5 plants/sq ft, wild mustard at 2-4 plants/sq ft and red root pigweed and common lambsquarters at 1/2-2 plants/sq ft. Sixty plus mph winds on August 1st caused severe seed shatter. The plots were not harvested for yield.

PE Treatment	Product Rate oz/a	% SR 6/14	% Crop Injury 6/14	% Crop Injury 6/27	Ruth 6/14	Ruth 6/27	Wimu 6/14	Wimu 6/27	Rrpw 8/10	Colq 8/10
					----------% Control----------					
Untreated	0	0	0	0	0	0	0	0	0	0
Express	0.25	3	0	3	47	42	60	68	78	38
Sharpen+MSO+AMS	1 +1%v/v+2%w/v	5	2	5	85	81	83	80	73	61
Spartan	4	10	3	8	89	97	73	88	97	98
Reflex	12	5	5	5	80	80	93	96	90	52
Prowl H2O	48	0	0	3	85	82	68	62	87	91
Sharpen+Spartan+MSO+AMS	1+4+1%v/v+2%w/v	2	2	12	93	95	88	96	97	98
Sharpen+Reflex+MSO+AMS	1+12+1%v/v+2%w/v	7	3	12	86	80	95	97	98	77
Sharpen+Prowl H2O+MSO+AMS	1+48+1%v/v+2%w/v	3	5	3	70	76	70	75	92	92
Express+Spartan	0.25+4	8	9	17	95	98	95	91	96	99
Spartan	3	10	8	20	93	97	78	81	98	98
EXP MEAN		5	4	9	76	77	74	77	84	75
C.V. %		87	70	60	19	12	23	14	9	14
LSD 5%		NS	4	9	24	15	29	18	13	17

Residual Effect of Huskie Applied in 2009 on 2010 Field Pea and Lentil. 2010.
Neil Riveland. Williston.

'K2' field pea and 'Richlea' lentil were planted notill into 2009 HRS wheat stubble (var. 'Mott')on April 21 and May 11, respectively. These plots had also been treated in 2009 with Huskie at rates listed below. Stand counts were taken on May 28. Visual crop injury ratings were done June 17 and June 27. There were no crop injury symptoms that could be identified visually as being Huskie carryover to field pea or lentil. Residual broadleaf weed control was rated on June 27. A wind and hail (small amount) event on August 1st caused a 70 to 80% shatter loss of unharvested field and lentil. Therefore no yield data was collected.

Previous Crop Treatment a	Product Rate	Stand Counts Pea	Stand Counts Lentil	CI - June 17 Pea	CI - June 17 Lentil	CI - June 27 Pea	CI - June 27 Lentil	BL Weed Control
		plants/ft2		---- % ----		---- % ----		% b
Untreated	0	4.6	9.1	0	0	0	0	0
Huskie + AMS	11 oz/a + 0.5 lb/a	4.6	9.4	4	13	8	9	55
Huskie + AMS	13.5 oz/a + 0.5 lb/a	5.3	9.8	4	6	6	4	52
Huskie + AMS	15 oz/a + 0.5 lb/a	4.9	9.1	5	9	9	5	69
Huskie + AMS + NIS	13.5 oz/a +0.5 lb/a +0.25% V/V	5.5	9.4	0	8	5	9	63
Widematch + MCPA Ester	1 pt/a + 0.5 pt/a	5.1	8.7	4	6	11	1	41
Affinity TM+Starane+NIS	0.6oz/a+0.33pt/a+0.25% V/V	4.0	8.7	4	1	8	5	28
HIGH MEAN		5.5	9.8	5	13	11	9	69
LOW MEAN		4.0	8.7	0	0	0	0	0
EXP MEAN		4.9	9.2	3	6	7	5	44
C.V. %		20.7	7.8	152	74	125	116	38
LSD 5%		NS	NS	NS	7	NS	NS	24
LSD 1%		NS	NS	NS	NS	NS	NS	34
# OF REPS		4	4	4	4	4	4	4
F-TRT		1.0	1.3	1	4	1	2	8

a - Treatment applied June 2, 2009 to Mott HRS wheat AMS = Ammonium Sulphate; NIS = Non ionic surfactant.
b - Visually rated for broadleaf weed control compared to the untreated plots, primarily Russian thistle.

Effect of seeding date on lentil tolerance to Spartan. Jenks, Willoughby, and Hoefing.Spartan is not labeled for use in lentil. Previous tolerance studies have shown minimal injury from Spartan while other studies show moderate to severe injury. The objective of this study was to determine if Spartan injury is correlated with early planting dates and cool temperatures. Lentil was planted on April 28, May 10, and May 18. Spartan was applied PRE at 3 and 6 oz on April 29, May 11, and May 20. For "Seeding Date 1", 0.42 and 0.73 inches of rain fell within 7 and 14 days after the PRE was applied, respectively. For "Seeding Date 2", 0 and 1.26 inches of rain fell within 7 and 14 days after the PRE was applied, respectively. For "Seeding Date 3", 1.26 and 2.97 inches of rain fell within 7 and 14 days after the PRE was applied, respectively. Moderate to severe lentil injury was observed with all seeding dates and Spartan rates. More injury was observed with the last seeding date and the least injury with the middle seeding date. Lentil injury from Spartan may be more correlated with rainfall soon after application as well as soil characteristics than soil temperature. Given these results, it appears that Spartan should not be labeled for use in lentil.

Table. Effect of seeding date on lentil tolerance to Spartan. (1019)

	Lentil								
	Visual Injury					Density	Height	Yield	Test wt.
Date Seeded	18-31 DAP	35-38 DAP	49-56 DAP	67-71 DAP	Jul 24	Jun 4	Jul 13	Sep 3	Sep 3
	----------%----------					m row	cm	lb/A	lb/bu
April 28									
Untreated	0	0	0	0	0	36.1	30.3	1336	60.7
3 oz	29	36	36	36	24	28.1	26.8	1012	61.3
6 oz	39	64	69	70	54	23.8	23.6	693	61.6
May 10									
Untreated	0	0	0	0	0	35.4	31.6	2172	61.6
3 oz	13	28	25	15	11	29.4	27.5	2190	61.9
6 oz	24	63	65	45	34	26.0	23.1	1435	61.9
May 18									
Untreated	0	0	0	0	0	28.4	28.4	1943	62.6
3 oz	81	82	80	50	50	19.4	19.4	1095	62.3
6 oz	96	96	96	85	85	13.4	13.4	412	62.2
LSD (0.05)	9.3	3.2	4.2	12.8	15.7	5	3.3	525	0.48
CV	20	5	7	26	37	13	8.9	26	0.52

[a]*Spartan applied PRE on April 29, May 11, and May 20*

Clearfield lentil tolerance to Sharpen. Jenks, Willoughby, and Hoefing.The objective of this study was to evaluate Clearfield lentil tolerance to Sharpen applied alone PRE (0.75 or 1 fl oz) or tank mixed with Prowl H2O. Glyphosate was included with all PRE treatments. Clearfield lentil ('Maxim') was seeded May 10 into 7.5-inch rows into stubble. PRE treatments were applied May 12. Beyond was applied POST on June 8 to all treatments when lentils were 4- to 6-inches tall. Note that Sharpen is not labeled at this time for use in lentils. (The last treatment in Table 1 is considered a 2X rate of Sharpen + Prowl.)

Sharpen applied alone caused minimal visible injury at either rate (Table 1). Significantly more lentil injury was observed with Prowl. Adding Prowl to the tank mix increased injury up to17% at normal rates and tended to reduce crop density. This is not uncommon to see 5-15% lentil injury from Prowl or other Group 3 herbicides. Crop injury was as much as 25% with the 2X rate of Sharpen + Prowl; however, the lentils recovered over time and this treatment resulted in the highest yield, likely due to better weed control. Beyond provided excellent control of pigweed, lambsquarters, and foxtail, but poor control of wild buckwheat (Table 2). The 2X rate of Sharpen + Prowl followed by Beyond provided better wild buckwheat control (83%).

Table 1. Clearfield lentil tolerance to Sharpen. (1016)

		Lentil								
		Injury				Density	Height		Yield	TW
Treatment[ab]	Rate	28 May	8 Jun	25 Jun	9 Jul	19 Jun	2 Jul	26 Jul	25 Aug	25 Aug
		----------%----------				m row	cm		lb/A	lb/bu
Beyond	4 fl oz	0	0	0	0	31.8	22.4	39.5	1567	62.6
Sharpen / Beyond	0.75 fl oz / 4 fl oz	0	2	1	1	30.5	24.1	36.3	1410	61.3
Sharpen / Beyond	1 fl oz / 4 fl oz	0	2	4	2	31.4	23.5	32.6	1500	61.2
Sharpen + Prowl H2O / Beyond	0.75 fl oz + 2 pt / 4 fl oz	0	7	15	12	24.7	22.3	32.4	1821	62.4
Sharpen + Prowl H2O / Beyond	1 fl oz + 2 pt / 4 fl oz	0	7	17	12	28.2	21.7	36.1	1701	62.6
Prowl H2O / Beyond	1.5 pt / 4 fl oz	0	2	9	8	32.0	22.8	38.5	1361	62.2
Sharpen + Prowl H2O / Beyond	1.5 fl oz + 4 pt / 4 fl oz	0	16	25	19	25.8	20.3	36.7	1896	63.0
Untreated		0	0	0	0	27.0	28.9	31.2	100	--
LSD (0.05)		NS	1	4	5	NS	3	NS	529	NS
CV		0	17	23	41	11	7	10	23	1

[a]*Sharpen and Prowl applied PRE; Beyond applied POST. Glyphosate applied PRE to all treatments except untreated.*

[b]*Beyond applied with NIS (0.25%) + 28% N (2.5 %); Sharpen applied with MSO (1%)*

Table 2. Weed control with Sharpen tank mixes followed by Beyond. (1016)

Treatment[ab]	Rate	Weed Control[c]							
		Wibw		Rrpw		Colq		Grft	
		8 Jun	9 Jul	8 Jun	9 Jul	8 Jun	9 Jul	8 Jun	9 Jul
		----------%----------							
Beyond	4 fl oz	60	53	80	100	80	100	60	99
Sharpen / Beyond	0.75 fl oz / 4 fl oz	68	57	85	100	83	100	57	98
Sharpen / Beyond	1 fl oz + / 4 fl oz	68	59	85	100	83	98	57	98
Sharpen + Prowl H2O / Beyond	0.75 fl oz + 2 pt / 4 fl oz	76	64	93	100	90	100	87	99
Sharpen + Prowl H2O / Beyond	1 fl oz + 2 pt / 4 fl oz	73	66	92	100	87	100	83	99
Prowl H2O / Beyond	1.5 pt / 4 fl oz	67	55	85	100	86	100	85	98
Sharpen + Prowl H2O / Beyond	1.5 fl oz + 4 pt / 4 fl oz	89	83	97	100	96	100	95	100
Untreated		0	0	0	0	0	0	0	0
LSD (0.05)		9	8	9	NS	7	1	5	2
CV		8	7	8	0	5	1	5	2

[a] *Sharpen and Prowl applied PRE; Beyond applied POST. Glyphosate applied PRE to all treatments except untreated.*

[b] *Beyond applied with NIS (0.25%) + 28% N (2.5 %); Sharpen applied with MSO (1%)*

[c] *Wibw= Wild buckwheat; Rrpw= Redroot pigweed; Colq= Common lambsquarters; Grft= Green foxtail*

Weed control in lentil. Williston 2009. Neil Riveland

'Richlea lentil was planted on May 17 into 2009 HRS wheat stubble using a JD 750 no-till drill with 7 inch row spacing at 70 lbs/a. All treatments were applied PE on May 26 to a dry soil surface with 71 F air temperature, 40% RH, 95% clear sky and wind at 2-6 mph from 78 degrees with topsoil at 68 F. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply all treatments. PE treatments were applied through 8002 flat fan nozzles delivering 20 gals/a at 40 psi. Plot size was 6.67 ft wide area the length of 10 by 30 ft plots. First rain received after PE applications was 0.10 inch on May 20. The experiment was a randomized complete block design with three replications. Plots were evaluated for crop injury on June 16 and June 26 and for weed control on June 26 and July 17. Russian thisle density was 1-2 plants/sq ft, prostrate pigweed(prpw) 6-8 plants/sq ft, redroot pigweed (rrpw) 2 plants/sq ft and Russian thistle (Ruth) and Kochia (Kocz) at 1/2-2 plants/sq ft and green foxtail at 10 plants/sq ft. Sixty plus mph winds on August 1st caused severe seed shatter. The plots were not harvested for yield.

				% Crop		---- % Weed Control ----				
PE	Product	-- % SR--		Injury		Prpw	Rrpw	Ruth	Grft	Kocz
Treatment	Rate oz/a	6/14	6/26	6/14	6/26	6/26	6/26	7/17	7/17	7/17
Untreated	0	0	0	0	0	0	0	0	0	0
Prowl H2O	40	7	5	2	0	80	7	17	43	0
Express	0.25	2	8	9	30	62	85	27	10	25
Sharpen+MSO+AMS	0.75+1%v/v+2%w/v	13	17	13	33	91	91	52	15	90
Spartan	2	22	32	23	37	85	97	85	60	95
Reflex	12	13	17	32	53	99	99	63	48	38
Sharpen+Spartan+MSO+AMS	0.75+2+1%v+2%v	52	42	8	28	93	96	93	20	95
Sharpen+Reflex+MSO+AMS	0.75+12+1%+2%	18	18	13	52	99	99	67	95	93
Sharpen+Prowl H2O+MSO+AMS	0.75+40+1%+2%	12	17	5	22	95	98	42	48	38
Express+Prowl H2O	0.25+40	28	48	53	85	99	99	10	0	20
Prowl H2O	32	0	3	3	3	57	0	20	93	15
EXP MEAN		15	19	15	31	78	70	43	39	46
C.V. %		68	81	121	100	14	7	69	97	47
LSD 5%		18	26	31	NS	19	8	51	NS	49

Clearfield Lentil weed control and tolerance. Jenks, Willougby, and Hoefing.The objective of this study was to evaluate weed control with Sharpen and Express applied alone or tank mixed with glyphosate or Prowl. Another objective was to evaluate weed control with or without Beyond. Clearfield lentil ('Maxim') was seeded May 11 into 7.5-inch rows into stubble. Preemergence (PRE) treatments were applied May 12. Beyond was applied POST on June 9 in three treatments when lentils were 4- to 6-inches tall. Select Max was applied POST to control grasses in treatments that did not include Beyond, except for treatments 1 and 2 (untreated and glyphosate alone).

Express tank mixed with glyphosate did not improve weed control over glyphosate alone (Table 1). Sharpen tank mixed with glyphosate significantly increased lambsquarters control compared to glyphosate alone, but only slightly increased control of other weeds. Applying Beyond POST provided >90% control of all weeds except kochia. Pigweed control was poor with all treatments except where Beyond was applied POST.

None of the treatments caused more than 7% visible crop injury and did not reduce crop density or height (Table 2). Beyond increased lentil yield 200-600 lb/A compared to treatments with soil-applied herbicides followed by Select Max (Table 2).

Table 1. Weed Control in Clearfield Lentil. (1007)

		Weed control[b]				
		Kocz	Prle	Howe	Rrpw	Colq
Treatment[ac]	Rate	July 9				
		----------%----------				
Untreated		0	0	0	0	0
Glyph	22 fl oz	75	83	78	17	20
Glyph + Express	22 oz + 0.25 oz	80	85	80	17	20
Sharpen + Glyph	1 fl oz + 22 fl oz	81	94	88	37	83
Sharpen + Glyph + Prowl H2O	1 fl oz + 22 fl oz + 2 pt	82	93	88	58	98
Sharpen + Glyph / Beyond	1 fl oz + 22 fl oz / 4 fl oz	81	91	92	99	99
Glyph + Express / Beyond	22 fl oz + 0.25 oz / 4 fl oz	80	98	91	99	99
Sharpen + Glyph + Prowl H2O / Beyond	1 oz + 22 oz + 2 pt / 4 oz	87	96	94	99	99
Glyph + Prowl H2O	22 fl oz + 1.5 pt	68	85	77	57	88
LSD (0.05)		16	11	9	16	21
CV		13	8	7	13	18

[a]*Glyphosate applied with AMS (2%); Express applied with NIS (0.25%); Beyond applied with NIS (0.25%); Sharpen applied with MSO (1%); Glyph = Roundup PowerMax; Select = Select Max*

[b]*Kocz=Kochia; Prle=Prickly Lettuce; Howe=Horseweed; Rrpw=Redroot pigweed; Colq=Common lambsquarters*

[c]*All treatments applied PRE except for Beyond which was applied POST.*

Table 2. Clearfield lentil tolerance to herbicides applied PRE and POST. (1007)

Treatment[ab]	Rate	Lentil				
		Density	Height	Injury	Yield	TW
		Jun 4	Jul 26	Jul 3	Aug 25	Aug 25
		m row	cm	%	lb/A	lb/bu
Untreated		24.9	40.8	0	255	60.4
Glyphosate	22 fl oz	26.3	45.8	0	712	60.3
Glyph + Express[c]	22 oz + 0.25 oz	28.6	43.5	3	1644	62.3
Sharpen + Glyph[c]	1 fl oz + 22 fl oz	23.5	42.0	3	1936	62.7
Sharpen + Glyph + Prowl H2O[c]	1 fl oz + 22 fl oz + 2 pt	24.8	44.7	7	2006	63.1
Sharpen + Glyph / Beyond	1 fl oz + 22 fl oz / 4 fl oz	27.6	43.2	7	2237	63.2
Glyph + Express / Beyond	22 fl oz + 0.25 oz / 4 fl oz	27.3	43.5	3	2432	63.3
Sharpen + Glyph + Prowl H2O / Beyond	1 oz + 22 oz + 2 pt / 4 oz	27.5	45.3	3	2610	63.0
Glyph + Prowl H2O[c]	22 fl oz + 1.5 pt	27.8	43.9	2	1944	63.0
LSD (0.05)		NS	NS	4.7	513	0.94
CV		10.6	9.1	90	17	0.87

[a]*Glyphosate applied with AMS (2%); Express applied with NIS (0.25%); Beyond applied with NIS (0.25%); Sharpen applied with MSO (1%); Glyph = Roundup PowerMax; Select = Select Max*

[b]*All treatments applied PRE except for Beyond which was applied POST.*

[c]*Select Max was applied POST to control grasses.*

Lentil desiccation with Sharpen. Jenks, Willoughby, and Hoefing.The objective of this study was to evaluate lentil desiccation with Sharpen compared to Gramoxone. Treatments were applied on August 13 when about 80% of the lentil pods had turned to a light green or yellow color. Sharpen and glyphosate treatments were applied at 10 gpa, while Gramoxone was applied at 20 gpa. Treatments were evaluated visually for percent desiccation of leaves, vines, and pods at 3, 7, 10, and 14 days after treatment (DAT).

Gramoxone provided much faster desiccation at 3 and 7 DAT. Sharpen + glyphosate tended to provide slightly faster desiccation than either herbicide alone. Desiccation with Sharpen + glyphosate was not equivalent to Gramoxone until at least 10-14 DAT. Surprisingly, desiccation with glyphosate was comparable to Sharpen alone by 10 DAT; high temperatures in the 80s and 90s likely helped glyphosate desiccation.

Table. Lentil desiccation with Sharpen. (1044)

		Lentil desiccation (days after treatment)												Yield	TW
		Leaf				Stem				Pods					
Treatment[abc]	Rate	3	7	10	14	3	7	10	14	3	7	10	14	Aug 27	
		----------%desiccation----------								---% green remaining---				lb/A	lb/bu
Untreated		16	35	63	72	5	18	33	39	38	24	13	8	1734	62.4
Sharpen	1 oz	35	53	88	94	9	28	49	57	24	4	1	0	2025	62.9
Sharpen	2 oz	39	54	89	96	10	31	51	60	24	4	0	0	1731	62.4
Sharpen	4 oz	40	53	89	95	10	31	51	63	24	5	0	0	1894	62.7
Glyphosate	22 oz	20	58	95	99	5	36	60	74	35	10	0	0	1508	61.9
Sharpen + Gly	1 oz + 22 oz	35	68	98	99	9	40	65	79	26	2	0	0	1701	62.9
Gramoxone	1.5 pt	87	98	99	99	33	73	78	81	5	0	0	0	1767	62.6
LSD (0.05)		7	6	6	5	3	4	7	7	11	11	7	5	NS	0.58
CV		13	7	5	4	20	8	8	8	29	107	226	279	17	0.62

[a]*All treatments applied pre-harvest Aug 13; Sharpen and Glyphosate applied with MSO (1%) + AMS (5%); Gramoxone applied with NIS (0.25%).*

[b]*Glyphosate=Roundup Powermax*

[c]*GramoxoneInteon applied at 20 gpa; all other treatments applied at 10 gpa.*

Weed control in non-irrigated potato with SOLIDA. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted near Glyndon, MN to determine the efficacy and selectivity of SOLIDA compared to Matrix FNV on Red Norland Potato. Plots were 4 rows by 25 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 38 inch rows and 12 inch spacing on June 2, 2010. Treatments were applied on June 14 for the PRE applications and June 29 for the POST applications to the middle 2 rows. Crop injury and weed control were evaluated 15, 23, and 49 days after application "A" (DAA A). Potatoes were machine harvested October 6, and graded a few weeks later. Application, environmental, crop, and weed data are listed below:

Date:		6/14/10	6/29/10
Treatment:		PRE	POST
Sprayer:	GPA:	20	20
	PSI:	40	40
	Nozzle:	8002	8002
Air temperature (F):		71	72
Relative humidity (%):		24	44
Wind (MPH):		8	6
Soil moisture:		Adequate	Adequate
Cloud cover (%):		40	10
Next rain:		6/15/10	7/3/10

No crop injury was observed throughout the trial. The primary weeds that were examined were common lambsquarters, redroot pigweed, and green foxtail. Common lambsquarters was the most prevalent of the three, followed by green foxtail, and then redroot pigweed. At 15 and 23 DAA with the PRE treatments, common lambsquarters control increased as the rate of SOLIDA increased. On August 2 (34 DAA B), provided the greatest control of common lambsquarters, with 95%. At that same time, SOLIDA @ 0.0117 lb ai/a PRE treatment provided unacceptable common lambsquarters control (78%) and significantly less common lambsquarters control than the SOLIDA @ 0.047 lb ai/a + Preference @ 0.25% v/v POST treatment.
Tuber yields were all similar except for the untreated. The untreated plants had a yield of 129 cwt/a, while in all other treatments, plants yielded >184 cwt/a.

Table 1. Weed Control 14 and 45 DAA.

					------6/29/10------			------7/7/10------			------8/2/10------		
				App	Colq	RRpw	Grft	Colq	RRpw	Grft	Colq	RRpw	Grft
No	Name	Rate	Unit	Code	----------% Control----------								
1	Unt				0 c	0 b	0 c	0 b	0 b	0 c	0 c	0 c	0 c
2	Solida	0.0117	lb a/a	A	92 b	98 a	95 a	86 a	96 a	88 b	78 b	93 ab	84 ab
3	Solida	0.0.234	lb a/a	A	96 ab	100 a	95 a	90 a	98 a	89 ab	85 ab	93 ab	85 ab
4	Solida	0.047	lb a/a	A	98 a	100 a	95 a	93 a	96 a	91 ab	84 ab	94 ab	90 a
5	Matrix	0.0234	lb a/a	A	95 ab	100 a	93 b	90 a	99 a	90 ab	86 ab	93 ab	90 a
6	Solida Preference	0.0117 0.25	lb a/a % v/v	B B				88 a	98 a	91 ab	86 ab	98 a	94 a
7	Solida Preference	0.0234 0.25	lb a/a % v/v	B B				89 a	100 a	93 ab	93 ab	100 a	93 a
8	Solida Preference	0.047 0.25	lb a/a % v/v	B B				91 a	100 a	93 ab	95 a	100 a	94 a
9	Matrix Preference	0.0234 0.25	lb a/a % v/v	B B				86 a	98 a	95 a	91 ab	99 a	91 a
10	Lorox Prowl H2O	3 2	lb/a pt/a	A A	99 a	100 a	95 a	90 a	93 a	88 b	84 ab	81 b	78 b
11	Sencor Prowl H2O	0.67 2	lb/a pt/a	A A	100 a	100 a	95 a	95 a	98 a	89 ab	90 ab	91 ab	79 b
				LSD (P≤.05)	4	3	2	5	5	4	9	9	8

Table 2. Effect of herbicides on yield and grade.

			App	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz
Name	Rate	Unit	Code	---------- cwt/a ----------					
Untreated				129 b	41 a	65 b	20 b	3 a	88 b
Solida	0.0117	lb a/a	A	200a	39 a	107 a	38 a	15 a	160 a
Solida	0.0.234	lb a/a	A	193 a	41 a	97 a	40 a	15 a	152 a
Solida	0.047	lb a/a	A	184 a	35 a	97 a	39 a	13 a	149 a
Matrix	0.0234	lb a/a	A	195 a	39 a	98 a	42 a	16 a	156 a
Solida	0.0117	lb a/a	B	205 a	44 a	105 a	40 a	15 a	161 a
Preference	0.25	% v/v	B						
Solida	0.0234	lb a/a	B	208 a	40 a	109 a	39 a	19 a	167 a
Preference	0.25	% v/v	B						
Solida	0.047	lb a/a	B	227 a	48 a	109 a	49 a	22 a	179 a
Preference	0.25	% v/v	B						
Matrix	0.0234	lb a/a	B	225 a	42 a	114 a	48 a	20 a	183 a
Preference	0.25	% v/v	B						
Lorox	3	lb/a	A	207 a	45 a	107 a	40 a	15 a	163 a
Prowl H2O	2	pt/a	A						
Sencor	0.67	lb/a	A	229 a	49 a	113 a	49 a	18 a	180 a
Prowl H2O	2	pt/a	A						
			LSD (P≤.05)	33	15	18	10	10	28

Weed control in irrigated potato with SOLIDA. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Irrigation Research site near Inkster, ND to determine the efficacy and selectivity of SOLIDA compared to Matrix FNV on Russet Burbank Potato. Wheat was the previous crop in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on May 20, 2010. Treatments were applied on June 4 (2 days after hilling) for the PRE applications and June 23 for the POST applications to the middle 2 rows. Crop injury and weed control were evaluated 14 and 45 days after application "A" (DAA A). Water was not limiting as irrigation was scheduled every 3 to 4 days once potatoes had emerged following hilling. Potatoes were machine harvested September 29 and graded a few weeks later. Application, environmental, crop, and weed data are listed below:

Date:		6/4/10	6/23/10
Treatment:		PRE	POST
Sprayer:	GPA:	20	20
	PSI:	40	40
	Nozzle:	8002	8002
Air temperature (F):		67	65
Relative humidity (%):		77	83
Wind (MPH):		7	7
Soil moisture:		Adequate	Adequate
Cloud cover (%):		0	100

There was no observed crop injury during this trial. The primary weeds that were examined were common lambsquarters, redroot pigweed, and green foxtail. Common lambsquarters was the most abundant of the three, followed by green foxtail, and then redroot pigweed. At 14 DAA A, all PRE treatments provided between 88-91% common lambsquarters control. At 45 DAA A or 26 DAA B, all POST treatments provided significantly greater common lambsquarters control compared to the PRE treatments (>93% and <86%, respectively).
Tuber yields indicated no significance differences among treatments even though yields differed as much as 171 cwt/A. The highest yielding treatment was SOLIDA @ 0.047 lb ai/a + Preference @ 0.25% v/v POST at 600 cwt/a. The treatment with the lowest yield was the untreated at 429 cwt/a.

Table 1. Weed Control 14 and 45 DAA A.

				-----6/18/10-----			-----7/19/10-----		
			App	Colq	RRpw	Grft	Colq	RRpw	Grft
Name	Rate	Unit	Code	----------% Control----------					
Untreated				0 b	0 b	0 b	0 c	0 b	0 b
Solida	0.0117	lb a/a	A	89 a	100 a	96 a	85 b	98 a	98 a
Solida	0.0.234	lb a/a	A	88 a	100 a	91 a	86 b	99 a	98 a
Solida	0.047	lb a/a	A	91 a	100 a	99 a	86 b	98 a	100 a
Matrix	0.0234	lb a/a	A	89 a	100 a	99 a	85 b	100 a	100 a
Solida Preference	0.0117 0.25	lb a/a % v/v	B B				94 a	100 a	99 a
Solida Preference	0.0234 0.25	lb a/a % v/v	B B				93 a	100 a	100 a
Solida Preference	0.047 0.25	lb a/a % v/v	B B				94 a	100 a	99 a
Matrix Preference	0.0234 0.25	lb a/a % v/v	B B				94 a	100 a	100 a
LSD (P ≤.05)				4	0	6	3	2	4

Table 2. Effect of herbicides on yield and grade.

			App	Total	<4 oz	4-6 oz	6-12 oz	>12 oz	>4 oz
Name	Rate	Unit	Code	---------- Cwt/a ----------					
Untreated				429 a	134 a	124 a	146 a	25 a	295 a
Solida	0.0117	lb a/a	A	589 a	203 a	182 a	188 a	16 a	386 a
Solida	0.0.234	lb a/a	A	449 a	161 a	158 a	118 a	12 a	288 a
Solida	0.047	lb a/a	A	555 a	196 a	176 a	164 a	19 a	359 a
Matrix	0.0234	lb a/a	A	588 a	173 a	180 a	203 a	33 a	415 a
Solida Preference	0.0117 0.25	lb a/a % v/v	B B	498 a	163 a	151 a	153 a	31 a	335 a
Solida Preference	0.0234 0.25	lb a/a % v/v	B B	518 a	168 a	160 a	163 a	27 a	350 a
Solida Preference	0.047 0.25	lb a/a % v/v	B B	600 a	188 a	168 a	201 a	43 a	412 a
Matrix Preference	0.0234 0.25	lb a/a % v/v	B B	598 a	179 a	174 a	204 a	41 a	419 a
LSD (P ≤.05)				208	62	75	80	33	155

Adjuvants with pre-emergence herbicides for improved weed control on red potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Non-Irrigation Research site near Grand Forks, ND to evaluate different adjuvants tank-mixed with common pre-emergence herbicides used on Red Norland Potato. Soybean was the previous crop in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on June 16, 2010. Treatments were applied on July 7 to the middle 2 rows. Crop injury and weed control were evaluated 12 and 22 days after application (DAA). Potatoes were machine harvested October 18 and graded a few weeks later. Application, environmental, crop, and weed data are listed below:

Date:		7/7/10
Treatment:		PRE
Sprayer:	GPA:	20
	PSI:	40
	Nozzle:	8002
Air temperature (F):		76
Relative humidity (%):		57
Wind (MPH):		5
Soil moisture:		Adequate
Cloud cover (%):		33
Next rain:		7/9/10

No crop injury was observed throughout the trial. The primary weeds that were examined were common lambsquarters, redroot pigweed, and green foxtail. There were no significant differences in weed control, yield, and grade. The lack of common lambsquarters, redroot pigweed, and green foxtail control differences suggest that when these weed pressures are low, reduced metribuzin or dimethenamid-P rates may provide similar control as the labeled rates. Yield variability did not allow for treatment separation at the 5% level even though a difference of 146 cwt/a in total yield occurred between the highest and lowest yielding treatments.

Table 1. Weed Control 12 and 22 DAA.

					-----7/19/10-----			-----7/29/10-----		
				App	Colq	RRpw	Grft	Colq	RRpw	Grft
No	Name	Rate	Unit	Code	----------% Control----------					
1	Kalo 1 Metribuzin	1 5.4	qt/a oz/a	A A	100 a	100 a	100 a	100 a	100 a	100 a
2	Kalo 1 Metribuzin	1 2.7	qt/a oz/a	A A	100 a	100 a	100 a	100 a	100 a	99 a
3	Kalo 1 Outlook	1 10.5	qt/a fl oz/a	A A	100 a	100 a	99 a	100 a	99 a	100 a
4	Kalo 1 Outlook	1 5.25	qt/a fl oz/a	A A	100 a	99 a	100 a	100 a	100 a	100 a
5	Kalo 2 Metribuzin	1 5.4	qt/a oz/a	A A	100 a	100 a	100 a	100 a	100 a	100 a
6	Kalo 2 Metribuzin	1 2.7	qt/a oz/a	A A	100 a	100 a	100 a	100 a	100 a	100 a
7	Kalo 2 Outlook	1 10.5	qt/a fl oz/a	A A	100 a	99 a	100 a	100 a	100 a	100 a
8	Kalo 2 Outlook	1 5.25	qt/a fl oz/a	A A	100 a	100 a	100 a	100 a	100 a	100 a
9	Winfield 1 Metribuzin	1 5.4	qt/a oz/a	A A	100 a	100 a	100 a	100 a	100 a	100 a
10	Winfield 1 Metribuzin	1 2.7	qt/a oz/a	A A	100 a	100 a	100 a	100 a	100 a	100 a
11	Winfield 1 Outlook	1 10.5	qt/a fl oz/a	A A	100 a	100 a	100 a	100 a	100 a	100 a
12	Winfield 1 Outlook	1 5.25	qt/a fl oz/a	A A	100 a	98 a	99 a	100 a	100 a	98 a
13	Metribuzin	5.4	oz/a	A	100 a	100 a	100 a	100 a	100 a	100 a
14	Metribuzin	2.7	oz/a	A	100 a	100 a	100 a	99 a	100 a	100 a
15	Outlook	10.5	fl oz/a	A	100 a	99 a	100 a	100 a	99 a	100 a
16	Outlook	5.25	fl oz/a	A	100 a	98 a	99 a	100 a	98 a	100 a
17	Metribuzin	10.7	oz/a	A	100 a	100 a	100 a	100 a	100 a	100 a
18	Outlook	21	fl oz/a	A	100 a	99 a	95 a	100 a	100 a	100 a
19	Preference Metribuzin	1 2.7	qt/a oz/a	A A	100 a	100 a	99 a	100 a	100 a	100 a
20	Preference Outlook	1 5.25	qt/a fl oz/a	A A	100 a	100 a	98 a	100 a	100 a	99 a
21	Untreated				0 b	0 b	0 b	0 b	0 b	0 b
LSD (P≤.05)					1	2	4	1	1	2

Table 2. Effect of herbicides on yield and grade.

No	Name	Rate	Unit	App Code	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz
					----------cwt/a----------					
1	Kalo 1 Metribuzin	1 5.4	qt/a oz/a	A A	222 a	52 a	90 a	31 a	49 a	170 a
2	Kalo 1 Metribuzin	1 2.7	qt/a oz/a	A A	280 a	90 a	111 a	36 a	43 a	190 a
3	Kalo 1 Outlook	1 10.5	qt/a fl oz/a	A A	249 a	95 a	116 a	30 a	7 a	153 a
4	Kalo 1 Outlook	1 5.25	qt/a fl oz/a	A A	257 a	111 a	109 a	31 a	5 a	146 a
5	Kalo 2 Metribuzin	1 5.4	qt/a oz/a	A A	219 a	100 a	89 a	21 a	8 a	119 a
6	Kalo 2 Metribuzin	1 2.7	qt/a oz/a	A A	296 a	76 a	98 a	37 a	85 a	220 a
7	Kalo 2 Outlook	1 10.5	qt/a fl oz/a	A A	231 a	91 a	76 a	24 a	40 a	140 a
8	Kalo 2 Outlook	1 5.25	qt/a fl oz/a	A A	228 a	92 a	98 a	30 a	7 a	135 a
9	Winfield 1 Metribuzin	1 5.4	qt/a oz/a	A A	226 a	95 a	95 a	30 a	6 a	131 a
10	Winfield 1 Metribuzin	1 2.7	qt/a oz/a	A A	235 a	101 a	101 a	26 a	7 a	134 a
11	Winfield 1 Outlook	1 10.5	qt/a fl oz/a	A A	228 a	84 a	77 a	27 a	41 a	144 a
12	Winfield 1 Outlook	1 5.25	qt/a fl oz/a	A A	272 a	101 a	117 a	40 a	13 a	171 a
13	Metribuzin	5.4	oz/a	A	272 a	96 a	119 a	36 a	20 a	175 a
14	Metribuzin	2.7	oz/a	A	209 a	84 a	89 a	28 a	9 a	125 a
15	Outlook	10.5	fl oz/a	A	287 a	99 a	126 a	44 a	18 a	187 a
16	Outlook	5.25	fl oz/a	A	272 a	84 a	121 a	36 a	31 a	188 a
17	Metribuzin	10.7	oz/a	A	236 a	95 a	92 a	28 a	21 a	141 a
18	Outlook	21	fl oz/a	A	292 a	76 a	116 a	44 a	56 a	216 a
19	Preference Metribuzin	1 2.7	qt/a oz/a	A A	240 a	117 a	89 a	27 a	7 a	123 a
20	Preference Outlook	1 5.25	qt/a fl oz/a	A A	365 a	83 a	115 a	48 a	118 a	282 a
21	Untreated				311 a	85 a	115 a	50 a	61 a	226 a
LSD (P≤.05)					89	32	47	21	72	95

Weed control with Reflex +/- Dual or +/- Boundary as a pre-emergence treatment in Ranger Russet potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Irrigation Research site near Inkster, ND to evaluate crop tolerance and weed control of Reflex +/- Dual or +/- Boundary as a pre-emergence treatment in Ranger Russet Potato. The previous crop was wheat. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on May 21, 2010. Treatments were applied on June 4 (2 days after hilling) to the middle 2 rows. Crop injury and weed control were evaluated 14 and 45 days after application (DAA). Water was not a limiting as irrigation was scheduled every 3 to 4 days once potatoes had emerged following hilling. Potatoes were machine harvested September 29 and graded a few weeks later. Application, environmental, crop, and weed data are listed below:

Date:		6/4/10
Treatment:		PRE
Sprayer:	GPA:	20
	PSI:	40
	Nozzle:	8002
Air temperature (F):		67
Relative humidity (%):		77
Wind (MPH):		9
Soil moisture:		Adequate
Cloud cover (%):		0

No crop injury was observed in this trial. The primary weeds that were examined were common lambsquarters, redroot pigweed, and green foxtail. Common lambsquarters had the most abundant of the three, followed by green foxtail, and then redroot pigweed. At 14 DAA, Sencor @ 0.67 lb/a + Outlook @ 16 fl oz (100%) and Reflex @ 1 pt/a + Boundary @ 1.5 pt/a (98%) provided significantly better common lambsquarters control compared to the other treatments (<96%). Results were similar at 45 DAA for common lambsquarters control.
Matrix @ 1 oz/a + Outlook @ 16 fl oz/a had the highest yield with 551 cwt/a, which was significantly greater than the untreated. Plants treated with Reflex @ 1 pt/a + Dual Magnum @ 1 pt/a had the second highest yield at 522 cwt/a. The untreated plants had the lowest yield with 374 cwt/a.

Table 1. Weed Control 14 and 45 DAA.

					------6/18/10------			-------7/19/10-------		
				App	Colq	RRpw	Grft	Colq	RRpw	Grft
No	Name	Rate	Unit	Code	----------% Control----------					
1	Untreated				0 d	0 b	0 c	0 c	0 b	0 b
2	Reflex 2SL	1	pt/a	A	90 c	100 a	88 b	90 b	100 a	91 a
3	Reflex 2SL	2	pt/a	A	96 ab	100 a	90 ab	93 b	100 a	94 a
4	Reflex 2SL Dual Magnum	1 1	pt/a pt/a	A	96 ab	100 a	91 ab	91 b	100 a	95 a
5	Reflex 2SL Boundary	1 1.5	pt/a pt/a	A	98 a	100 a	91 ab	97 a	100 a	94 a
6	Matrix Outlook	1 16	oz/a fl oz/a	A	94 b	100 a	93 ab	90 b	100 a	96 a
7	Sencor 75DF Outlook	0.67 16	lb/a fl oz/a	A	100 a	100 a	95 a	98 a	100 a	96 a
				LSD (P ≤.05)	3	0	4.3	2.9	1.4	11.9

Table 2. Effect of herbicides on yield and grade.

				App	Total	<4 oz	4-6 oz	6-12 oz	>12 oz	>4 oz
No	Name	Rate	Unit	Code	---------- cwt/a ----------					
1	Untreated				374 b	78 a	97 a	172 a	27 b	295 b
2	Reflex 2SL	1	pt/a	A	478 ab	106 a	120 a	206 a	46 ab	372 ab
3	Reflex 2SL	2	pt/a	A	508 a	92 a	121 a	246 a	48 ab	416 ab
4	Reflex 2SL Dual Magnum	1 1	pt/a pt/a	A	522 a	101 a	118 a	243 a	60 ab	421 ab
5	Reflex 2SL Boundary	1 1.5	pt/a pt/a	A	492 ab	101 a	124 a	213 a	55 ab	392 ab
6	Matrix Outlook	1 16	oz/a fl oz/a	A	551 a	92 a	120 a	249 a	90 a	459 a
7	Sencor 75DF Outlook	0.67 16	lb/a fl oz/a	A	492 ab	108 a	125 a	227 a	31 b	384 ab
				LSD (P ≤.05)	89.6	22.3	30.4	57.7	30.8	86.8

Weed control with Reflex +/- Dual or +/- Boundary as a pre-emergence treatment in Russet Burbank Potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Irrigation Research site near Inkster, ND to evaluate crop tolerance and weed control of Reflex +/- Dual or +/- Boundary as a pre-emergence treatment in Russet Burbank Potato. Wheat was the previous crop in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on May 21, 2010. Treatments were applied on June 4 (2 days after hilling) to the middle 2 rows. Crop injury and weed control were evaluated 14 and 45 days after application (DAA). Water was not a limiting as irrigation was scheduled every 3 to 4 d once potatoes had emerged following hilling. Potatoes were machine harvested September 29 and graded a few weeks later. Application, environmental, crop, and weed data are listed below:

Date:		6/4/10
Treatment:		PRE
Sprayer:	GPA:	20
	PSI:	40
	Nozzle:	8002
Air temperature (F):		67
Relative humidity (%):		77
Wind (MPH):		9
Soil moisture:		Adequate
Cloud cover (%):		0

No crop injury was observed following herbicide applications. The primary weeds that were evaluated were common lambsquarters, redroot pigweed, and green foxtail. Common lambsquarters was the most abundant, followed by green foxtail, and then redroot pigweed. At 14 DAA the only treatment that was significantly different (besides untreated) was Reflex @ 1 pt/a, which had 90% control of common lambsquarters while all other treatments provided >95% control. At 45 DAA, Reflex @ 1 pt/a + Boundary @ 1.5 pt/a and Sencor @ 0.67 lb/a + Outlook @ 16 fl oz/a provided significantly better common lambsquarters control than the other treatments (96 and 98%, respectively).
There were no significant differences among Russet Burbank tuber yield and grade.

Table 1. Weed Control 14 and 45 DAA.

				------6/18/10------			-------7/19/10-------		
			App	Colq	RRpw	Grft	Colq	RRpw	Grft
Treatment	Rate	Unit	Code	----------% Control----------					
Untreated				0 c	0 b	0 b	0 c	0 b	0 b
Reflex 2SL	1	pt/a	A	90 b	100 a	89 a	90 b	100 a	96 a
Reflex 2SL	2	pt/a	A	96 a	100 a	90 a	91 b	100 a	96 a
Reflex 2SL Dual Magnum	1 1	pt/a pt/a	A	95 a	100 a	90 a	91 b	100 a	94 a
Reflex 2SL Boundary	1 1.5	pt/a pt/a	A	97 a	100 a	94 a	96 a	100 a	96 a
Matrix Outlook	1 16	oz/a fl oz/a	A	96 a	100 a	95 a	90 b	100 a	95 a
Sencor 75DF Outlook	0.67 16	lb/a fl oz/a	A	100 a	100 a	91 a	98 a	100 a	96 a
LSD (P ≤.05)				3.9	0	6.3	2.8	0	4.7

Table 2. Effect of herbicides on potato yield and grade.

			App	Total	<4 oz	4-6 oz	6-12 oz	>12 oz	>4 oz
Name	Rate	Unit	Code	----------cwt/a----------					
Untreated				424 a	122 a	119 a	159 a	24 a	302 a
Reflex 2SL	1	pt/a	A	362 a	105 a	97 a	140 a	20 a	257 a
Reflex 2SL	2	pt/a	A	539 a	140 a	134 a	222 a	43 a	399 a
Reflex 2SL Dual Magnum	1 1	pt/a pt/a	A	491 a	136 a	138 a	177 a	40 a	355 a
Reflex 2SL Boundary	1 1.5	pt/a pt/a	A	544 a	135 a	138 a	222 a	49 a	409 a
Matrix Outlook	1 16	oz/a fl oz/a	A	489 a	130 a	140 a	182 a	38 a	359 a
Sencor 75DF Outlook	0.67 16	lb/a fl oz/a	A	494 a	149 a	145 a	163 a	38 a	346 a
LSD (P ≤.05)				166.4	46.1	59.3	76.2	25.3	131.2

Weed control with Reflex +/- Dual or +/- Boundary as a pre-emergence treatment in Shepody Potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Irrigation Research site near Inkster, ND to evaluate crop tolerance and weed control of Reflex +/- Dual or +/- Boundary as a pre-emergence treatment in Shepody Potato. Wheat was the previous crop in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on May 21, 2010. Treatments were applied on June 4 (2 days after hilling) to the middle 2 rows. Crop injury and weed control were evaluated 14 and 45 days after application (DAA). Water was not a limiting as irrigation was scheduled every 3 to 4 days once potatoes had emerged following hilling. Potatoes were machine harvested September 29 and graded a few weeks later. Application, environmental, crop, and weed data are listed below:

Date:		6/4/10
Treatment:		PRE
Sprayer:	GPA:	20
	PSI:	40
	Nozzle:	8002
Air temperature (F):		67
Relative humidity (%):		77
Wind (MPH):		9
Soil moisture:		Adequate
Cloud cover (%):		0

No injury was observed following the herbicide applications. The primary weeds that were evaluated were common lambsquarters, redroot pigweed, and green foxtail. Common lambsquarters was the most prevalent of the three, followed by green foxtail, and then redroot pigweed. At 14 DAA, Sencor @ 0.67 lb/a + Outlook @ 16 fl oz (100%) and Reflex @ 1 pt/a + Boundary @ 1.5 pt/a (99%) provided significantly better control of common lambsquarters compared to the other treatments, <96%. Similar results occurred at 45 DAA for common lambsquarters control. There were no significant differences among Shepody tuber yield and grade.

Table 1. Weed Control 14 and 45 DAA.

					------6/18/10------			-------7/19/10-------		
				App	Colq	RRpw	Grft	Colq	RRpw	Grft
No	Name	Rate	Unit	Code	---------- % Control ----------					
1	Untreated				0 d	0 b	0 b	0 e	0 b	0 b
2	Reflex 2SL	1	pt/a	A	91 c	99 a	90 a	89 d	100 a	95 a
3	Reflex 2SL	2	pt/a	A	96 b	100 a	91 a	93 bc	100 a	95 a
4	Reflex 2SL Dual Magnum	1 1	pt/a pt/a	A	95 b	99 a	90 a	90 cd	100 a	96 a
5	Reflex 2SL Boundary	1 1.5	pt/a pt/a	A	99 a	100 a	91 a	95 ab	100 a	96 a
6	Matrix Outlook	1 16	oz/a fl oz/a	A	95 b	100 a	94 a	90 cd	100 a	96 a
7	Sencor 75DF Outlook	0.67 16	lb/a fl oz/a	A	100 a	100 a	94 a	97 a	100 a	96 a
				LSD (P ≤.05)	2.8	2	5.3	2.8	0	2.9

Table 2. Effect of herbicides on yield and grade.

				App	Total	<4 oz	4-6 oz	6-12 oz	>12 oz	>4 oz
No	Name	Rate	Unit	Code	---------- cwt/a ----------					
1	Untreated				460 a	26 a	39 a	184 a	212 a	434 a
2	Reflex 2SL	1	pt/a	A	475 a	32 a	47 a	167 a	229 a	443 a
3	Reflex 2SL	2	pt/a	A	528 a	38 a	50 a	212 a	228 a	491 a
4	Reflex 2SL Dual Magnum	1 1	pt/a pt/a	A	501 a	30 a	46 a	172 a	173 a	391 a
5	Reflex 2SL Boundary	1 1.5	pt/a pt/a	A	509 a	32 a	45 a	215 a	218 a	477 a
6	Matrix	1	oz/a	A	516 a	38 a	41 a	194 a	243 a	478 a

Vida and Aceto Diquat as desiccants in Red Norland potatoes. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Non-irrigated Research site near Grand Forks, ND to evaluate Vida and Aceto Diquat herbicides as desiccants. Soybean was the previous crop in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (s oz) were planted on 36 inch rows and 12 inch spacing on June 16, 2010. Treatments were applied when potatoes were beginning to senesce on September 14. Two treatments had a second application which occurred on September 21. Treatments were applied to the middle 2 rows. Leaf and stem necrosis data were taken 3 times, September 22, 8 days after application A (DAA A), September 28 (14 DAA A), and October 5 (21 DAA A). Potatoes were machine harvested on October 20 and graded a few weeks later. Application, environmental, and crop data are listed below.

Date:		9/14/10	9/21/10
Treatment:		A	B
Sprayer:	GPA:	20	20
	PSI:	40	40
	Nozzle:	8002	8002
Air temperature (F):		60	53
Relative humidity (%):		55	68
Wind (MPH):		5	11
Soil moisture:		Adequate	Adequate
Cloud cover (%):		75	100
Next rainfall		9/16/10	9/23/10

At 8 DAA A, all treatments quickly burned the leaf tissue, except for Vida @ 5.5 fl oz/a + Herbimax @ 1% v/v + AMS @ 2.5 lb/a. This treatment had 33% leaf necrosis, while all other treatments had >69% desiccation. However, by 21 DAA A, all treatments provided >98% necrosis of both leaves and stems. Tuber yield and grade with the desiccation treatments were similar to the untreated indicating that additional tuber bulking was not occurring.

Table 1. Desiccant data 8, 14, 21 DAA A.

					----9/22/10----		-----9/28/10-----		-----10/5/10-----	
				App	Leaf	Stem	Leaf	Stem	Leaf	Stem
No	Name	Rate	Unit	Code	----------% Desiccated----------					
1	Untreated				0 d	0 e	0 c	0 c	0 b	0 c
2	Vida Herbimax AMS	5.5 1 2.5	fl oz/a % v/v lb/a	A A A	33 c	10 de	85 b	74 b	100 a	98 b
3	Rely 200 AMS	29 2.5	fl oz/a lb/a	A A	80 a	26 a-d	99 a	93 a	100 a	100 a
4	Vida Rely 200 AMS	2.75 24 2.5	fl oz/a fl oz/a lb/a	A A A	79 a	31 a-d	96 a	91 a	100 a	100 a
5	Vida Reglone Preference AMS	2.75 1 0.25 2.5	fl oz/a pt/a % v/v lb/a	A A A A	79 a	29 a-d	100 a	97 a	100 a	100 a
6	Vida Reglone Herbimax AMS	2.75 1 1 2.5	fl oz/a pt/a % v/v lb/a	A A A A	69 a	18 b-e	96 a	90 a	100 a	100 a
7	Reglone Preference AMS	2 0.25 2.5	pt/a % v/v lb/a	A A A	79 a	40 ab	99 a	96 a	100 a	100 a
8	Reglone Preference Reglone Preference	1 0.25 1 0.25	pt/a % v/v pt/a % v/v	A A B B	70 ab	26 a-d	96 a	92 a	100 a	100 a
9	Aceto Diquat Preference	1 0.25	pt/a %v/v	A A	58 b	15 cde	95 a	89 a	100 a	100 a
10	Aceto Diquat Preference	2 0.25	pt/a % v/v	A A	89 a	48 a	100 a	99 a	100 a	100 a
11	Aceto Diquat Preference Aceto Diquat Preference	1 0.25 1 0.25	pt/a % v/v pt/a % v/v	A A B B	80 a	36 abc	100 a	99 a	100 a	100 a
LSD (P≤.05)					13	15	5	8	1	1

Table 2. Yield and grade.

No	Name	Rate	Unit	App Code	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	> 4 oz
					----------cwt/a----------					
1	Untreated				283 a	78 a	129 a	55 a	20 a	205 a
2	Vida Herbimax AMS	5.5 1 2.5	fl oz/a % v/v lb/a	A A A	265 a	88 a	116 a	41 a	21 a	178 a
3	Rely 200 AMS	29 2.5	fl oz/a lb/a	A A	264 a	89 a	120 a	38 a	18 a	176 a
4	Vida Rely 200 AMS	2.75 24 2.5	fl oz/a fl oz/a lb/a	A A A	261 a	83 a	117 a	39 a	21 a	178 a
5	Vida Reglone Preference AMS	2.75 1 0.25 2.5	fl oz/a pt/a % v/v lb/a	A A A A	268 a	89 a	126 a	37 a	16 a	180 a
6	Vida Reglone Herbimax AMS	2.75 1 1 2.5	fl oz/a pt/a % v/v lb/a	A A A A	269 a	86 a	120 a	43 a	20 a	183 a
7	Reglone Preference AMS	2 0.25 2.5	pt/a % v/v lb/a	A A A	281 a	85 a	118 a	44 a	34 a	196 a
8	Reglone Preference Reglone Preference	1 0.25 1 0.25	pt/a % v/v pt/a % v/v	A A B B	282 a	85 a	136 a	43 a	19 a	197 a
9	Aceto Diquat Preference	1 0.25	pt/a %v/v	A A	262 a	97 a	117 a	33 a	15 a	165 a
10	Aceto Diquat Preference	2 0.25	pt/a % v/v	A A	276 a	88 a	134 a	45 a	9 a	187 a
11	Aceto Diquat Preference Aceto Diquat Preference	1 0.25 1 0.25	pt/a % v/v pt/a % v/v	A A B B	253 a	97 a	113 a	34 a	10 a	157 a
LSD (P≤.05)					36	22	24	12	17	35

Adjuvants to improve desiccation with Sharpen herbicide in Red Lasoda potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Non-Irrigation Research site near Grand Forks, ND to evaluate adjuvants with Sharpen herbicide as a desiccant compared to local standards. Soybeans were grown in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on June 16, 2010. Treatments were applied when potatoes were beginning to senesce on September 22. One treatment had a second application which occurred on September 27. Treatments were applied to the middle 2 rows. Leaf and stem necrosis data were taken three times, September 28, 6 days after application A (6 DAA A), October 5 (13 DAA A), and October 12 (20 DAA A). Potatoes were machine harvested October 20 and graded a few weeks later. Application, environmental, and crop data are listed below.

Date:		9/22/10	9/27/10
Treatment:		A	B
Sprayer:	GPA:	20	20
	PSI:	40	40
	Nozzle:	8002	8002
Air temperature (F):		54	63
Relative humidity (%):		69	73
Wind (MPH):		7	8
Soil moisture:		Adequate	Adequate
Cloud cover (%):		100	100
Next rainfall		9/23/10	9/29/10

All treatments except Sharpen @ 2 fl oz/a + Class Act NG @ 2.5% v/v + Destiny HC @ 0.75 pt/a provided similar plant desiccation at 20 DAA A compared to the standards. Reglone @ 2 pt/a + Preference @ 0.25% v/v provided complete necrosis of leaves and stems by 20 DAA A. Splitting the application (Reglone @ 1 pt/a + Preference @ 0.25% v/v applied 2X) provided slightly less stem necrosis. By 20 DAA A, all Sharpen treatments had leaf necrosis between 91-98%. Sharpen @ 2 fl oz/a + Class Act NG @ 2.5% v/v + Destiny @ 1 pt/a had the greatest control of the Sharpen treatments with 98% necrosis of the leaves and 90% of the stems.
Yields were statistically similar for all treatments.

Table 1. Leaf and stem necrosis at 6, 13,and 20 DAA A.

					--9/28/10--		-----10/5/10-----		----10/12/10----	
				App	Leaf	Stem	Leaf	Stem	Leaf	Stem
No	Name	Rate	Unit	Code	----------% Desiccated----------					
1	Untreated				0 b	0 c	0 e	0 e	0 c	0 c
2	Sharpen	2	fl oz/a	A	11 a	3 ab	41 cd	14 d	91 ab	79 ab
3	Sharpen	2	fl oz/a	A	16 a	5 ab	50 bcd	21 bcd	91 ab	80 ab
	Class Act NG	2.5	% v/v	A						
	InterLock	2	fl oz/a	A						
4	Sharpen	2	fl oz/a	A	14 a	4 ab	54 bcd	25 bcd	91 ab	80 ab
	AG 06011	6	fl oz/a	A						
	NPAK AMS Liq	2.5	% v/v	A						
5	Sharpen	2	fl oz/a	A	10 a	2 b	35 d	14 d	66 b	60 b
	Class Act NG	2.5	% v/v	A						
	Destiny HC	0.75	pt/a	A						
6	Sharpen	2	fl oz/a	A	16 a	4 ab	63 bc	33 bc	95 ab	86 ab
	Class Act NG	2.5	% v/v	A						
	Destiny HC	0.5	% v/v	A						
7	Sharpen	2	fl oz/a	A	14 a	5 ab	55 bcd	23 bcd	98 a	90 ab
	Class Act NG	2.5	% v/v	A						
	Destiny HC	1	pt/a	A						
8	Sharpen	2	fl oz/a	A	13 a	5 ab	51 bcd	25 bcd	95 ab	85 ab
	NPAK AMS Liq	2.5	% v/v	A						
	Destiny (MSO)	1	% v/v	A						
9	Sharpen	2	fl oz/a	A	16 a	5 ab	58 bcd	26 bcd	95 ab	85 ab
	AG 07043	1	% v/v	A						
10	Sharpen	2	fl oz/a	A	13 a	4 ab	49 bcd	20 cd	94 ab	85 ab
	Prime Oil 1%	1	% v/v	A						
	NPAK AMS Liq	2.5	% v/v	A						
11	Sharpen	2	fl oz/a	A	11 a	4 ab	45 cd	16 d	91 ab	79 ab
	AG 07010	1	pt/a	A						
	Class Act NG	2.5	% v/v	A						
12	Sharpen	2	fl oz/a	A	15 a	4 ab	55 bcd	28 bcd	94 ab	85 ab
	AG 08001	1	pt/a	A						
	Class Act NG	2.5	% v/v	A						
13	Sharpen	2	fl oz/a	A	11 a	3 ab	45 cd	15 d	91 ab	84 ab
	AG 08050	0.5	% v/v	A						
	Class Act NG	2.5	% v/v	A						
14	Reglone	2	pt/a	A	19 a	6 a	81 a	50 a	100 a	100 a
	Preference	0.25	% v/v	A						
15	Regone	1	pt/a	A	15 a	5 ab	69 ab	35 b	100 a	98 a
	Preference	0.25	% v/v	A						
	Reglone	1	pt/a	B						
	Preference	0.25	% v/v	B						
LSD (P≤.05)					5	2	14	9	18	18

Table 2. Yield and grade.

				App	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	> 4 oz
No	Name	Rate	Unit	Code	---------- cwt/a ----------					
1	Untreated				303 a	71 a	90 a	37 a	106 a	233 a
2	Sharpen	2	fl oz/a	A	303 a	70 a	112 a	55 a	66 a	233 a
3	Sharpen	2	fl oz/a	A	305 a	62 a	96 a	45 a	102 a	243 a
	Class Act NG	2.5	% v/v	A						
	InterLock	2	fl oz/a	A						
4	Sharpen	2	fl oz/a	A	309 a	59 a	92 a	42 a	116 a	250 a
	AG 06011	6	fl oz/a	A						
	NPAK AMS Liq	2.5	% v/v	A						
5	Sharpen	2	fl oz/a	A	316 a	66 a	86 a	37 a	126 a	250 a
	Class Act NG	2.5	% v/v	A						
	Destiny HC	0.75	pt/a	A						
6	Sharpen	2	fl oz/a	A	276 a	68 a	88 a	40 a	79 a	208 a
	Class Act NG	2.5	% v/v	A						
	Destiny HC	0.5	% v/v	A						
7	Sharpen	2	fl oz/a	A	295 a	64 a	82 a	39 a	110 a	231 a
	Class Act NG	2.5	% v/v	A						
	Destiny HC	1	pt/a	A						
8	Sharpen	2	fl oz/a	A	320 a	57 a	95 a	51 a	117 a	263 a
	NPAK AMS Liq	2.5	% v/v	A						
	Destiny (MSO)	1	% v/v	A						
9	Sharpen	2	fl oz/a	A	318 a	54 a	95 a	46 a	123 a	264 a
	AG 07043	1	% v/v	A						
10	Sharpen	2	fl oz/a	A	292 a	61 a	90 a	43 a	97 a	231 a
	Prime Oil 1%	1	% v/v	A						
	NPAK AMS Liq	2.5	% v/v	A						
11	Sharpen	2	fl oz/a	A	320 a	66 a	93 a	41 a	119 a	254 a
	AG 07010	1	pt/a	A						
	Class Act NG	2.5	% v/v	A						
12	Sharpen	2	fl oz/a	A	264 a	60 a	96 a	43 a	66 a	204 a
	AG 08001	1	pt/a	A						
	Class Act NG	2.5	% v/v	A						
13	Sharpen	2	fl oz/a	A	339 a	68 a	102 a	47 a	122 a	271 a
	AG 08050	0.5	% v/v	A						
	Class Act NG	2.5	% v/v	A						
14	Reglone	2	pt/a	A	287 a	64 a	93 a	48 a	82 a	223 a
	Preference	0.25	% v/v	A						
15	Regone	1	pt/a	A	297 a	58 a	92 a	42 a	105 a	239 a
	Preference	0.25	% v/v	A						
	Reglone	1	pt/a	B						
	Preference	0.25	% v/v	B						
LSD (P≤.05)					51	17	22	14	42	48

Effect of glyphosate droplet concentration in Russet Burbank potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Irrigation Research site near Inkster, ND to evaluate the effect of glyphosate droplet concentration when applied to Russet Burbank potato at different growth stages. Wheat was the previous crop in 2009. Plots were 4 rows by 25 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on May 17, 2010. Treatments were applied on July 19 (tuber initiation), August 6 (early tuber bulking), and September 8 (late tuber bulking) to the middle 2 rows with a modified ATV sprayer. Roundup Weathermax (5.5 lb/gal ai glyphosate) and AMS @ 4 pounds/100 gallons were used in this trial. Potatoes were machine harvested October 7 and graded a few weeks later. Application, environmental, and crop data are listed below:

Date:		7/19/10			8/6/10			9/8/10	
Treatment:		TI (A)			EB (B)			LB (C)	
Sprayer:	GPA:	5(1)	10(2)	20(3)	5(1)	10(2)	20(3)	5(1)	20(3)
	PSI:	40			40			40	
	Nozzle:	80005	8001	8002	80005	8001	8002	80005	8002
Air temperature (F):		71			72			60	
Relative humidity (%):		69			65			65	
Wind (MPH):		7			5			6	
Soil moisture:		Adequate			Adequate			Adequate	
Cloud cover (%):		5			75			10	

There were no significant yield or grade differences. However, there was a tendency at each growth stage (TI, EB, or LB), for yield to decrease as the rate of glyphosate increased with the exception for 20 GPA at TI and LB. When glyphosate was applied at the TI stage, total tuber counts (averaged 291 tubers) were less than tuber counts for plants treated with glyphosate at the EB and LB stages as well as untreated plants with 329, 310, and 318 tubers/25 ft, respectively. Last year, potato responded in a similar manner, suggesting that for potato, droplet concentration does not increase absorption to the point where yield is affected.

Table 1. Russet Burbank yield and grade.

			App	Total	<4 oz	4-6 oz	6-12 oz	>12 oz	>4 oz	Total	<4 oz	4-6 oz	6-12 oz	>12 oz	>4 oz
Name	Rate	Unit	Code	----------cwt/a----------						----------Tuber counts in 25 feet----------					Tuber %
Unt				525 a	140 a	139 a	198 a	47 a	385 a	318 a	163 a	78 a	69 a	9 a	49 a
RU*	0.125	lb ai/a	A1	455 a	122 a	119 a	166 a	49 a	333 a	269 a	137 a	66 a	57 a	9 a	49 a
RU*	0.0625	lb ai/a	A1	518 a	118 a	140 a	207 a	54 a	401 a	292 a	133 a	77 a	72 a	10 a	54 a
RU*	0.125	lb ai/a	A2	495 a	141 a	131 a	187 a	37 a	354 a	299 a	155 a	72 a	65 a	7 a	48 a
RU*	0.0625	lb ai/a	A2	520 a	145 a	143 a	176 a	56 a	375 a	315 a	164 a	80 a	62 a	10 a	48 a
RU*	0.125	lb ai/a	A3	496 a	156 a	138 a	183 a	19 a	340 a	323 a	178 a	77 a	64 a	4 a	45 a
RU*	0.0625	lb ai/a	A3	394 a	111 a	134 a	139 a	11 a	283 a	249 a	123 a	74 a	49 a	2 a	51 a
RU*	0.125	lb ai/a	B1	515 a	149 a	149 a	189 a	29 a	366 a	317 a	163 a	83 a	66 a	6 a	49 a
RU*	0.0625	lb ai/a	B1	579 a	163 a	193 a	281 a	55 a	415 a	400 a	184 a	107 a	98 a	11 a	54 a
RU*	0.125	lb ai/a	B2	510 a	140 a	131 a	199 a	39 a	369 a	311 a	162 a	73 a	69 a	7 a	48 a
RU*	0.0625	lb ai/a	B2	521 a	142 a	145 a	187 a	47 a	379 a	310 a	155 a	81 a	66 a	8 a	50 a
RU*	0.125	lb ai/a	B3	503 a	152 a	144 a	168 a	39 a	351 a	323 a	177 a	80 a	59 a	8 a	45 a
RU*	0.0625	lb ai/a	B3	530 a	131 a	141 a	223 a	34 a	399 a	313 a	151 a	78 a	77 a	7 a	52 a
RU*	0.125	lb ai/a	C1	540 a	127 a	146 a	209 a	57 a	413 a	307 a	144 a	81 a	72 a	10 a	53 a
RU*	0.0625	lb ai/a	C1	544 a	148 a	165 a	187 a	45 a	397 a	335 a	170 a	91 a	66 a	8 a	49 a
RU*	0.125	lb ai/a	C3	529 a	122 a	132 a	209 a	66 a	407 a	303 a	145 a	74 a	71 a	12 a	52 a
RU*	0.0625	lb ai/a	C3	504 a	130 a	133 a	180 a	61 a	374 a	395 a	149 a	74 a	62 a	10 a	49 a
*AMS added		LSD (P≤.05)		124	56	54	83	38	129	91	64	30	28	7	14

Simulated glyphosate drift in Red Norland potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Non-Irrigation Research site near Grand Forks, ND to evaluate glyphosate drift at different growth stages on Red Norland Potato. Soybean was the previous crop in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on June 16, 2010. Treatments were applied on July 29 (tuber initiation-TI), August 19 (early tuber bulking-EB), and September 8 (late tuber bulking-LB) to the middle 2 rows with a modified ATV sprayer. Roundup Weathermax (5.5 lb/gal ai glyphosate) and AMS @ 4 pounds/100 gallons were used in this trial. Potatoes were machine harvested October 20 and graded a few weeks later. Application, environmental, and crop data are listed below:

Date:		7/29/10	8/19/10	9/8/10
Treatment:		TI	ETB	LTB
Sprayer:	GPA:	5	5	5
	PSI:	40	40	40
	Nozzle:	80005	80005	80005
Air temperature (F):		75	69	62
Relative humidity (%):		58	63	60
Wind (MPH):		6	10	6
Soil moisture:		Adequate	Adequate	Adequate
Cloud cover (%):		10	0	10
Next rain:		7/30/10	8/23/10	9/10/10

Glyphosate applied at the tuber initiation (TI) stage showed to have the greatest effect on yield and tuber counts for this cultivar. Glyphosate applied at 0.25 and 0.125 lb ai/a (TI stage) had a total yield of 24 and 79 cwt/a, respectively. The untreated had the highest yield with 268 cwt/a. Glyphosate applied at 0.25 lb ai/a (TI stage) had no tuber >4 oz, while the 0.125 lb ai/a had only 8 cwt/a. The untreated had the highest "A" size yield with 169 cwt/a >4 oz. Glyphosate applied at 0.25 lb ai/a (TI stage) only had 57 tubers in 20 feet of row or 2.85 tubers/plant while the untreated had 160 tubers in 20 feet or 8 tubers/plant.

Table 1. Effect of glyphosate drift on yield and grade on Red Norland potatoes.

			App	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz
Name	Rate	Unit	Code	----------cwt/a----------						----------Tuber counts in 20 feet----------					Tuber %
Unt				268 a	99 ab	113 a	39 a	17 a	169 a	160 a	101 abc	45 a	12 a	3 a	39 a
RU*	.25	lb ai/a	TI	24 b	24 c	0 b	0 b	0 a	0 b	57 b	57 c	0 b	0 b	0 a	0 c
RU*	.125	lb ai/a	TI	79 b	71 b	8 b	0 b	0 a	8 b	112 a	108 ab	4 b	0 b	0 a	3 c
RU*	.0625	lb ai/a	TI	174 a	113 a	48 ab	11 ab	1 a	60 ab	162 a	139 a	20 ab	4 ab	.3 a	13 bc
RU*	.25	lb ai/a	EB	216 a	90 ab	98 a	24 ab	4 a	126 a	139 a	91 bc	40 a	7 ab	.8 a	34 a
RU*	.125	lb ai/a	EB	194 a	100 ab	72 a	18 ab	4 a	95 ab	153 a	117 ab	30 a	6 ab	.8 a	24 ab
RU*	.0625	lb ai/a	EB	230 a	84 ab	92 a	31 a	23 a	146 a	137 a	88 bc	36 a	9 a	4.3 a	35 a
RU*	.25	lb ai/a	LB	211 a	92 ab	90 a	21 ab	9 a	120 a	136 a	90 bc	37 a	6 ab	1.8 a	34 a
RU*	.125	lb ai/a	LB	221 a	91 ab	88 a	30 a	12 a	130 a	138 a	91 bc	36 a	9 a	2.3 a	34 a
RU*	.0625	lb ai/a	LB	245 a	98 ab	104 a	28 a	15 a	146 a	146 a	93 bc	43 a	9 a	2.8 a	36 a
*AMS added		LSD (P≤.05)		82	24	49	18	17	76	33	30	19	5	3.2	13

Simulated glyphosate drift in Red Lasoda potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Non-Irrigation Research site near Grand Forks, ND to evaluate glyphosate drift at different growth stages on Red Lasoda Potato. Soybeans were grown in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on June 16, 2010. Treatments were applied on July 29 (tuber initiation), August 19 (early tuber bulking), and September 8 (late tuber bulking) to the middle 2 rows with a modified ATV sprayer. Roundup Weathermax (5.5 lb/gal ai glyphosate) and AMS @ 4 pounds/100 gallons were used in this trial. Potatoes were machine harvested October 20 and graded a few weeks later. Application, environmental, and crop data are listed below:

Date:		7/29/10	8/19/10	9/8/10
Treatment:		TI	ETB	LTB
Sprayer:	GPA:	5	5	5
	PSI:	40	40	40
	Nozzle:	80005	80005	80005
Air temperature (F):		75	69	62
Relative humidity (%):		58	63	60
Wind (MPH):		6	10	6
Soil moisture:		Adequate	Adequate	Adequate
Cloud cover (%):		10	0	10
Next rain:		7/30/10	8/23/10	9/10/10

Glyphosate at the rate of 0.25 lb ai/a at either the tuber initiation (TI), early tuber bulking (EB), and late tuber bulking (LB) stage had the greatest affect on yield. The lowest yield was when plants were treated with 0.25 lb ai/a glyphosate at the EB stage with 103 cwt/a, followed by 0.25 lb ai/a glyphosate at the TI stage with 150 cwt/a, and 0.25 and 0.125 lb ai/a glyphosate at the LB and EB stages, respectively, with 165 cwt/a. The highest yield was from untreated plants with 326 cwt/a. The next three highest yields were from plants treated with 0.0625 lb ai/a glyphosate at the LB, TI, and EB stages, respectively. Tuber counts in 20 feet showed similar results with the greatest tuber production from plants receiving the lowest rate of glyphosate or untreated plants. Plants treated with glyphosate @ 0.25 lb ai/a produced the fewest tubers at all three application timings.

Table 1. Effect of glyphosate drift on yield and grade on Red Lasoda potatoes.

			App	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz
Name	Rate	Unit	Time	----------cwt/a----------						----------Tuber counts in 20 feet----------					Tuber %
Unt				326 a	55 a	96 a	47 ab	128 a	271 a	132 ab	65 ab	35 a	13 a	19 a	50 a
RU*	.25	lb ai/a	TI	150 cd	54 a	34 d	15 cd	46 bc	96 cd	93 bcd	69 ab	13 d	4 bc	7 bc	25 c
RU*	.125	lb ai/a	TI	213 bc	72 a	67 abc	31 a-d	44 bc	142 bcd	130 ab	88 a	26 abc	9 abc	7 bc	32 bc
RU*	.0625	lb ai/a	TI	309 a	67 a	96 a	50 a	96 ab	241 a	141 a	77 ab	35 a	13 a	15 ab	46 ab
RU*	.25	lb ai/a	EB	103 d	39 a	38 d	12 d	14 c	65 d	66 d	45 b	15 cd	4 c	2 c	31 bc
RU*	.125	lb ai/a	EB	165 cd	63 a	48 cd	18 cd	36 bc	102 cd	105 a-d	75 ab	18 bcd	5 bc	6 c	27 c
RU*	.0625	lb ai/a	EB	280 ab	73 a	79 ab	35 abc	93 ab	207 ab	139 a	85 a	30 ab	10 ab	15 ab	39 abc
RU*	.25	lb ai/a	LB	165 cd	42 a	61 bcd	27 bcd	35 bc	123 cd	79 cd	43 b	23 a-d	7 abc	6 c	46 ab
RU*	.125	lb ai/a	LB	210 bc	46 a	72 abc	35 abc	57 bc	164 bc	94 bcd	49 b	26 abc	10 ab	9 bc	48 a
RU*	.0625	lb ai/a	LB	308 a	51 a	80 ab	43 ab	134 a	257 a	117 abc	55 ab	29 ab	12 a	21 a	53 a
*AMS added		LSD (P≤.05)		63	21	21	14	41	58	28	21	8	4	6	11

Simulated glyphosate drift in Sangre potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Grower's Non-Irrigation Research site near Grand Forks, ND to evaluate glyphosate drift at different growth stages on Sangre Potato. Soybeans were grown in 2009. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on June 24, 2010. Treatments were applied on August 6 (tuber initiation-TI), August 25 (early tuber bulking-EB), and September 14 (late tuber bulking-LB) to the middle 2 rows with a modified ATV sprayer. Roundup Weathermax (5.5 lb/gal ai glyphosate) and AMS @ 4 pounds/100 gallons were used in this trial. Potatoes were machine harvested October 20 and graded a few weeks later. Application, environmental, and crop data are listed below:

Date:		8/6/10	8/25/10	9/14/10
Treatment:		TI	ETB	LTB
Sprayer:	GPA:	5	5	5
	PSI:	40	40	40
	Nozzle:	80005	80005	80005
Air temperature (F):		65	66	61
Relative humidity (%):		80	50	50
Wind (MPH):		3	7	5
Soil moisture:		Adequate	Adequate	Adequate
Cloud cover (%):		10	0	75
Next rain:		8/10/10	8/30/10	9/16/10

Glyphosate at the rate of 0.25 lb ai/a at either the tuber initiation (TI), early tuber bulking (EB), and late tuber bulking (LB) stage had the greatest affect on yield. The lowest yield was when glyphosate @ 0.25 lb ai/a was applied at the EB stage with 47 cwt/a, followed by glyphosate @ 0.25 lb ai/a applied at the LB stage with 76 cwt/a. The highest yield was when glyphosate @ 0.0625 lb ai/a was applied at TI with 216 cwt/a. The untreated plants had the second highest yield with 194 cwt/a, and was followed by plants treated with 0.0625 lb ai/a glyphosate at EB, and LB, respectively. Tuber counts in 20 feet of row showed that plants treated with 0.0625 lb ai/a glyphosate at the EB stage produced the most tubers, with 135, followed by plants treated with 0.25 lb ai/a glyphosate at the TI stage with 118 tubers. The untreated plants were in the middle of total tuber counts, but had 49% of the tubers > 4 oz. The highest percentage of "A-size" tubers was from plants treated with 0.0625 lb ai/a glyphosate at the TI stage with 51%. Plants within all glyphosate treatments of 0.625 lb ai/a, regardless of the growth stage timing, produced more "A-size" tubers compared to plants receiving higher glyphosate rates.

Table 1. Effect of glyphosate drift on yield and grade on Sangre potatoes.

			App	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz	Total	<4 oz	4-6 oz	6-10 oz	>10 oz	>4 oz
Name	Rate	Unit	Code	----------cwt/a----------						----------Tuber counts in 20 feet----------					Tuber %
Unt				194 ab	37 a	59 a	31 a	67 a	157 ab	85 ab	43 b	21 ab	9 a	12 a	49 ab
RU*	.25	lb ai/a	A	150 abc	71 a	51 ab	19 ab	8 b	78 a-d	118 ab	91 ab	20 ab	6 ab	2 b	23 bcd
RU*	.125	lb ai/a	A	138 abc	50 a	54 ab	21 ab	12 b	88 a-d	83 ab	54 ab	22 ab	6 ab	2 b	43 abc
RU*	.0625	lb ai/a	A	216 a	47 a	73 a	28 ab	68 a	169 a	95 ab	47 ab	27 a	8 ab	12 a	51 a
RU*	.25	lb ai/a	B	47 c	35 a	6 b	3 b	3 b	12 d	67 b	63 ab	3 b	1 b	1 b	6 d
RU*	.125	lb ai/a	B	118 abc	56 a	29 ab	12 ab	20 b	62 bcd	95 ab	77 ab	11 ab	3 ab	4 b	20 cd
RU*	.0625	lb ai/a	B	188 ab	78 a	63 a	23 ab	25 b	110 abc	135 a	99 a	25 a	7 ab	4 b	27 a-d
RU*	.25	lb ai/a	C	76 bc	38 a	25 ab	3 b	10 b	38 cd	59 b	45 ab	11 ab	1 b	2 b	24 bcd
RU*	.125	lb ai/a	C	118 abc	45 a	43 ab	19 ab	12 b	74 bcd	76 ab	52 ab	16 ab	5 ab	2 b	30 a-d
RU*	.0625	lb ai/a	C	182 ab	45 a	54 ab	24 ab	58 a	137 ab	88 ab	51 ab	20 ab	7 ab	10 a	42 abc
*AMS added		LSD (P≤.05)		74	27	33	17	20	61	39	33	13	4	4	17

Pre-emergence herbicides for weed control in safflower. Williston,2009. Neil Riveland

'MonDak'safflower was planted on May 6 into land planted to durum in 2008 with a drill having 7 inch row spacing, seeding at 30 lbs/a. All treatments were applied post plant but pre-emergence to safflower on May 11. Air temperature was 68 deg F, soil temperature of 63 degrees, 85% clear sky, wind from 168 degrees at 2-5 mph and 27% RH. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 20 gals/a at 40 psi through 8002 flat fan nozzles to a 6.67 ft wide area the length of 10 by 30 ft plots. First rain received after application was 0.24 inches on May 5 (after application). The experiment was a randomized complete block design with three replications. Plots were evaluated for crop injury on June 10 for crop injury and weed control and again on July 11 for weed control. Population densities of Russian thistle(Ruth) were 1-2 plts/ft2, wild buckwheat(Wibw),1-2 plts/ft2; Common Lambsquarters(Colq),0.5-1 plt/ft2 and green foxtail(grft) were 5-6 plts/ft2. Safflower was machine harvested on September 24.

Treatment a	Product Rate oz/a	% Std Loss 6/10	% Control Ruth 7/11	Wibw 7/11	Colq 7/11	Grft 7/11	Test Weight lbs/b	Yield lbs/a
Untreated	0	0	0	0	0	0	41.1	471.8
Express+Spartan	0.25 +4.5	5	63	40	75	68	42.6	702.2
Sharpen+Spartan	1 +4.5	35	70	95	90	73	43.0	699.0
Sharpen	4	78	55	90	93	0	43.1	167.4
KIH-485	2.4	5	35	15	58	80	41.1	451.9
KIH-485	4.8	18	65	0	50	93	41.0	377.8
Valor	2	5	77	63	60	85	42.9	656.3
Valor	3	15	96	80	73	95	43.2	706.2
Spartan	4.5	28	73	45	80	50	42.0	515.3
Prowl H2O	48	10	0	0	73	95	41.9	577.5
Spartan	3.5	5	60	23	35	60	42.2	522.5
Spartan	2.5	0	30	0	0	30	41.9	477.7
Sonalan+Spartan	24	18	65	35	63	68	41.6	467.9
HIGH MEAN		78	96	95	93	95	43.2	706.2
LOW MEAN		0	0	0	0	0	41.0	167.4
EXP MEAN		17	53	37	58	61	42.1	522.6
C.V. %		77	37	51	26	25		30.9
LSD 5%		28	42	42	33	34		NS
LSD 1%		40	59	59	46	47		NS
# OF REPS		2	2	2	2	2	1	2
F-TRT		5	4	7	8	9	.0	1.8

Stand loss used to estimate crop injury.
Safflower stand establishment was only fair, even in the untreated plots. Therfore stand loss ratings were variable as were final yields. Rep 3 was abandon. Valor gave the best weed control with 15% stand loss and had among the highest crop yields also.

Postemergence weed control in safflower. Williston,2009. Neil Riveland

'MonDak'safflower was planted on May 6 into land planted to lentils in 2008 with a drill having 7 inch row spacing, seeding at 30 lbs/a. All treatments were applied postemergence on June 5 to 4-5 leaf safflower,1-2 Russian thistle (Ruth) and common lambquarters (Colq) and 2-4 leaf green foxtail (grft). Air temperature was 52 deg F, soil temperature of 66 degrees, 10% clear sky, wind from 27 degrees at 1-4 mph and 38% RH. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 10 gals/a at 40 psi through 8001 flat fan nozzles to a 6.67 ft wide area the length of 10 by 30 ft plots. First rain received after application was 0.34 inches on June 6. The experiment was a randomized complete block design with three replications. Plots were evaluated for crop injury on June 14 and July 11 for crop injury and July 11 for weed control. Population densities of Ruth were 1/2-2 plts/ft2 and grft were 5-7plts/ft2. Safflower was machine harvested on September 24.

Treatment a	Product Rate oz/a	% Crop Injury 6/14	7/11	% Control Ruth 6/14	Grft 6/14	Test Weight lbs/b	Yield lbs/a	Seed Oil %OD
AssureII+HrmGT+COC	8+0.2+1%	6	2	55	97	39.7	1594	32.3
Poast+HrmGT+COC	16+0.2+1%	5	3	33	98	36.7	1203	31.1
SelectMax+HrmGT+NIS	9+0.25+0.25%	8	2	50	98	38.1	1528	31.9
SelectMax+HrmGT+NIS	9+0.3+0.25%	7	1	60	98	37.9	1414	31.2
Harmony GT+NIS	0.2+0.25%	2	2	33	0	39.8	1371	32.4
Harmony GT+NIS	0.25+0.25%	3	0	43	0	40.9	1419	33.1
Harmony GT+NIS	0.3+0.25%	2	0	58	0	39.5	1541	32.4
Harmony GT+NIS	0.4+0.25%	1	1	47	0	39.2	1316	31.9
HrmGT+Everest+NIS	0.2+0.5+0.25%	13	7	65	93	38.5	1392	32.1
Glean+NIS	0.25+0.25%	0	1	48	48	38.6	1467	31.8
HarmonyGT+Glean+NIS	0.2+0.2+0.25%	3	8	70	75	40.0	1524	32.5
Ally+NIS	0.1+0.25%	7	8	68	70	39.6	1649	32.5
HarmonyGT+Ally+NIS	0.2+0.075+0.25%	6	8	57	42	37.9	1313	31.2
Untreated Check	0	0	0	0	0	39.8	1265	32.8
EXP MEAN		4	3	49	51	39.0	1428	32.1
C.V. %		79	143	36	24	4.0	12	2.3
LSD 5%		6	NS	30	21	NS	NS	NS

a - NIS = Activator 90 AND MSO from Loveland.
COC - Herbimax from Loveland

Early season injury was accentuated by cool temperatures. No treatment gave satisfactory Russian thistle control.

Spartan on safflower. Williston,2010. Neil Riveland and Jerry Bergman.

The objective of this experiment was to evaluate safflower tolerance to PE applications of Spartan herbicide in higher pH soil. 'Cardinal'safflower was planted in 24 inch row spacing on May 21 at the Eastern Agriculture Experiment Station at Sidney, MT. This land was planted to sugarbeets in 2009. Soil type is a Savage silty clay loam with a pH of 8.2. The safflower was planted at a seeding rate of 20 lbs/a. All treatments were applied PE on May 26. Air temperature was 67 deg F, soil temperature of 61 degrees, 85% clear sky, wind from 81 degrees at 2-3 mph and 39% RH. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 20 gals/a at 40 psi through 8002 flat fan nozzles to a 6.67 ft wide area the length of 10 by 30 ft plots. First rain received after application was 0.26 inches on May 26 (8 hours after application). The experiment was a randomized complete block design with four replications. Plots were evaluated for crop injury on June 10 for crop injury and for weed control and crop injury on September 10. Weed densities of common ragweed (corw) and kochia (Kocz) were very low and would not significantly affect yield potential. Safflower was machine harvested on October 3.

Treatment	Product Rate oz/a	% Std Red. 6/16	% Crop Injury 6/16	9/10	% Control Corw -- 9/10--	Kocz	Seed Oil 8%	Test Weight lbs/b	Yield lbs/a
Weedy check	0	0	0	0	0	0	28.8	34.5	1070
Spartan	2	0	8	0	94	81	29.4	34.8	1111
Spartan	2.5	0	3	0	83	88	29.1	34.8	1037
Spartan	3	0	6	0	94	98	29.6	34.9	1066
Spartan	3.5	5	16	4	98	99	29.5	34.4	1062
Spartan	4	3	13	2	99	99	29.6	34.4	1044
Spartan	5	7	34	5	98	99	29.6	34.4	958
Spartan	6	11	45	8	99	99	29.9	34.6	941
Prowl H2O	48	0	0	0	44	0	29.2	34.6	1210
Outlook	16	0	1	5	98	92	29.4	35.5	1215
EXP MEAN		2	12	2	82	76	29.4	34.7	1071
C.V. %		65	48	118	12	12	1.0	2.6	8
LSD 5%		2	9	4	15	16	.4	NS	125

Summary: Early safflower injury was visually observed on safflower at Spartan rates of 3.5 oz/a and higher. Only the 5 and 6 oz/a rates of Spartan injured safflower enough to reduce yields by 11%. The silty clay loam soil type may have reduced the level of safflower injury expected when Spartan is applied to high pH soils.

Safflower Cultivar Tolerance to Selected SU Herbicides. 2010. Neil Riveland.

The objective of this experiment was to document resistance of two safflower lines selected for their resistance to Express to other selected SU herbicides. Three safflower cultivars were planted on May 10 into land planted to lentils in 2009 with a drill having 7 inch row spacing, seeding at 30 lbs/a. Three safflower cultivars were chosen by there reaction to Express herbicide. 'MonDak' safflower is susceptible to severe injury from Express. 00B1587-6 and 00B1597-3 are two cultivars developed by selection for their resistance to Express herbicide. All treatments were applied postemergence at 2x use rates on June 9 to 2-4 leaf safflower with very few broadleaf weeds present. Air temperature as 66 deg F, soil temperature of 67 degrees, 85% clear sky, wind from 97 degrees at 3-6 mph and 56% RH. We used a small plot sprayer with wind cones, mounted on a G-Allis Chalmers tractor to apply the treatments, delivering 10 gals/a at 40 psi through 8001 flat fan nozzles to a 6.67 ft wide area the length of 10 by 15 ft plots. First rain received after application was 0.08 inches on June 10. The experiment was a split block in a randomized complete block design with four replications. Plots were evaluated for crop injury on June 24 and July 7 for crop injury. Poast herbicide was applied to the the plot area to control grassy weeds. Safflower was machine harvested on September 27.

Cultivar	Treatment	Product Rate oz/a	Crop Injury 6/24 --- %	Crop Injury 7/7 ----	Test Weight lb/bu	SEED OIL %	Yield lbs/a
00B 1587-6	Untreated	0	0	0	37.6	39.0	522
00B 1587-6	Glean	0.5	1	1	37.6	38.6	677
00B 1587-6	Ally	0.2	3	3	37.5	39.4	622
00B 1587-6	Affinity TM	1.5	6	4	37.7	39.3	499
00B 1587-6	Amber	1	20	23	37.5	38.8	449
00B 1587-6	Harmony GT	0.8	3	6	37.4	38.9	528
00B 1587-6	Express XP	0.8	6	5	38.0	39.6	510
00B 1587-6	Harmony SG	1.2	4	4	38.1	38.9	529
00B 1587-6	Harmony Extra XP	0.8	3	3	38.2	38.9	604
00B 1587-6	Finesse	0.5	0	2	37.9	39.1	543
	AVERAGE		4.5	4.9	37.7	39.0	548
00B 1597-3	Untreated	0	0	0	39.2	37.6	673
00B 1597-3	Glean	0.5	3	0	39.9	37.3	807
00B 1597-3	Ally	0.2	0	0	39.6	37.4	793
00B 1597-3	Affinity TM	1.5	3	3	38.7	37.3	696
00B 1597-3	Amber	1	26	19	39.2	37.3	649
00B 1597-3	Harmony GT	0.8	1	0	39.4	37.6	527
00B 1597-3	Express XP	0.8	1	1	39.2	37.4	640
00B 1597-3	Harmony SG	1.2	5	5	39.1	37.4	578
00B 1597-3	Harmony Extra XP	0.8	2	3	40.0	37.6	763
00B 1597-3	Finesse	0.5	0	0	40.1	37.6	760
	AVERAGE		4.0	3.1	39.4	37.4	705
MonDak	Untreated	0	0	0	42.1	34.4	815
MonDak	Glean	0.5	5	5	42.2	34.3	862
MonDak	Ally	0.2	10	8	41.9	33.9	809
MonDak	Affinity TM	1.5	60	30	41.3	33.8	653

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Safflower Cultivar Tolerance to Selected SU Herbicides-CONTINUED

MonDak	Amber	1	93	65	39.3	33.4	593
MonDak	Harmony GT	0.8	11	11	41.1	33.8	565
MonDak	Express XP	0.8	90	79	39.1	32.3	421
MonDak	Harmony SG	1.2	73	54	41.1	33.5	550
MonDak	Harmony Extra XP	0.8	76	56	41.0	33.6	553
MonDak	Finesse	0.5	7	6	42.0	34.1	855
	AVERAGE		42.5	31.4	41.1	33.7	667
EXP MEAN			17	13	39.4	36.7	635
C.V. %			33	49	1.7	1.7	19
LSD 5%			8	9	.9	.9	173
LSD 5% FOR VARIETY AVERAGES			2.0	3.9	0.68	0.49	74.1
	TREATMENTS AVERAGED OVER CULTIVARS						
	Untreated	0	0.0	0.0	39.6	36.9	670
	Glean	0.5	2.9	1.9	39.9	36.7	781
	Ally	0.2	4.2	3.5	39.6	36.9	741
	Affinity TM	1.5	22.9	12.1	39.2	36.7	616
	Amber	1	46.3	35.4	38.6	36.4	563
	Harmony GT	0.8	4.8	5.8	39.3	36.7	595
	Express XP	0.8	32.3	28.2	38.7	36.3	523
	Harmony SG	1.2	27.1	20.8	39.4	36.7	552
	Harmony Extra XP	0.8	26.9	20.8	39.7	36.6	640
	Finesse	0.5	2.3	2.5	40.0	36.9	719
	LSD 5%		5.2	5.8	0.54	NS	124

Summary: The cultivars 00B1587-6 and 00B1597-3 are resistant to many SU herbicides. They are relatively susceptible to Amber. MonDak, the cultivar susceptible to Express, is tolerant of Glean, Ally, Harmony GT and Finesse. However MonDak's reaction to Harmony SG was surprising in that it appeared to be significantly more susceptible to injury than with Harmony GT.

Weed control with PRE and POST herbicides in ALS Sunflower. Howatt, Roach, and Harrington. Crop varieties in treatments 1 and 2 - first two rows IMI, row three CLHA, and row 4 ExpressSun; treatments 3 and 4 - IMI; treatments 5 and 6 - CLHA; and treatment 7 - ExpressSun were seeded on May 26. Preemergence treatments were applied on May 27 with 68°F, 53% relative humidity, 65% cloud cover, 6 mph wind at 135°, and dry soil at 60°F. Post treatments were applied to 4 to 6 leaf sunflowers, 1 to 4 inch redroot pigweed, and cotyledon Venice mallow on June 25 with 82°F, 60% relative humidity, 80% cloud cover, 1 to 3 mph wind at 180°, and damp soil at 77°F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-foot wide area the length of 10- by 30-foot plots. The experiment was a randomized complete block design with three replicates. One pass with a row cultivator was performed when sunflower had approximately eight leaves.

			7/1	7/16	7/16	8/10	8/10	9/29	9/29	10/4
Treatment	Rate	Timing	Sufl	Sufl	Vema	Vema	Rrpw	Vema	Rrpw	Yield
	oz ai/A		%	%	%	%	%	%	%	kg/ha
Suen/Handweeded	3	Pre/wkly	0	0	83	98	99	96	99	1710
Sulfentrazone	3	Pre	0	0	83	87	92	65	94	1550
Suen/Seth+MSO	3/3+1%	Pre/Post	0	0	83	88	95	78	88	1400
Suen/Immx+MSO+AMS	3/0.5+1%+24	Pre/Post	9	0	90	96	99	85	96	1500
Suen/Immx+MSO+AMS	3/0.75+1%+24	Pre/Post	6	0	92	96	99	94	99	1970
Suen/Trib-sg+Quiz+MSO+AMS	3/0.25+0.94+1%+24	Pre/Post	80	70	87	94	92	82	95	380
Trib-sg+Quiz+MSO+AMS	0.25+0.94+1%+24	Post	0	0	37	95	73	85	88	1190
CV			6	0	6	3	3	4	3	13
LSD 5%			1	0	8	5	6	6	6	330

Commercial imidazolinone-resistant sunflower was les tolerant of imazamox, 9% injury with 0.5 oz ai/A, than CLHA sunflower, 6% injury with 0.75 oz/A. However, temporary response was recorded. Tribenuron caused excessive damage to CLHA sunflower but did not kill more than a couple plants. Affected plants, 80% injury, maintained some green tissue and continued to product new biomass including heads that produced some seed although heads were very deformed. Soil-applied sulfentrazone gave a substantial amount of weed control. The best full-season weed control was obtained with sulfentrazone followed by 0.75 oz/A imazamox. The yield of this treatment was 1970 kg/ha (1760 lb/A). Please note the different treatments have different seed sources, so yield variance could be due to agronomic traits of the hybrids in addition to weed control.

Weed control in ALS sunflower. Howatt, Roach, and Harrington. Clearfield sunflower was seeded in treatments 1 through 4, 6 though 8, and 11 and Express SUN sunflower was seeded in treatments 5 and 10 at Fargo on June 4. Plot was over sprayed with sulfentrazone at 3 oz ai/A as a preemergence treatment. Treatments (4-6") were applied to 4 to 6 inch sunflowers, 2 leaf yellow foxtail, 2 to 5 leaf wild buckwheat, and 2 to 10 inch common ragweed on July 7 with 70°F, 67% relative humidity, 100% cloud cover, 5 mph wind at 135°, and moist soil at 68°F. Treatments (12-15") were applied to 12 to 15 inch sunflower, 5 to 18 inch common ragweed, 6 to 12 inch yellow foxtail, and 12 inch wild buckwheat on July 19 with 73°F, 71% relative humidity, 90% cloud cover, 0 wind, and dry soil at 65°F. All treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-foot wide area the length of 10- by 30-foot plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	Stage	7/16 Sunflower	8/2 Sunflower	8/2 Yeft	8/2 Wibw	8/2 Cora
	oz ai/A		%	%	%	%	%
Immx+NIS+AMS	0.5+0.25%+40	4-6"	3	0	93	71	79
Immx+NIS+AMS	0.75+0.25%+40	4-6"	8	0	92	79	86
Immx+MSO+AMS	0.5+1%+40	4-6"	9	0	99	93	89
Immx+MSO+AMS	0.75+1%+40	4-6"	17	0	98	93	92
Trib-sg+Clet-SM+NIS	0.25+1.5+0.25%	4-6"	0	0	88	92	85
Immx+NIS+AMS	0.5+0.25%+40	12-15"	0	0	45	50	35
Immx+NIS+AMS	0.75+0.25%+40	12-15"	0	0	69	64	53
Immx+MSO+AMS	0.5+1%+40	12-15"	0	0	74	67	52
Immx+MSO+AMS	0.75+1%+40	12-15"	0	0	85	77	67
Trib-sg+Clet-SM+NIS	0.25+1.5+0.25%	12-15"	0	0	72	72	45
Untreated	0		0	0	0	0	0
CV			33	0	6	8	11
LSD 5%			1	0	78	8	10

Imazamox caused transient mottled chlorosis of leaf tissue when applied to imazamox-resisant sunflower having 4 to 6 leaves (4-6") that correlated with rate and adjuvant type, with 0.75 oz ai/A imazamox or MSO causing more injury than the counterpart. By August, all visible evidence of injury to imazamox-resistant sunflower was gone. Tribenuron did not cause visible injury to tribenuron-resistant sunflower. Earlier herbicide application resulted in more complete control of weeds present, and there was not much late emergence of weeds after treatment. With the early application timing, wild buckwheat control with imazamox was substantially better with MSO than with NIS. This also improved control of yellow foxtail, resulting in 10 percentage points advantage over clethodim.

Sunflower desiccation with flumioxazin. Howatt, Roach, and Harrington. Clearfield sunflower was seeded at Fargo on June 4. The study area was over sprayed with sulfentrazone at 3 oz ai/A and pendimethalin at 16 oz ai/A as a preemergence treatment. Imazamox at 0.5 oz ai/A was applied POST for general weed control. Desiccation treatments were applied when sunflower was estimated to have 35% seed moisture. Treatments were applied with a tractor mounted sprayer having a 20-ft wide offset spray boom that delivered 8.5 gpa pressurized with CO_2. Plots were 20 ft wide and 40 ft long with 5 ft of alley between each plot for driving. The experiment was a randomized complete block design with three replicates.

		Sunflower desiccation	
Treatment	Rate	10 DAT	21 DAT
Flumioxazin+MSO	1.5+0.25G	72	87
Flumioxazin+Glyt-WM+MSO	0.5+12+0.25G	88	91
Flumioxazin+Glyt-WM+MSO	1+12+0.25G	92	95
Flumioxazin+Glyt-WM+MSO	1.5+12+0.25G	93	95
Glyphosate-WM+NIS+AMS	12+0.25%+24	92	94
Saflufenacil+MSO+AMS	0.72+0.25G+40	90	96
Saflufenacil+Glyt-WM+MSO	0.36+12+0.25G	92	96
Untreated	0	70	85
CV		3	2
LSD 5%		5	3

Flumioxazin alone did not cause visible desiccation to sunflower compared with the untreated sunflower, although small weeds underneath the sunflower canopy had visible injury consistent with flumioxazin activity. Addition of flumixazin to glyphosate did not result in different response than glyphosate alone. Sunflower treated with glyphosate or saflufenacil demonstrated substantially hastened desiccation relative to the untreated sunflower.