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

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Yellow section: **continued** Page

Chemical removal of alfalfa. Howatt, Roach, and Harrington. Glyphosate-resistant alfalfa was established at the NDSU Experiment Station on campus several years prior to application. Treatments were applied to 6-inch tall alfalfa on September 12 with 74°F, 60% relative humidity, clear sky, 8.5 mph wind at 270°, and dry soil at 68°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 foot plots. The experiment was a randomized complete block design with four replicates.

		Alfalfa control	
Treatment	Rate	9/23	10/12
	oz/A	%	%
2,4-De+dicamba	8+8	38	76
2,4-De+dicamba	16+8	35	85
2,4-Da+dicamba	16+8	35	76
2,4-De	16	38	78
2,4-De	24	38	81
2,4-Da	16	28	68
2,4-Da	24	35	70
Dicamba	8	28	68
Clopyralid&2,4-D	12.8	38	75
Clopyralid&2,4-D+2,4-Da	12.8+5.2	33	79
Clopyralid&2,4-D+2,4-Da	12.8+13.2	40	84
Clopyralid&fluroxypyr	4	35	74
Clopyralid	2	20	70
Saflufenacil+MSO	0.36+0.18	74	76
Fluroxypyr	3	28	55
Glyphosate+NIS+AMS	12+0.25%+11	0	0
CV		18	6
LSD 5%		8	6

This well-established alfalfa stand was slow to express symptoms to treatments with auxinic herbicides, generally giving 30 to 40% control on 9/23 (about 2 weeks after treatment). Although considered by many to be the best option for eliminating alfalfa, this study demonstrated the slow activity of clopyralid alone, only 20% control on 9/23. The very rapid PPO activity of saflufenacil provided 74% control; however, tissue near the crown appeared green and viable.

Alfalfa treated with saflufenacil was rated 76% control on 10/12 (1 month after treatment). New growth was not present, but the crown tissue still appeared green and relatively healthy. Clopyralid activity was similar to several of the other auxinic herbicide treatments but did not provide the best control. 2,4-D improved the activity of clopyralid to 84% control when a total of 24 oz ae/A was applied with clopyralid (clopyralid&2,4-D + 2,4-Da at 12.8 + 13.2). 2,4-De plus dicamba at 16 plus 8 oz ae/A provided 85% control of alfalfa. In general, 2,4-D ester gave better control than 2,4-D amine by 10 percentage points at similar rates.

Alfalfa will be evaluated again in the spring. After spring evaluation, additional control measures may be imposed across existing treatments.

Canola production systems comparison. Howatt, Roach, and Harrington. Canola cultivars were seeded near Fargo on May 26. Seed indicates herbicide resistance trait system: SU, sulfonylurea; LL, Liberty Link; RR, Roundup Ready; and CL, Clearfield. Treatments were applied to two-leaf canola, six-leaf wild mustard, four-leaf wild buckwheat and Venice mallow, and three-leaf yellow foxtail on June 20 with 68°F, 60% relative humidity, 100% cloud cover, 7.5 mph wind at 90°, and dry soil surface at 66°F. 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.

Seed	Treatment	Rate	Jul-13 inj	Jul-13 wimu	Jul-13 wibw	Jul-28 wibw	Jul-28 vema	Jul-28 yeft
		oz/A	%	%	%	%	%	%
SU	Thif&trib+clethodim+NIS	0.23+1.5+0.25%	12	98	98	86	85	68
SU	Imazamox+NIS+UAN	0.5+0.25%+0.13G	14	99	94	83	84	90
LL	Glufosinate+NIS+AMS	6.4+0.25%+48	20	89	93	85	93	70
RR	Glyphosate+NIS+AMS	12+0.25%+16	4	99	99	98	98	99
CL	Imazamox+NIS+UAN	0.5+0.25%+0.13G	5	99	95	83	90	92
SU	Untreated	0	0	0	0	0	0	0
	CV		53	3	4	4	5	9
	LSD 5%		7	3	5	4	5	9

All herbicide treatments resulted in noticeable chlorosis relative to untreated sulfonylurea-resistant canola. Imazamox did not cause more injury to the SU line than thifensulfuron and tribenuron, but CL-canola was more tolerant to imazamox than the SU-canola. Expression and duration of injury may have been influenced by persistent precipitation that kept the soil near saturation for about 2 weeks after application. Chlorosis was not present on July 28.

Glyphosate provided near complete control of all weeds present. Other treatments also controlled wild mustard but gave about 86% control of other broadleaf weeds on July 28. Imazamox gave 90 to 92% control of yellow foxtail while clethodim and glufosinate only gave 68 and 70% control, respectively.

Canola systems herbicide tolerance. Howatt, Roach, and Harrington. Canola cultivars were seeded near Fargo on May 26. Seed indicates herbicide resistance trait system: SU, sulfonylurea; CL, Clearfield; LL, Liberty Link; and RR, Roundup Ready. Treatments were applied to four-leaf canola, flowering mustard, five-leaf wild buckwheat, four-leaf Venice mallow, and three-leaf yellow foxtail on July 1 with 78°F, 59% relative humidity, 80% cloud cover, 2 mph wind at 225°, and damp soil at 72°F. 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 20 foot plots. The experiment was a randomized complete block design with four replicates.

Seed	Treatment	Rate	7/13 inj	7/13 wimu	7/13 wibw	7/28 wibw	7/28 vema	7/28 yeft
		oz/A	%	%	%	%	%	%
SU	Untreated	0	0	0	0	0	0	0
SU	Thif&trib+clet+NIS	0.23+1.5+0.25%	19	94	84	86	84	86
SU	Thif&trib+clet+NIS	0.45+1.5+0.25%	25	96	85	86	89	80
SU	Thif&trib+clet+NIS	0.9+1.5+0.25%	35	97	85	93	94	94
SU	Untreated	0	0	0	0	0	0	0
SU	Immx+NIS+UAN	0.5+0.25%+0.13G	1	84	35	63	40	95
SU	Immx+NIS+UAN	1+0.25%+0.13G	14	84	38	81	43	97
SU	Immx+NIS+UAN	2+0.25%+0.13G	10	85	45	81	79	97
CL	Untreated	0	0	0	0	0	0	0
CL	Immx+NIS+UAN	0.5+0.25%+0.13G	0	93	68	70	18	91
CL	Immx+NIS+UAN	1+0.25%+0.13G	0	93	80	79	60	97
CL	Immx+NIS+UAN	2+0.25%+0.13G	3	91	79	85	79	98
LL	Untreated	0	0	0	0	0	0	0
LL	Gluf+NIS+AMS	6.4+0.25%+48	0	98	63	73	76	89
LL	Gluf+NIS+AMS	12.8+0.25%+48	4	99	94	92	91	98
LL	Gluf+NIS+AMS	25.6+0.25%+48	6	99	99	92	88	96
RR	Untreated	0	0	0	0	0	0	0
RR	Glyt+NIS+AMS	12+0.25%+48	3	97	83	86	93	96
RR	Glyt+NIS+AMS	24+0.25%+11	3	99	95	90	93	98
RR	Glyt+NIS+AMS	48+0.25%+11	9	99	99	93	92	99
CV			92	2	5	6	11	5
LSD 5%			8	2	4	5	9	5

Thifensulfuron and tribenuron applied to SU-canola caused substantial injury at rates from 1 to 4 times field rate, resulting in 19 to 35% chlorosis July 13. Imazamox application to SU-canola resulted in less chlorosis than thifensulfuron and tribenuron. Other systems also caused slight injury when treated with the companion herbicide, but injury was not observed with any treatment by July 28.

Field rate of thifensulfuron and tribenuron gave broadleaf weed control similar to glyphosate and better than imazamox or glufosinate. Glyphosate or imazamox provided better foxtail control than clethodim or glufosinate.

Application timing in an SU-canola system. Howatt, Roach, and Harrington. Sulfonylurea-resistant canola was seeded near Fargo on May 26. Treatments were applied at various timings with application information as follows:

Timing	Canola	Date	Air °F	% RH	% Clouds	Wind	Direction	Soil	Soil °F
1 WAE	Cot	6/16	75	55%	30%	5 mph	90°	Moist	78
2 WAE	two-leaf	6/24	65	66%	70%	4 mph	90°	Very wet	60
3 WAE	six-leaf	7/1	78	59%	80%	2 mph	180°	Damp	72
4 WAE	eight-leaf	7/5	82	50%	0%	4 mph	135°	dry	70

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 ft plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	Applied	7/13 inj	7/13 Wimu	7/28 Wimu
	oz/A	WAE	%	%	%
Thif&trib+cleth+NIS	0.23+1.5+0.25%	1	11	98	90
Thif&trib+cleth+NIS	0.23+1.5+0.25%	2	12	98	90
Thif&trib+cleth+NIS	0.23+1.5+0.25%	3	2	85	90
Thif&trib+cleth+NIS	0.23+1.5+0.25%	4	0	32	96
Thif&trib+cleth+NIS	0.23+1.5+0.25%	5	0	0	95
Untreated	0		0	0	0
CV			109	5	1
LSD 5%			6	4	1

Injury was expressed as chlorosis and was more severe when treatments were applied with greater soil water content. Treatments applied 3 weeks or more after emergence did not express substantial injury; however, by that time competition from wild mustard was very severe and canola had suffered unacceptable disruption of biomass accumulation. Canola development was not hindered by mustard presence, but size and branching of canola plants was obviously less than canola in plots where mustard was removed by treatment before 3 weeks after emergence. Wild mustard was removed by about 10 days after application, even when treated after plants began flowering, which had occurred by 2 weeks after emergence.

Volunteer canola control. Howatt, Roach, and Harrington. 'DKL 72-55' canola was seeded June 9. Treatments were applied to early bolt to early flowering canola that was 16 to 20 inches tall on July 21 with 65°F, 66% relative humidity, clear sky, 4.5 mph wind at 205°, and wet soil at 70°F. Treatments were applied with a backpack sprayer delivering 35 psi through 11001 TT nozzles to a 7-ft wide area the length of 10 by 30 foot plots. The experiment was a randomized complete block design with four replicates.

Treatment	Rate	8/12 canola
	oz/A	%
MCPA	4	98
MCPA	8	99
2,4-D	4	99
2,4-D	8	99
Fluroxypyr	2	86
Dicamba	3	43
Dicamba&fluroxypyr	1.75	38
Bromoxynil&MCPA5	8	88
Carfentrazone&2,4-D+NIS	4.13+0.25%	99
Bromoxynil&pyrasulfotol	2.83	94
Florasulam&MCPA+NIS	5+0.25%	98
Thif&trib&flox+NIS	1.25+0.25%	86
Thifensulfuron-sg+NIS	0.25+0.25%	75
Tribenuron-sg+NIS	0.13+0.25%	95
Bentazon+MSO	8+0.16G	33
Acifluorfen+NIS	4+0.25	83
Lactofen+NIS	1.5+0.25%	0
Fomesafen+MSO	1.4+0.16G	94
CV		5
LSD 5%		6

Treatments that included MCPA or 2,4-D provided at least 98% control of canola. Control with MCPA or 2,4-D was similar with rates of 4 or 8 oz ae/A. Tribenuron (95%) provided substantially better control than thifensulfuron (75%) but similar control to bromoxynil and pyrasulfotole (94%) or fomesafen (94%). Dicamba or dicamba and fluroxypyr would be a poor option for control of canola that has bolted. Lactofen did not cause visible injury.

Volunteer Roundup Ready canola control. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. Two experiments were conducted near Hickson, ND, to evaluate volunteer canola efficacy of herbicide programs at canola stages 3.2 and 4.1. No crop was planted, canola from the previous year's crop was allowed to grow during the spring of 2011. Canola stage 3.2 (beginning of bolting) treatments were applied June 9 at 3:00 pm with 71 F air, 65 F soil surface, 32% relative humidity, 90% cloud cover, 1 to 3 mph E wind, dry soil surface, moist subsoil, and no dew present to 5 inch tall, early bolting canola. Canola stage 4.1 (beginning flowering) treatments were applied June 16 at 11:05 am with 72 F air, 65 F soil surface, 48% relative humidity, 50% cloud cover, 3 to 5 mph E wind, wet soil surface, wet subsoil, and dew present to flowering canola. This study only pertained to only volunteer canola, no other weeds were recorded. All 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.

Canola stage 3.2 = early bolting stage. Canola stage 4.1 = begin flowering. Most control ratings were lower at 4.1 growth stage compared to 3.2 (except Ultra Blazer) showing that weed control will be greater the earlier that herbicides are applied. (Dept of Plant Sciences, North Dakota State University, Fargo).

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

		Canola	14 DAT	28 DAT
Treatment	Rate	Stage	Canola	Canola
	(product/A)	3.2 or 4.1	- % control -	- % control -
Atrazine+Herbimax	0.46lb+1qt	3.2	66	57
		4.1	33	43
Banvel	6fl oz	3.2	40	38
		4.1	20	20
Basagran+Soy-Stik	1pt+1.25pt	3.2	58	43
		4.1	42	43
Ultra Blazer+R-11	1pt+0.25% v/v	3.2	70	67
		4.1	83	75
Cobra+R-11	6fl oz+0.25% v/v	3.2	53	37
		4.1	40	37
Callisto+Atrazine+Herbimax	3fl oz+0.42lb+1qt	3.2	93	98
		4.1	85	97
Express SG+R-11	0.25oz+0.25% v/v	3.2	70	88
		4.1	52	57
Harmony GT+R-11	0.125oz+0.25% v/v	3.2	52	35
		4.1	30	38
Harmony GT+R-11	0.5oz+0.25% v/v	3.2	57	50
		4.1	43	43
Huskie	11fl oz	3.2	96	99
		4.1	77	99
Laudis+Atrazine+Soy-Stik	3fl oz+0.42lb+1.25pt	3.2	92	95
		4.1	62	70
MCPA-ester	1pt	3.2	60	92
		4.1	37	82
Status+Herbimax+AMS	4oz+1.5pt+8.5lb/100gal	3.2	42	47
		4.1	18	18
Wolverine	1.7pt	3.2	93	97
		4.1	75	92
2,4-D ester	1pt	3.2	65	92
		4.1	25	50
LSD (0.05)			8	9

<u>Eptam based weed control in dry beans.</u> Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Mayville, ND, to evaluate weed efficacy to PRE Eptam programs in dry edible beans. A PPI treatment was double incorporated with a field cultivator to a depth of 2 to 3 inches on May 26, 2011 at 9:00 am with 64 F air, 52 F soil at a four inch depth, 31% relative humidity, 10% cloud cover, 5 to 7 mph SE wind, dry soil surface, and moist subsoil followed by the planting of 'Stampede' pinto and 'Montcalm' dark red kidney dry edible beans, followed by PRE applications at 9:10 am with 64 F air, 52 F soil at a four inch depth, 31% relative humidity, 10% cloud cover, 5 to 7 mph SE wind, dry soil surface, and wet subsoil Soil characteristics were: 65% sand, 10% silt, 25% clay, sandy clay loam texture, 2.7% OM, and 6.4 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 for PPI and PRE treatments. The experiment had a randomized complete block design with three replicates per treatment.

No crop injury on both dry bean types on June 9 (14 DAP {days after planting} or 7 DAE {days after emergence) (data not shown), dry beans were in unifoilate stage. Dark red kidney bean emergence was variable in some parts of the study. No crop injury at all other ratings (data not shown). The lower the wheat control the higher the yield loss, volunteer wheat hurt yield more than the high populations of common ragweed. Depending on weed population, yields varied considerably. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Eptam based weed control in dry beans (Zollinger, Ries, Kazmierczak).

		14 DAE					28 DAE					Yield	
Treatment	Rate	Fxtl[1]	V Wht	Rrpw	Colq	Corw	Fxtl	V Wht	Rrpw	Colq	Corw	Pinto	Kidney
	(product/A)	% control					% control					cwt/A	
PRE													
Eptam	4pt	99	99	98	98	83	99	99	82	85	84	8.7	6.8
Eptam+Soalan	3.5pt+2pt	99	99	99	99	83	99	99	98	98	85	10.2	7.7
Eptam+Soalan	3pt+3pt	99	99	99	99	73	99	99	99	98	77	10.2	6.2
Eptam+Dual Magnum	3.5pt+1.4pt	99	98	93	90	75	99	98	93	80	87	15.1	10.8
Dual Magnum	1.67pt	83	25	72	62	22	83	53	72	62	38	7.7	2.8
PPI/PRE													
Prowl H_2O+Outlook	3pt+14fl oz	99	78	87	87	25	99	80	87	80	50	10	7.3
Untreated		0	0	0	0	0	0	0	0	0	0	0.9	0.5
LSD (0.05)		2	5	5	5	10	2	8	10	8	9	6.5	7.5

[1]Fxtl = a combination of green and yellow foxtail.

Eptam and Permit based weed control in dry bean. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Mayville, ND, to evaluate weed efficacy and crop response to PPI and EPOST programs in dry edible beans. PPI treatments were double incorporated with a field cultivator at a depth of 2 to 3 inches and were applied on May 26 at 9:15 am with 64 F air, 52 F soil at a four inch depth, 31% relative humidity, 10% cloud cover, 5 to 7 mph SE wind, dry soil surface, and moist subsoil, followed by the planting of 'Black' pinto and 'T-39' black dry edible beans. Soil characteristics were: 65% sand, 10% silt, 25% clay, sandy clay loam, 2.7% OM, and 6.4 pH. EPOST treatments were applied on June 24 at 11:00 am with 73 F air, 84 F soil surface, 50% relative humidity, 20% cloud cover, 1 to 3 mph SW wind, moist soil surface, moist subsoil and no dew present to V2 to V3 pinto and V1 to V2 black dry edible beans. Weeds present at the time of EPOST were: 2 to 4 inch (5 to 10/ft^2) common lambsquarters; 3 to 5 inch (5 to 10/ft^2) common ragweed; 2 to 4 inch (1to 5/ft^2) redroot pigweed; 6 to 8 inch, T2 (1 to 5/ft^2) volunteer wheat and green and yellow foxtail. 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 treatments 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 injury observed at 14 DAE (days after emergence) and 99% control of green and yellow foxtail (Fxtl), volunteer wheat, redroot pigweed, and common lambsquarters (data not shown). The lower the volunteer wheat control the higher the yield loss, volunteer wheat hurt yield more than the high populations of common ragweed. Depending on weed population, yield varied greatly per plot. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Eptam and Permit based weed control in dry bean (Zollinger, Ries, Kazmierczak).

		14 DAE	7 DAT - EPOST		14 DAT - EPOST		14 DAT - EPOST				
Treatment	Rate	Corw	Pinto	Black	Pinto	Black	Fxtl	V Wht	Rrpw	Colq	Corw
	(product/A)	- % control -	- - % injury - -		- - % injury - -		- - - - - - - - - - - % control - - - - - - - - - - -				
PPI											
Eptam+Sonalan	3pt+3pt	72	0	0	0	0	99	99	99	98	70
Eptam+Sonalan	3pt+2pt	77	0	0	0	0	99	99	98	96	75
Eptam+Sonalan+Permit	3pt+2pt+0.67oz	77	0	0	0	0	99	99	99	98	87
PPI/EPOST											
Eptam+Sonalan/Permit+Herbimax+28%	3pt+2pt/0.67oz+1pt+2% v/v	94	0	0	0	0	99	99	99	98	95
EPOST											
Permit+	0.67oz+	-									
R-11+28%	0.25% v/v+2% v/v	-	0	0	0	0	0	0	40	20	67
Herbimax+28%	1pt+2% v/v	-	5	5	0	0	0	0	50	20	83
Basagran+Herbimax+28%	1pt+1pt+2% v/v	-	0	0	0	0	0	0	50	20	78
Raptor+Basagran+Herbimax+28%	2fl oz+1pt+1pt+2% v/v	-	0	0	10	10	57	50	80	52	85
Rezult B+Rezult G+Herbimax+28%	0.8pt+0.8pt+1pt+2% v/v	-	0	10	8	8	70	67	57	40	83
Raptor+Reflex+Basagran+Herbimax+28%	2fl oz+8fl oz+1pt+1pt+2% v/v	-	10	15	10	10	70	67	95	95	95
Raptor+Reflex+Herbimax+28%	2fl oz+8fl oz+1pt+2% v/v	-	5	5	10	10	73	68	95	87	95
Reflex+Herbimax+28%	8fl oz+1pt+2% v/v	-	5	5	8	8	50	13	99	73	85
Raptor+Basagran+Herbimax+28%	2fl oz+1pt+1pt+2% v/v	-	5	5	5	5	78	50	75	73	80
Untreated		0	0	0	0	0	0	0	0	0	0
LSD (0.05)		2	1	2	2	2	5	4	8	5	7

Table cont. Eptam and Permit based weed control in dry bean (Zollinger, Ries, Kazmierczak).

Treatment	Rate	60 DAT - EPOST		60 DAT - EPOST					Yield	
		Pinto	Black	Fxtl	V Wht	Rrpw	Colq	Corw	Pinto	Black
	(product/A)	- - % injury - -		- - - - - - - - - - - - - - - % control - - - - - - - - - - - - - -					- - - cwt/A - - -	
PPI										
Eptam+Sonalan	3pt+3pt	0	0	99	99	99	98	62	20.4	39.2
Eptam+Sonalan	3pt+2pt	0	0	99	99	98	96	63	22.3	30.6
Eptam+Sonalan+Permit	3pt+2pt+0.67oz	0	0	99	99	99	98	87	25.0	20.9
PPI/EPOST										
Eptam+Sonalan/Permit+Herbimax+28%	3pt+2pt/0.67oz+1pt+2% v/v	0	0	99	99	99	98	85	23.0	23.7
EPOST										
Permit+	0.67oz+									
R-11+28%	0.25% v/v+2% v/v	0	0	0	0	40	20	73	6.4	9.4
Herbimax+28%	1pt+2% v/v	0	0	0	0	50	20	82	7.1	9.4
Basagran+Herbimax+28%	1pt+1pt+2% v/v	0	0	0	0	50	20	85	10.9	10.7
Raptor+Basagran+Herbimax+28%	2fl oz+1pt+1pt+2% v/v	10	10	57	50	80	52	87	26.4	25.2
Rezult B+Rezult G+Herbimax+28%	0.8pt+0.8pt+1pt+2% v/v	8	8	70	67	57	40	88	24.6	18.3
Raptor+Reflex+Basagran+Herbimax+28%	2fl oz+8fl oz+1pt+1pt+2% v/v	10	10	70	67	95	95	96	24.4	23.6
Raptor+Reflex+Herbimax+28%	2fl oz+8fl oz+1pt+2% v/v	10	10	73	68	95	82	97	27.8	27.3
Reflex+Herbimax+28%	8fl oz+1pt+2% v/v	8	8	20	13	99	77	95	9.1	10.0
Raptor+Basagran+Herbimax+28%	2fl oz+1pt+1pt+2% v/v	5	5	85	85	75	73	83	26.8	28.9
Untreated		0	0	0	0	0	0	0	4.1	8.1
LSD (0.05)		2	2	4	4	8	4	5	4.6	6.8

Permit and Spartan Charge in dry beans. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Mayville, ND, to evaluate crop response and weed efficacy to PRE programs in dry edible beans. 'LaPaz' pinto and 'Eclipse' black dry edible beans were planted on May 26, 2011, followed by the application of PRE treatments at 9:15 am with 66 F air, 52 F soil at a four inch depth, 31% relative humidity, 10% cloud cover, 5 to 7 mph SE wind, dry soil surface, and moist subsoil. Soil characteristics were: 65% sand, 10% silt, 25% clay, sandy clay loam texture, 2.7% OM and 6.4 pH. The entire study was sprayed with a POST application of Assure II at 8 fl oz/A plus Herbimax at 1.5pt/A to control grasses. 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 PRE treatments and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for the POST applied Assure II application. The experiment had a randomized complete block design with three replicates per treatment.

No pinto or black bean injury observed at 7, 14, 28, and 60 DAE (days after emergence, data not shown). 60 DAE weed efficacy ratings generally were the same as 28 DAE, (data not shown). Yields were quite variable do to the weed variability in some plots. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Permit and Spartan Charge in dry beans (Zollinger, Ries, Kazmierczak).

		14 DAT				28 DAT				Yield	
Treatment	Rate	Rrpw	Colq	Corw	Ebns	Rrpw	Colq	Corw	Ebns	Pinto	Black
	(product/A)	% control				% control				cwt/A	
Permit	0.67oz	92	95	78	48	82	83	92	58	22.8	19.1
Permit+Spartan Charge	0.67oz+4.75fl oz	99	99	88	99	99	98	92	99	25.8	26.1
Permit+Spartan Charge	0.5oz+4.75fl oz	99	90	70	99	99	88	72	99	27.4	19.5
Permit+Spartan Charge	0.5oz+5.75fl oz	85	85	83	99	90	85	90	99	25.0	22.1
Permit+Spartan Charge	0.67oz+5.75fl oz	99	99	88	99	99	99	95	99	32.1	26.0
Spartan Charge	5.75fl oz	70	70	20	99	53	60	20	50	5.4	5.0
Prowl H_2O+Pursuit Plus	1.25pt+20fl oz	99	99	38	99	99	99	32	99	16.8	10.8
Untreated		0	0	0	0	0	0	0	0	2.0	1.5
LSD (0.05)		16	18	7	2	10	8	8	2	4.8	4.9

Dry bean response to Zidua and Warrant. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Hatton, ND, to evaluate weed efficacy and crop tolerance to POST programs in dry edible beans. 'Stampede' pinto and 'Eclipse' black dry edible beans were planted on June 10, 2011 followed by a PRE application (see table below) of Outlook at 18 fl oz/A at 9:35 am with 64 F air, 55 F soil at a four inch depth, 36% relative humidity, 100% cloud cover, dry soil surface, and moist subsoil. Soil characteristics were: 62.5% sand, 10% silt, 27.5% clay, sandy clay loam texture, 2.7% OM, and 6.6 pH. POST treatments were applied on July 11 at 9:45 pm with 77 F air, 80 F soil surface, 65% relative humidity, 0% cloud cover, 5 to 10 mph NW wind, moist soil surface, wet subsoil, fair crop vigor and no dew present to V3 pinto and V1 to V2 black dry edible beans. Weeds present at the time of POST were: 1 to 5 inch, T1 (5 to 10/yd^2) yellow foxtail; 1 to 2 inch (1/yd^2) common ragweed; 1 to 4 inch (5 to 10/yd^2) wild mustard; 1 to 4 inch (15 to 25/yd^2) hairy nightshade; 1 to 3 inch (3 to 5/yd^2) easternblack nightshade; 1 to 3 inch (3 to 5/yd^2) common lambsquarters; and 1 to 2 inch (3 to 5/yd^2) redroot pigweed. Weeds noted in plots that received an Outlook herbicide PRE treatment at the time of POST applications were: 1 to 3 inch (1/yd^2) common ragweed; 0.5 to 1 inch (3 to 5/yd^2) wild mustard; 0.5 to 1.5 inch (5 to 15/yd^2) hairy nightshade; and 0.5 to 1 inch (1 to 2/yd^2) eastern black nightshade. 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 PRE Outlook application and 8.5 gpa at 40 psi through 11001 Turbo TeeJet nozzles for POST treatments. The experiment had a randomized complete block design with three replicates per treatment.

Warrant, an encapsulated formulation of acetochlor was registered for EPOST application in soybean for residual control of small-seeded broadleaf weeds and glyphosate resistant weeds like waterhemp. Degradation of Warrant and Dual is rapid and up to 4 weeks residual control is usually observed. Zidua (pyroxasulfone) is the same mode of action as Warrant and Dual but of a different chemistry and residual weed control has been observed for 8 to 12 weeks. Warrant and Dual does not have any POST weed control activity but Zidua can kill small emerged weeds as shown in the POST treatments. On July 18, all injury was leaf burn, presumably from the added oil adjuvant. Dry bean plants were not stunted or yellow except at the high injury ratings. July 25 injury was stunting and slight leaf burn. At 60 DAT, generally the crop response decreased slightly, and the weed control ratings decreased, (data not shown). (Department of Plant Sciences, North Dakota State University, Fargo).

Table. Dry bean response to Zidua and Warrant (Zollinger, Ries, Kazmierczak).

Treatment	Rate	7 DAT (7/18)		14 DAT (Jul 25)						28 DAT (Aug 8)					
		Pinto	Black	Pinto	Black	Fxtl	Rrpw	Colq	Ebns	Pinto	Black	Fxtl	Rrpw	Colq	Ebns
	(product/A)	- % injury -		- % injury -		------ % control ------				- % injury -		------ % control ------			
Outlook PRE fb POST (1-3 inch weeds)															
Dual Magnum+Herbimax+28%	1.33pt+1.5pt+2.5% v/v	2	10	3	12	47	53	53	50	3	18	47	45	45	45
Warrant+Herbimax+28%	1.5qt+1.5pt+2.5% v/v	5	8	3	7	50	50	50	50	0	3	43	43	43	43
Warrant+Herbimax+28%	2qt+1.5pt+2.5% v/v	3	5	0	3	55	67	67	62	5	5	50	50	50	47
Zidua+Herbimax+28%	1.68oz+1.5pt+2.5% v/v	5	10	0	7	65	63	57	53	0	8	67	67	63	53
Zidua+Herbimax+28%	3.36oz+1.5pt+2.5% v/v	10	17	10	10	99	93	93	93	12	12	99	96	96	96
Zidua+Herbimax+28%	5.04oz+1.5pt+2.5% v/v	20	30	10	25	93	93	93	87	5	20	96	95	95	93
POST (1-5 inch weeds)															
Rezult B+Rezult G+Herbimax+28%	1.6pt+1.6pt+1.5pt+2.5% v/v	10	10	0	7	98	95	95	70	7	5	98	95	95	70
Rezult B+Rezult G+Dual Magnum+PO+28%	1.6pt+1.6pt+1.33pt+1.5pt+2.5% v/v	10	12	0	2	99	83	83	70	0	2	72	50	40	50
Rezult B+Rezult G+Warrant+PO+28%	1.6pt+1.6pt+1.5qt+1.5pt+2.5% v/v	10	13	5	7	99	93	88	78	5	7	96	65	68	50
Rezult B+Rezult G+Warrant+PO+28%	1.6pt+1.6pt+2qt+1.5pt+2.5% v/v	12	12	8	7	99	83	78	63	8	12	96	73	65	48
Rezult B+Rezult G+Zidua+PO+28%	1.6pt+1.6pt+1.68oz+1.5pt+2.5% v/v	13	13	5	8	99	93	90	85	5	7	99	93	90	84
Rezult B+Rezult G+Zidua+PO+28%	1.6pt+1.6pt+3.36oz+1.5pt+2.5% v/v	20	22	5	10	99	93	93	82	2	3	99	93	92	78
Rezult B+Rezult G+Zidua+PO+28%	1.6pt+1.6pt+5.04oz+1.5pt+2.5% v/v	22	28	13	20	99	95	95	90	12	17	99	95	95	90
LSD (0.05)		3	4	6	7	9	12	14	14	7	11	7	11	8	9

Table cont. Dry bean response to Zidua and Warrant (Zollinger, Ries, Kazmierczak).

Treatment	Rate	42 DAT (Aug 22)						60 DAT (Sept 11)					
		Pinto	Black	Fxtl	Rrpw	Colq	Ebns	Pinto	Black	Fxtl	Rrpw	Colq	Ebns
	(product/A)	- % injury -		------ % control ------				- % injury -		------ % control ------			
Outlook PRE fb POST (1-3 inch weeds)													
Dual Magnum+Herbimax+28%	1.33pt+1.5pt+2.5% v/v	3	17	43	43	43	42	3	17	43	43	43	38
Warrant+Herbimax+28%	1.5qt+1.5pt+2.5% v/v	0	3	37	37	37	30	0	3	37	37	37	27
Warrant+Herbimax+28%	2qt+1.5pt+2.5% v/v	5	5	50	47	43	43	5	5	50	47	43	33
Zidua+Herbimax+28%	1.68oz+1.5pt+2.5% v/v	0	8	83	84	80	70	0	8	75	75	72	63
Zidua+Herbimax+28%	3.36oz+1.5pt+2.5% v/v	10	12	96	96	96	96	8	10	96	96	96	96
Zidua+Herbimax+28%	5.04oz+1.5pt+2.5% v/v	5	15	96	96	96	96	5	15	95	95	93	90
POST (1-5 inch weeds)													
Rezult B+Rezult G+Herbimax+28%	1.6pt+1.6pt+1.5pt+2.5% v/v	2	2	43	40	40	40	2	2	40	37	37	33
Rezult B+Rezult G+Dual Magnum+PO+28%	1.6pt+1.6pt+1.33pt+1.5pt+2.5% v/v	0	2	52	37	28	32	0	0	47	20	25	25
Rezult B+Rezult G+Warrant+PO+28%	1.6pt+1.6pt+1.5qt+1.5pt+2.5% v/v	5	7	76	55	55	43	3	3	46	55	52	43
Rezult B+Rezult G+Warrant+PO+28%	1.6pt+1.6pt+2qt+1.5pt+2.5% v/v	10	12	76	62	53	47	8	10	70	60	53	40
Rezult B+Rezult G+Zidua+PO+28%	1.6pt+1.6pt+1.68oz+1.5pt+2.5% v/v	5	5	96	92	88	82	2	3	96	92	87	80
Rezult B+Rezult G+Zidua+PO+28%	1.6pt+1.6pt+3.36oz+1.5pt+2.5% v/v	0	3	96	92	92	84	0	3	98	93	92	84
Rezult B+Rezult G+Zidua+PO+28%	1.6pt+1.6pt+5.04oz+1.5pt+2.5% v/v	3	8	99	93	93	93	3	8	99	93	93	90
LSD (0.05)		7	10	8	8	7	10	7	10	9	11	9	11

Dry bean desiccants. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Hatton, ND, to evaluate dry bean dessication. 'Avalanche' navy dry beans were planted on June 10, 2011. Dessication treatments were applied on September 8 at 10:45 am with 83 F air, 85 F soil surface, 51% relative humidity, 0% cloud cover, 1 to 3 mph SE wind, dry soil, mature crop and no dew present. DEB was in natural dessication, 40 to 70% leaf drop/dry, 0 to 10 % vine dessication, 5 to 20% green pods, 60 to 75% yellow pods, and 0 to 5% brown pods. Treatments were applied to the center 6.7 by 30 foot plots with a backpack-type plot sprayer delivering 17 gpa at 40 psi through 11002 Turbo TeeJet nozzles for dessication treatments. The experiment had a randomized complete block design with three replicates per treatment.

Weather conditions were favorable for desiccation, breezy to windy, mostly sunny, and little rainfall. (Department of Plant Sciences, North Dakota State University, Fargo).

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

Treatment	Rate	3 DAT					7 DAT				
		Leaf[1]	Vine[2]	Green[3]	Yellow[4]	Brown[5]	Leaf	Vine	Green	Yellow	Brown
	(product/A)	------------- % control -------------					------------- % control -------------				
Valor SX+Soy-Stik+AMS	1.5oz+1qt+2.5lb	92	22	4	22	68	97	38	0	27	73
Valor SX+RUPM+Soy-Stik+AMS	1.5oz+22fl oz+1qt+2.5lb	93	15	4	25	71	96	28	2	33	61
RUPM	22fl oz	75	5	15	80	5	80	17	10	47	43
Gramoxone Inteon+R-11	2pt+0.25% v/v	91	18	8	38	53	97	38	5	38	67
Sharpen+Soy-Stik+AMS	1fl oz+2% v/v+2.5lb	90	35	1	10	89	99	72	0	7	93
Sharpen+Soy-Stik+AMS	2fl oz+2% v/v+2.5lb	92	47	0	8	92	99	77	0	0	99
Scythe+Soy Stik+AMS	9% v/v+1% v/v+2.5lb	84	8	13	75	12	85	12	12	75	13
Scythe+Soy Stik+AMS	7% v/v+1% v/v+2.5lb	80	7	12	82	7	81	10	8	78	12
Scythe+Soy Stik+AMS	5% v/v+1% v/v+2.5lb	78	5	17	78	5	82	7	13	78	8
Scythe+Vida+Soy-Stik+AMS	5% v/v+3fl oz+1% v/v+2.5lb	83	8	17	70	13	85	17	13	72	18
Scythe+Vida+Soy-Stik+AMS	3% v/v+3fl oz+1% v/v+2.5lb	86	5	15	72	13	87	13	12	75	73
Untreated		72	1	13	82	5	78	12	7	78	25
LSD (0.05)		3	5	5	4	5	3	5	4	10	11

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

Table cont. Dry bean desiccants (Zollinger, Ries, 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 -------------				
Valor SX+Soy-Stik+AMS	1.5oz+1qt+2.5lb	99	93	0	0	99	99	99	0	0	99
Valor SX+RUPM+Soy-Stik+AMS	1.5oz+22fl oz+1qt+2.5lb	98	92	0	0	99	98	98	0	0	99
RUPM	22fl oz	90	57	7	15	78	95	77	5	13	82
Gramoxone Inteon+R-11	2pt+0.25% v/v	99	87	0	5	95	99	97	0	0	99
Sharpen+Soy-Stik+AMS	1fl oz+2% v/v+2.5lb	99	99	0	0	99	99	99	0	0	99
Sharpen+Soy-Stik+AMS	2fl oz+2% v/v+2.5lb	99	99	0	0	99	99	99	0	0	99
Scythe+Soy Stik+AMS	9% v/v+1% v/v+2.5lb	89	33	10	42	48	91	58	5	5	63
Scythe+Soy Stik+AMS	7% v/v+1% v/v+2.5lb	88	28	13	48	43	90	53	10	10	53
Scythe+Soy Stik+AMS	5% v/v+1% v/v+2.5lb	91	23	12	52	37	92	48	10	10	53
Scythe+Vida+Soy-Stik+AMS	5% v/v+3fl oz+1% v/v+2.5lb	92	38	7	40	53	94	57	5	5	62
Scythe+Vida+Soy-Stik+AMS	3% v/v+3fl oz+1% v/v+2.5lb	93	35	8	43	48	94	57	5	5	63
Untreated		85	32	7	17	77	94	47	5	15	80
LSD (0.05)		4	3	4	4	5	2	4	2	3	4

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

Broadleaf weed control with Weld herbicide in fallow, Carrington, 2011. Greg Endres and Michael Schaefer. The experiment was conducted at the NDSU Carrington Research Extension Center in cooperation with Winfield Solutions. Experimental design was a randomized complete block with three replicates. Herbicide treatments were applied with a CO_2-hand-boom plot sprayer delivering 11.5 gal/A at 40 psi through 80015VS XR flat fan nozzles to the center 5 ft of 8- by 30-ft plots on June 24 with 67 F, 78% RH and 5 mph wind to 2- to 10-inch tall horseweed and 1- to 14-inch tall kochia.

Broadleaf weeds were large and were partially shielded by dense foxtail during application of herbicides. Horseweed control was good (80 to 83%) with Weld at 24 fl oz/A and WideMatch plus MCPA on July 9 (Table). On July 28 (5 weeks after treatment) horseweed control was good to excellent (88 to 99%) with all treatments. Weld at the high rate or Weld plus Interlock provided good (81 to 84%) control of kochia, and control similar to WideMatch plus MCPA on July 28.

Table.

Herbicide		Weed control[1]			
		7/9		7/28	
Treatment[2]	Rate/A	horseweed	kochia	horseweed	kochia
	fl oz product	%			
Weld	16	75	76	94	69
Weld Interlock	16 4	75	77	88	81
Weld	21.3	77	75	94	73
Weld Interlock	21.3 4	78	73	99	83
Weld	24	80	78	97	84
WideMatch MCPA	21.3 8	83	83	98	88
CV (%)		2.3	6.2	4.1	12.1
LSD (0.05)		4	NS	NS	NS

Early-summer applied herbicides for non-crop dandelion control, Carrington, 2011. Greg Endres and Eric Allmaras. A field study was conducted at the NDSU Carrington Research Extension Center to examine non-crop dandelion control with early-summer applied herbicides. Experimental design was a randomized complete block with three replications. Herbicides were applied with a CO_2-pressurized plot sprayer delivering 17 gal/A at 35 psi through 8001 flat fan nozzles to the center 5 ft of 8- by 20-ft plots on June 9 at 64 F, 36% RH and 8 mph wind to rosette (5- to 12-inch diameter) to 'puffball' dandelion. Dandelion density was variable but averaged 12 plants/ft^2.

Dandelion control was 85 to 88% with tank mixtures of glyphosate and Express or Sharpen one month after treatment (MAT) (Table). Essentially no control of dandelion was observed 2 MAT with glyphosate or Sharpen plus glyphosate. Dandelion was suppressed (64 to 76% control) with Express or Express plus glyphosate 2 to 4 MAT. Horseweed control was good (80 to 82%) with Sharpen and Express plus glyphosate 4 MAT.

Table.

Herbicide		Weed control[1]							
		7/7		8/4		9/6		10/5	
Treatment[2]	Rate	dali	howe	dali	howe	dali	howe	dali	howe
		%							
RU PM	22 fl oz/A	75	88	20	78	0	73	0	73
Class Act NG	2.5% v/v								
Express SG	0.5 oz/A	75	59	67	13	67	0	64	0
Preference	0.25% v/v								
Express SG	0.25 oz/A	88	96	68	76	70	77	72	82
RU PM	22 fl oz/A								
Class Act NG	2.5% v/v								
Express SG	0.5 oz/A	85	93	76	77	72	78	71	80
RU PM	22 fl oz/A								
Class Act NG	2.5% v/v								
Sharpen	1 fl oz/A	85	96	22	83	23	77	24	80
RU PM	22 fl oz/A								
Destiny HC	12 fl oz/A								
Class Act NG	2.5% v/v								
CV (%)		10.1	10.6	49.6	17.0	50.4	8.8	55.6	10.0
LSD (0.05)		NS	17	NS	21	44	10	48	12

[1]Dali=common dandelion; Howe=horseweed.

[2]RU PM= Roundup PowerMax; Class Act NG= surfactant&AMS, Preference=NIS and Destiny HC=high surfactant oil concentrate (Winfield Solutions).

Evaluation of glyphosate antagonism from Sharpen on Canada thistle control (Jenks, Willoughby, and Hoefing) In 2010, we observed that tank mixing Sharpen and glyphosate (11 fl oz) resulted in reduced long-term Canada thistle control. In 2011, our main objective was to determine if higher rates of glyphosate would help overcome the antagonism from Sharpen. Glyphosate was applied at 11, 16, and 22 fl oz alone or with Sharpen at 1 fl oz. Treatments were applied on June 9 to 2- to 6-inch weeds. Canada thistle treated with Sharpen + glyphosate were quickly burned down; however, by 3 weeks after application, treated Canada thistle had started to re-grow. Plants treated with just glyphosate provided more consistent control over time. Increasing the glyphosate rate from 11 to 22 fl oz did increase Canada thistle control, but not to the level of glyphosate applied alone. It should be noted that we have not observed antagonism from Sharpen + glyphosate on annual weeds.

Table. Evaluation of glyphosate antagonism from Sharpen on Canada thistle control. (1121)

		Canada Thistle Control		
Treatment[ab]	Rate	18-Jun	29-Jun	15-Jul
		-------------------%-------------------		
Glyphosate	11 fl oz	60	83	79
Glyphosate	16 fl oz	60	85	82
Glyphosate	22 fl oz	60	87	82
Sharpen + Glyphosate	1 fl oz + 11 fl oz	76	43	38
Sharpen + Glyphosate	1 fl oz + 16 fl oz	83	60	58
Sharpen + Glyphosate	1 fl oz + 22 fl oz	85	69	65
Untreated		0	0	0
LSD (0.05)		6	16	17
CV		6	13	17

[a] *Glyphosate applied with AMS (2.5%); Treatments applied to 2-6 inch weeds*

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

Residual broadleaf weed control with soil-applied Express + Ally (Jenks, Willoughby, and Hoefing) The objective of this study was to evaluate residual broadleaf weed control from a soil-applied treatment of Express + Ally compared to other commercial products. All treatments were applied in a chemical fallow situation on May 19. Grasses were controlled with later applications of Select. The goal was to determine which weeds would be controlled and for how long by a preplant application. All treatments generally provided good weed control from the May 19 application date through the June 25 evaluation. However, by mid-July several weeds started to break through. Express + Ally tank mixed with glyphosate controlled all weeds as well as or better than other treatments.

Table. Residual broadleaf weed control with soil-applied Express + Ally. (1124)

		Weed Control[b]											
		Howe		Wibw		Colq		Rrpw		Prle		Shep	
Treatment[a]	Rate	25-Jun	19-Jul	25-Jun	19-Jul	25-Jun	19-Jul	25-Jun	19-Jul	25-Jun	19-Jul	25-Jun	19-Jul
		%											
Untreated		0	0	0	0	0	0	0	0	0	0	0	0
Glyphosate	1 qt	78	40	98	50	98	43	87	25	98	97	90	43
Express + Ally	0.25 oz + 0.036 oz	98	83	99	73	100	57	99	70	100	100	95	55
Express + Ally	0.5oz + 0.036 oz	98	87	99	62	100	60	99	77	100	100	97	57
Gly + Express + Ally	1 qt + 0.25 oz + 0.036 oz	99	87	100	87	100	63	99	82	100	100	95	52
Gly + Express + Ally	1 qt + 0.5 oz + 0.036 oz	98	85	100	77	100	58	100	73	100	100	96	50
Gly + Orion	1 qt + 17 fl oz	98	87	97	57	100	53	97	57	100	100	100	60
Gly + Sharpen	1 qt + 1 fl oz	99	91	98	73	100	67	97	62	100	100	82	37
LSD (0.05)		3	9	4	21	3	18	3	10	2	4	16	18
CV		2	7	2	20	2	21	2	10	1	2	11	23

[a] *All treatments applied May 19 in fallow; All Express + Ally treatments applied with NIS (0.25%); Glyphosate applied with AMS (2.5%); Sharpen applied with MSO (1%); Gly=Glyphosate*

[b] *Howe=Horseweed; Wibw=Wild buckwheat; Colq=Common lambsquarters; Rrpw=Redroot pigweed; Prle=Prickly lettuce; Shep=Shepherdspurse*

2011 Field Pea Tolerance to Lorox DF Herbicide

Eric Eriksmoen, Hettinger, ND

'Majoret' green field pea was seeded no-till on May 9. Treatments were applied just prior to crop emergence on May 19 with 60° F, 68% RH, cloudy sky and east wind at 10 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi through PK-01E80 nozzles to 5 foot wide by 28 foot long plots. The soil is classified as a silt-loam with a pH of 5.9 and OM of 2.6%. The trial was a randomized complete block design with four replications. The trial was sprayed with 16 oz/A Poast herbicide on June 10 to control grassy weeds and 4 oz/A Raptor Herbicide on June 24 to control common mallow. Plots were evaluated for stand establishment on June 3, date of 10% bloom and lodging just prior to harvest. The trial was harvested on August 8.

	Treatment	Product rate	Stand	10% bloom	Lodging	1000 KWT	Test weight	Seed yield
		oz/A	#/9' row	July	0-9*	grams	lbs/bu	bu/A
1	Untreated		40	3	6	197	64.1	47.7
2	Lorox DF	16	37	4	6	205	66.1	47.7
3	Lorox DF	32	37	3	5	205	64.7	50.4
4	Lorox DF	48	38	4	6	210	63.9	48.3
	C.V. %		17	15	10	6	3.5	6.4
	LSD .05		NS	NS	NS	NS	NS	NS

NS = no statistical difference between treatments

Summary

Crop injury was not observed at any time throughout the growing season. Agronomic characteristics including stand establishment, flowering date and crop lodging, and seed characteristics including kernel weight, test weight and yield showed no adverse effects from any of the application rates of Lorox DF.

Field pea weed control with Sharpen plus Spartan, Carrington, 2011. Greg Endres. The trial was conducted in cooperation with BASF to evaluate weed control and field pea response with soil-applied Sharpen plus Spartan. Experimental design was a randomized complete block with three replicates. The field trial was established on a Heimdal-Emrick loam soil with 4.1% organic matter, 6.6 pH, 40 lb N/A, 9 ppm P, and 227 ppm K. Inoculated 'Admiral' field pea was direct-seeded in flax stubble at 300,000 pls/A in 7-inch rows on May 19. PRE herbicide treatments were applied with a CO_2-hand-boom plot sprayer delivering 10 gal/A at 35 psi through 8001 flat-fan nozzles on May 19 with 73 F, 38% RH, 13 mph wind, 20% clear sky, and dry soil surface to 1-leaf yellow and green foxtail, and 0.5- to 1-inch tall broadleaf weeds. Rainfall totaled 0.41 inches during 3 d after application of herbicides. Assure II at 10 fl oz/A plus MSO at 20 fl oz/A was applied across the trial on June 23. Hail damage occurred in the trial on July 24. The trial was harvested with a plot combine on August 16.

Tank mixtures of Sharpen and/or Spartan with glyphosate provided excellent (91-99%) broadleaf weed control compared to glyphosate alone 2 weeks after treatment (WAT) (Table). Sheperdspurse and kochia control was good to excellent (83-99%) with glyphosate tank mixtures 4 WAT. Weed control was not antagonized with Sharpen plus Spartan tank mixtures with glyphosate. Crop stand was reduced with the high rate of Sharpen plus Spartan compared to the untreated check, but yield generally was similar among herbicide treatments.

Table.

Herbicide		Weed control[1]							Field pea	
		6/3				6/17			Stand	
Treatment[2]	Rate	fota	shpu	KOCZ	wibw	fota	shpu	KOCZ	6/3	Yield
	fl oz product/A	%							plants/A	bu/A
Untreated check	x	0	0	0	0	0	0	0	219224	13.0
Glyphosate	22	77	90	87	77	42	74	77	243898	18.1
Sharpen + glyt	1 + 22	90	99	96	91	71	85	86	229663	13.3
Sharpen + glyt	1.5 + 22	84	98	98	91	62	94	96	205937	20.1
Sharpen + glyt	2 + 22	88	98	98	91	73	94	92	228714	19.5
Spartan + glyt	3 + 22	90	98	98	91	70	83	96	258133	21.9
Sharpen + Spartan + glyt	1 + 3 + 22	93	98	98	92	74	86	99	216377	18.0
Sharpen + Spartan + glyt	2 + 3 + 22	94	99	99	91	75	95	98	229663	24.0
Sharpen + Spartan + glyt	4 + 6 + 22	98	99	99	92	89	98	98	168926	16.9
C.V. (%)		8.4	4.9	3.7	10.6	17.9	5.9	8.1	12.3	21.1
LSD (0.05)		12	7	6	16	19	8	12	47465	6.7

[1]Fota=yellow and green foxtail; shpu=sheperdspurse; KOCZ=kochia; wibw=wild buckwheat.

[2]All treatments include Class Act NG (Winfield Solutions) at 16 fl oz/A and all Sharpen treatments include Destiny HC (Winfield Solutions) at 12 fl oz/A; glyphosate=Roundup PowerMax (Monsanto); Sharpen=saflufenacil (BASF); Spartan=sulfentrazone (FMC).

Desiccation of flax with Saflufenacil. Howatt, Roach, and Harrington. 'York' flax was seeded near Fargo on May 26. Treatments were applied to 18-inch tall flax on September 13 with 58°F, 64% relative humidity, clear sky with 2 mph wind at 225°F, and dry soil at 60°F. Treatments with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 TT nozzles to a 7-foot wide area the length of 8 by 30 foot plots. The experiment was a randomized complete block design with three replicates.

Treatment	Rate	9/14 Leaf	9/16 Leaf	9/19 Stem	9/19 Leaf	9/23 Stem	9/23 Leaf	9/23 Boll	9/28 Stem	9/28 Leaf	9/28 Boll
		%	%	%	%	%	%	%	%	%	%
Saff+MSO+AMS	0.36+0.16G+24	20	20	0	20	20	70	60	30	77	75
Saff+MSO+AMS	0.72+0.16G+24	20	20	0	20	20	70	60	27	73	75
Saff+MSO+AMS	1.44+0.16G+24	20	20	0	20	20	70	60	33	83	77
Glyt+MSO+AMS	12+0.16G+24	20	20	0	20	20	53	50	40	90	83
Glyt+saff+MSO+AMS	12+0.36+0.16G+24	20	20	10	37	37	73	78	40	90	85
NaCl03+NIS	96+0.25%	20	20	0	20	20	70	60	30	73	73
Paraquat+NIS	6+0.25%	47	47	33	70	82	95	82	67	95	88
Untreated	0	20	20	0	20	10	30	40	20	63	70
CV		9	9	38	7	8	42	5	18	4	7
LSD (P=5)		4	4	4	4	4	5	5	11	6	10

Paraquat desiccation was apparent 1 day after application, but only 47% necrosis was observed. Flax desiccation with glyphosate plus saflufenacil became apparent September 19, the same night a hard frost occurred. All herbicides produced notable desiccation by 10 days after treatment, September 23, but only paraquat was producing necrosis on stem tissue greater than 40%. All treatments progressed relatively slowly. None of the flax plots were ready for mechanical harvest 2 weeks after application. The short time between application and frost may have interfered with chemical desiccation. Seed size was not affected by chemical desiccation (data not shown).

Lentil tolerance to Sharpen applied preemergence (Jenks, Willoughby, and Hoefing)The objective of the study was to evaluate lentil tolerance to Sharpen applied preemergence alone or tank mixed with Prowl H2O. The last treatment in the table below represents a 2X rate for all herbicides. All treatments caused slight to moderate injury at the June and July evaluations. However, by August there was minimal visible injury. Sharpen alone caused only 10% injury or less. Including Prowl in the tank mix resulted in more injury. The 2X treatment caused moderate to severe injury throughout the season.

Table. Lentil tolerance to Sharpen applied preemergence. (1116)

Treatment[ab]	Rate	Lentil Injury		
		29-Jun	16-Jul	4-Aug
		--------------%--------------		
Glyphosate	22 fl oz	0	0	0
Sharpen + Glyphosate	0.75 fl oz + 22 fl oz	7	2	0
Sharpen + Glyphosate	1 fl oz + 22 fl oz	10	5	0
Sharpen + Glyphosate + Prowl H2O	0.75 fl oz + 22 fl oz + 2 pt	19	13	1
Sharpen + Glyphosate + Prowl H2O	1 fl oz + 22 fl oz + 2 pt	23	16	0
Handweeded + Glyphosate + Prowl H2O	22 fl oz + 1.5 pt	12	8	2
Sharpen + Glyphosate + Prowl H2O[c]	1.5 fl oz + 44 fl oz + 4 pt	55	47	22
Untreated		0	0	0
LSD (0.05)		9	10	4
CV		31	50	74

[a] *Glyphosate applied with AMS (2.5%); Sharpen applied with MSO (1%)*

[b] *All treatments applied PRE*

[c] *All rates in this treatment are 2X*

Impact of herbicides and seeding rate on lentil yield and quality (Jenks, Willoughby, Jenks) The objective of the study was to determine if a higher lentil seeding rate would help offset any herbicide injury. Lentil was planted at 12 or 18 plants/ft^2. Various herbicides were applied preemergence (June 1) after planting on May 26. All treatments caused slight to moderate lentil injury at the July evaluation; however, in most treatments, the lentils generally grew out of the injury. In early August, there were no differences in height between treatments. There were no yield differences between treatments; however, wet soil conditions in some areas of the plot contributed to yield variability and a high CV. Lentil yields were higher where seeded at 18 plants/ft^2 compared to 12 plants/ft^2. There tended to be slightly less visible injury (3-8%) with the higher seeding rate.

Table. Impact of herbicides and seeding rate on lentil yield and quality (1119)

			Lentil				
			Injury		Height	Yield	TW
Treatment[ab]	Rate	Timing	9-Jul	17-Aug	4-Aug	15-Sep	
12 Plants per ft^2			----------%----------		cm	lb/A	lb/bu
Sharpen + Prowl H2O	1 fl oz + 3 pt	PRE	23	5	33.7	1068	62.8
Prowl	3 pt	PRE	17	5	33.3	1182	62.8
Sharpen + KIH-485	1 fl oz + 0.15 lb	PRE	16	8	34.2	1254	62.5
KIH-485	0.15 lb	PRE	15	6	35.1	1233	62.3
Sharpen + Spartan	1 fl oz + 3 fl oz	PRE	24	15	31.7	799	62.8
Spartan	3 fl oz	PRE	11	7	32.4	1124	62.8
Handweeded			10	3	33.8	1160	62.4
18 Plants per ft^2							
Sharpen + Prowl H2O	1 fl oz + 3 pt	PRE	17	2	33.5	1214	62.2
Prowl	3 pt	PRE	14	2	35.8	1373	62.2
Sharpen + KIH-485	1 fl oz + 0.15 lb	PRE	16	3	33.7	1282	61.6
KIH-485	0.15 lb	PRE	10	3	34.3	1358	61.6
Sharpen + Spartan	1 fl oz + 3 fl oz	PRE	20	7	34.3	1336	62.1
Spartan	3 fl oz	PRE	19	5	35.3	1677	62.6
Handweeded			0	0	35.3	1592	62.1
LSD (0.05)			5	5	NS	NS	NS
CV			24	64	5.2	23	1.4

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

[b] Beyond (4 fl oz) applied POST to all treatments

2011 BASF Clearfield Lentil System Trial

Eric Eriksmoen, Hettinger, ND

'CDC Maxim' lentil was seeded no-till on May 9. Pre-emergence treatments (PRE) were applied on May 19 with 42° F, 86% RH, cloudy sky and northeast wind at 3 mph. Post-emergence treatments (POST) were applied on June 15 to 8 node (4") lentil, 4 leaf volunteer Roundup Ready canola (vcan), 1 inch kochia (kocz), 2 inch Russian thistle (ruth), 4 inch wild buckwheat (wibw), Japanese brome (jabr) in the boot and heading downy brome (dobr) with 73° F, 41% RH, clear sky and north wind at 2 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi through PK-01E80 nozzles to 5 foot wide by 28 foot long plots. The soil is classified as a silt-loam with a pH of 6.2 and OM of 3.2%. The trial was a randomized complete block design with four replications. Weed populations for volunteer canola, kochia, Russian thistle, wild buckwheat, Japanese brome and downy brome were 6, 2, 0.25, 3, 3 and 2 plants per square foot, respectively. There was also a scattered amount of prickly lettuce (plet), tansy mustard (tmus) and volunteer spring wheat (vhrs) present. Plots were evaluated for crop stand establishment on June 3, for crop injury on June 1 and June 15, and for weed control on June 15, July 1, July 18 and August 11. The trial was harvested on August 16.

	Treatment	Product rate	App. timing	6/15 inj	Crop stand	July 18 wibw	July 18 tamu	July 18 jabr	July 18 vhrs	August 11 kocz	August 11 ruth	August 11 vcan	August 11 plet	Test weight	Seed yield
		oz/A		%	#/9' row	Percent Control								lbs/bu	lbs/A
1	Untreated			0	106	0	0	0	0	0	0	0	0	56.3	1174
2	Roundup Original fb Clethodim	32 4	PRE POST	2	106	58	0	99	96	97	94	0	74	59.9	1560
3	R'up + Prowl H_2O fb Clethodim	32 + 48 4	PRE POST	2	108	58	0	99	98	98	97	0	70	61.0	1685
4	R'up+Prowl H_2O+Sharpen fb Clethodim	32+48+0.75 4	PRE POST	8	106	50	23	99	92	98	94	0	76	60.7	1658
5	R'up fb Beyond	32 4	PRE POST	8	83	88	99	99	94	96	99	97	95	61.6	1660
6	R'up + Prowl H_2O fb Beyond	32 + 48 4	PRE POST	14	106	94	99	99	99	96	99	99	92	61.2	1871
7	R'up+Prowl H_2O+Sharpen fb Beyond	32+48+0.75 4	PRE POST	6	100	97	99	99	97	98	99	99	99	60.4	1603
8	R'up + Sharpen fb Beyond	32 + 0.75 4	PRE POST	10	95	97	99	99	99	90	97	99	93	60.3	1887
	C.V. %			64	16	12	17	0	6	4	4	3	19	2.0	5.5
	LSD .05			6	NS	12	13	1	7	5	5	2	22	1.8	132

NS = no statistical difference between treatments

Summary

Selected data is shown above. Crop injury consisted of leaf chlorosis and stunting which was quite evident with several treatments but did not correlate to seed yields. None of the pre-emergence treatments provided adequate season long control of wild buckwheat or prickly lettuce, however, treatments which also had a post-emergence application of Beyond herbicide had good to excellent control of these weeds. Beyond treatments also provided excellent season long control of tansy mustard and volunteer canola. All herbicide treatments provided excellent season long control of grassy weeds, kochia and Russian thistle.

Micro-rate herbicides for weed control in onion. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Oakes Irrigation Research Station to evaluate the use of micro-rate herbicides in 'Sedona' onion. Plots were 4 double-rows by 17 ft arranged in a randomized complete block design with four replicates. Planting took place on May 1 with a planting population of 200,000 seeds/a. Treatments were applied on May 17 (A), May 24 (B), June 1 (C), June 6 (D), June 14 (E), and June 23 (F). Onions were harvested October 4 and graded October 28.

Treatment 1 which consisted of four applications with Buctril and two applications with Goal Tender (and Chateau at the 4-leaf stage) was the highest yielding treatment that had micro-rate applications (330 cwt/a). The growers standard treatment (6) had the highest total yield (367 cwt/a). Weed pressure was very high, thus when pulling weeds in the hand-weeded check, some shallow rooted onions came with and others had too much root damage early resulting in no sizable onions. The only jumbo (>4") onions were from treatment 1.

Date:		5/17/11	5/24/11	6/1/11	6/6/11	6/14/11	6/23/11
Treatment:		A	B	C	D	E	F
Sprayer:	GPA:	20	20	20	20	20	20
	PSI:	40	40	40	40	40	40
	Nozzle:	11002	11003	8002	11003	8002	11003
Air Temperature (F):		47	56	70	88	73	69
Relative Humidity (%):		72	77	37	43	68	68
Wind (MPH):		4	11	11	10	8	12
Cloud Cover (%):		0	100	75	20	50	5
Onion Stage		75% emg.	Flag	1	1-2	2-3	3-4

					--2 Double Rows X 7 Feet--													
					----<1"----		----1"-2.25"----		----2.25"-3"----		----3"-4"----		--->4"---		----Total----			
					No.	Gr.	No.	Gr.	No.	Gr.	No.	Gr.	No.	Gr.	No.	Gr.	LB	CWT/A
Trt	Trt		Rate	App														
No	Name	Rate	Unit/A	Code														
1	Buctril	4	floz	B,C	.5a	4.1a	11.8ab	810ab	12.5b	2094b	10.3a	3247a	.5a	251a	36a	6406a	14.1a	330a
	Buctril	2	floz	D,E														
	Select	2	floz	B,C,D,E														
	Herbimax	1	pt	B,C,D,E														
	Goal Tender	2	floz	DE														
	Chateau	2	oz	F														
2	Buctril	2	floz	B,C,E,F	.3a	2a	18.8a	1242a	13b	1904bc	1b	252b	0b	0b	33a	3399b	7.5b	175b
	Buctril	4	floz	D														
	Select	2	floz	B,C,D,E,F														
	Herbimax	1	pt	B,C,D,E,F														
	Goal Tender	2	floz	E,F														
3	Goal Tender	1	floz	B,C,D,E,F	.3a	4.3a	23.3a	1437a	13.3b	1859bc	1.5b	393b	0b	0b	38a	3693b	8.1b	190b
	Buctril	2	floz	B,C,D,E,F														
	Select	2	floz	B,C,D,E,F														
	Destiny	0.5	%v/v	B,C,D,E,F														
4	Buctril	4	floz	B,C,D,E,F	.3a	2.8a	26.5a	1624a	10.8b	1717bc	.5b	175b	0b	0b	38a	3518b	7.8b	181b
	Select	2	floz	B,C,D,E,F														
	Herbimax	1	pt	B,C,D,E,F														
5	Goal Tender	2	floz	B,C,D,E,F	0a	0a	24.5a	1494a	12.5b	1800bc	1b	260b	0b	0b	38a	3553b	7.8b	183b
	Select	2	floz	B,C,D,E,F														
	Herbimax	1	pt	B,C,D,E,F														
6	Dacthal	10	lb	A	0a	0a	13.5ab	892ab	25.3a	3731a	8.8a	2513a	0b	0b	48a	7136a	15.7a	367a
	Buctril	1	pt	D														
	Goal	2	pt	D														
	Buctril	1	pt	F														
	Goal	2	pt	F														
7	Unt				.5a	5.6a	18.5a	1090a	3bc	416cd	0b	0b	0b	0b	22a	1511bc	3.3bc	77.8bc
8	Hand-weeded				0a	0a	0b	0b	0c	0d	0b	0b	0b	0b	0b	0c	0c	0c
				LCD (P=.05)	.65	7.53	12.65	797	7.59	1065	4.25	1437	.3	151	16.6	1887	4.16	97.1

Use of Micro-rates for weed control in onion. Harlene Hatterman-Valenti and Collin Auwarter.

Weed control in onion is essential to produce marketable bulbs and is compounded by the crop's notoriously competitive nature, especially during establishment when onion can take anywhere from 4-10 wk to reach the 2-leaf stage. Broadleaf weeds such as common lambsquarters, redroot pigweed, or hairy nightshade gain a competitive advantage over the establishing onion crop if weed control methods are not implemented. PRE and POST herbicide options prior to the 2-leaf stage are few, and often ineffective. This study was conducted in a grower's field near Oakes, ND to compare micro-rate and PRE+micro-rate herbicide treatments to the standard treatments. 'Talon' onion was planted April 24 with 16" centers and a planting population of 150,000 seeds/a. PRE treatments included 0.95 lb/A pendimethalin (Prowl H2O), 13.33 lb/A DCPA (Dacthal), 1 lb/A ethofumesate (Nortron), and 0.092 lb/A flumioxazin (Chateau). Micro-rate applications began 11 d after PRE applications and included different combinations of aciflurofen (Ultra Blazer), bromoxynil (Buctril), and oxyfluorfen (Goal Tender) at 0.25 and 0.13X the lowest labeled rate along with 0.031 lb/A clethodim (Select) and applied in four sequential applications every 7 d when weeds and onion were in seeding growth stages. Methylated seed oil (Destiny) (0.5% v/v) or petroleum oil concentrate (Herbimax) (1 pt/A) were also tank mixed with the micro-rate applications. All treatments received Buctril at 1pt, Goal at 2 pt and Prowl H2O at 4 pt/a during the 6 leaf stage.

Trt No	Trt Name	Rate	Rate Unit/A	App Code
1	Ultra Blazer	8	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
2	Prowl H2O	2	pt	A
	Goal Tender	2	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
3	Prowl H2O	12	floz	B,C,D,E
	Goal Tender	2	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
4	Goal Tender	2	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
5	Ultra Blazer	4	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
6	Prowl H2O	2	pt	A
	Goal Tender	1	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
7	Prowl H2O	12	floz	B,C,D,E
	Goal Tender	1	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
8	Goal Tender	1	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
16	Ultra Blazer	4	floz	B,C,D,E
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
17	Ultra Blazer	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
18	Buctril	4	floz	B,C
	Buctril	2	floz	D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
	Ultra Blazer	2	floz	D,E
19	Nortron	2	pt	A
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
20	Nortron	2	pt	A
	Goal Tender	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
21	Nortron	2	pt	A
	Buctril	4	floz	B,C
	Buctril	2	floz	D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
	Goal Tender	2	floz	D,E
22	Ultra Blazer	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
23	Ultra Blazer	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
24	Buctril	4	floz	B,C
	Buctril	2	floz	D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E

9	Ultra Blazer	2	floz	B,C,D,E
	Buctril	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
10	Prowl H2O	2	pt	A
	Goal Tender	1	floz	B,C,D,E
	Buctril	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
11	Prowl H2O	12	floz	B,C,D,E
	Goal Tender	1	floz	B,C,D,E
	Buctril	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
12	Goal Tender	1	floz	B,C,D,E
	Buctril	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
13	Dacthal	10	lb	A
	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
14	Dacthal	10	lb	A
	Goal Tender	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
15	Dacthal	10	lb	A
	Buctril	4	floz	B,C
	Buctril	2	floz	D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
	Goal Tender	2	floz	D,E

	Ultra Blazer	2	floz	D,E
25	Chateau	0.75	oz	A
	Buctril	4	floz	B,C
	Buctril	2	floz	D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
	Goal Tender	2	floz	D,E
26	Buctril	4	floz	B,C
	Buctril	2	floz	D,E
	Select	2	floz	B,C,D,E
	Herbimax	1	pt	B,C,D,E
	Goal Tender	2	floz	D,E
	Chateau	1	oz	G
27	Warrant	10	floz	B,C,D,E
	Buctril	2	floz	B,C,D,E,F
	Select	2	floz	B,C,D,E,F
	Herbimax	1	pt	B,C,D,E,F
	Goal Tender	2	floz	E,F
28	Buctril	4	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
29	Goal Tender	2	floz	B,C,D,E
	Select	2	floz	B,C,D,E
	Destiny	0.5	%v/v	B,C,D,E
30	Dacthal	10	lb	A
	Buctril	1	pt	E
	Goal	2	pt	E

	6/1/11	7/7/11	--------------------2 Double Rows X 7 Feet--------------------														
	Injury	Weed Control	--------<1"--------		---------1"-2.25"---------		--------2.25"-3"--------		------3"-4"------		---->4"-----					
	%	%	No.	Gr.	No.	Gr.	No.	Gr.	No.	Gr.	No.	Gr.	No.	Gr.	LB	CWT/A
1	72.5a	93.5ab	0c	0b	5.7ef	322ef	7.3def	968bc	0.3a	88a	0a	0a	13.3egf	1379def	3def	71def
2	27.5b-f	96ab	0c	0b	7.7c-f	533def	18a-e	2467bc	2a	441a	0a	0a	27.7def	3442b-f	7.6b-f	177b-f
3	33.8bc	99a	0c	0b	10.3b-f	724c-f	20.3a-d	2879bc	0a	0a	0a	0a	30.7c-f	3603b-f	7.9b-f	185b-f
4	32.5bcd	97a	.3c	3.5b	11.3b-f	807b-f	25.3abc	3611b	2.3a	533a	0a	0a	39.3a-d	4954abc	10.9abc	255abc
5	30b-e	88.8ab	0c	0b	14.3b-f	928b-f	11.7a-f	1458bc	1a	218a	0a	0a	26.7def	2531b-f	5.6b-f	130b-f
6	27.5b-f	93.8ab	0c	0b	12.7b-f	849b-f	21.3a-d	3114bc	1.3a	335a	0a	0a	35.3a-d	4298a-e	9.5a-e	221a-e
7	22.5b-g	95.8ab	0c	0b	9b-f	676c-f	25.3abc	3702b	1.7a	397a	0a	0a	36a-d	4775a-d	10.5a-d	246a-d
8	17.5c-g	92.5ab	0c	0b	11b-f	693c-f	20a-d	2939bc	2a	463a	0a	0a	33a-e	4095b-e	9b-e	211b-e
9	18.8c-g	91.3ab	0c	0b	16.7b-f	1137b-f	21.7a-d	3063bc	1.3a	314a	0a	0a	39.7a-d	4513a-d	10a-d	232a-d
10	25b-f	92.5ab	0c	0b	14.7b-f	1053b-f	27.3ab	6574a	0a	0a	0a	0a	42a-d	7626a	16.8a	392a
11	20c-g	94.8ab	.3c	2.17b	23.3a-d	1474a-d	21.3a-d	2791bc	0a	0a	0a	0a	45a-d	4268a-e	9.4a-e	220a-e
12	22.5b-g	92.5ab	0c	0b	11.3b-f	846b-f	23a-d	3243bc	1a	238a	0a	0a	35.3a-d	4327a-e	9.5a-e	223a-e
13	23.8b-g	92.3ab	0c	0b	21a-e	1528a-d	23.7a-d	3430bc	0a	0a	0a	0a	44.7a-d	4958abc	10.9abc	255abc
14	37.5b	95.8ab	.3c	2.33b	16b-f	1086b-f	13.7a-f	2015bc	1.3a	300a	0a	0a	31.3b-f	3402b-f	7.5b-f	175b-f
15	21.3b-g	94.8ab	0c	0b	24.3abc	1765abc	20a-d	2755bc	1.3a	298a	0a	0a	45.7a-d	4818a-d	10.6a-d	248a-d
16	23.8b-g	90ab	0c	0b	10.7b-f	801b-f	23a-d	3500bc	1.7a	422a	0a	0a	35.3a-d	4723a-d	10.4a-d	243a-d
17	23.8b-g	20d	2a	14b	21a-e	1201b-f	11b-f	1398bc	0.3a	82a	0a	0a	34.3a-d	2694b-f	5.9b-f	139b-f
18	23.8b-g	87.5ab	0c	0b	34.3a	2357a	19a-d	2537bc	1a	236a	0a	0a	54.3a	5130abc	11.3abc	264abc
19	13.8e-h	91.3ab	0c	0b	25.7ab	1717abc	26abc	3521bc	1.7a	394a	0a	0a	53.3ab	5632ab	12.4ab	290ab
20	26.3b-f	97a	0c	0b	13b-f	939b-f	16.7a-e	2431bc	0.3a	98a	0a	0a	30c-f	3468b-f	7.6b-f	178b-f
21	16.3d-g	94.8ab	0c	0b	15.3b-f	1016b-f	28a	3644b	0.3a	76a	0a	0a	43.7a-d	4736a-d	10.4a-d	244a-d
22	22.5b-g	50c	1bc	4.33b	24.3abc	1495a-d	10.7c-f	1403bc	0a	0a	0a	0a	36a-d	2902b-f	6.4b-f	149b-f
23	13.8e-h	25d	.7bc	6.67b	20a-e	1115b-f	8def	1104bc	0a	0a	0a	0a	28.7c-f	2225b-f	4.9b-f	114b-f
24	16.3d-g	86.3ab	0c	0b	25.3ab	1668abc	19a-d	2670bc	1.7a	407a	0a	0a	46a-d	4745a-d	10.5a-d	244a-d
25	17.5c-g	96ab	0c	0b	11.3b-f	869b-f	13.7a-f	2116bc	2a	493a	0a	0a	27def	3477b-f	7.7b-f	179b-f
26	15efg	98a	0c	0b	20.7a-e	1393a-e	20.3a-d	2863bc	0a	0a	0a	0a	41a-d	4255a-e	9.4a-e	219a-e
27	12.5fgh	97a	0c	0b	25.7ab	1856ab	23.7a-d	3313bc	0.7a	149a	0a	0a	50abc	5317ab	11.7ab	274ab
28	13.8e-h	75b	0c	0b	19a-f	1341b-e	22.3a-d	3083bc	1a	245a	0a	0a	42.3a-d	4668a-d	10.3a-d	240a-d
29	63.8a	82.5ab	0c	0b	6.7def	503def	17.3a-e	2691bc	1a	242a	0a	0a	25def	3436b-f	7.6b-f	177b-f
30	7.5gh	92.5ab	.7bc	6.33b	2.7f	149f	1.7f	230c	0a	0a	0a	0a	5g	385f	.8f	20f
31	0h	20d	1.5ab	12.5a	5.5ef	285ef	3.5ef	493bc	1a	228a	0a	0a	11.5fg	1018ef	2.2ef	52ef
32	0h	100a	.7bc	4.67b	16.3b-f	823b-f	8def	970bc	0a	0a	0a	0a	25def	1798c-f	4c-f	92c-f
LSD(P=.05)	9.12	11.43	.61	4.83	9.24	606	8.84	1790	2.05	484	0	0	11.89	1881	4.15	96.8

Date:		5/6/11	5/17/11	5/24/11	6/1/11	6/6/11	6/14/11	6/23/11	7/7/11
Treatment:		A	B	C	D	E	F	G	H
Sprayer:	GPA:	20	20	20	20	20	20	30	20
	PSI:	40	40	40	40	40	40	40	40
	Nozzle:	8002	11002	11003	8002	11003	8002	11003	8002
Air Temperature (F):		68	59	56	72	92	72	72	84
Relative Humidity (%):		27	45	77	34	41	71	54	53
Soil Moisture:		Adequate	Excessive	Adequate	Inadequate	Inadequate	Adequate	Excessive	Adequate
Wind (MPH):		9	9	12	9	10	5	11	5
Cloud Cover (%):		0	0	100	10	20	95	5	10
Onion Stage		Seed Cracking	Flag Leaf	Loop	1 Leaf	1.5-2 Leaf	2.5-3 Leaf	3-4 Leaf	6 Leaf

All treatments showed very good weed control 14 d after final micro-rate application (>88%) except the treatments that included acifluorfen or those without both bromoxynil and oxyfluorfen in the treatment. Treatments with oxyfluorfen and no bromoxynil or acifluorfen either with a PRE or without had better weed control than bromoxynil without oxyfluorfen or acifluorfen with or without a PRE application. However, the oxyfluorfen treatments also showed greater injury than the bromoxynil treatments and resulted in lower total yields. Evaluations 14 d after the first micro-rate application showed injury between 13-37% for treatments that included a micro-rate application. The onion stand was poor from herbicide injury and wet conditions let alone some over-land flooding that washed away emerged plants. The highest yielding treatment was 0.95 lb/A pendimethalin applied PRE followed by four sequential micro-rate applications of 0.031 lb/A oxyfluorfen + 0.031 lb/A bromoxynil + 0.031 lb/A clethodim + MSO (392 cwt/A). The lowest yielding treatment was the standard of 13.33 lb/A DCPA applied PRE followed by 0.5 lb/A oxyfluorfen + 0.25 lb/A bromoxynil at the 2 and 5-leaf stage with 20 cwt/A. All other treatments excluding the weedy check and 0.125 lb/A acifluorfen + 0.063 lb/A bromoxynil + 0.031 lb/A clethodim + MSO had greater than 100 cwt/A.

Micro-rate herbicides for weed control in onion. Harlene Hatterman-Valenti and Collin Auwarter.
This study was conducted in a grower's field near Dawson, ND to compare micro-rate and PRE+micro-rate herbicide treatments to standard treatments. 'Sedona' onion was planted May 1 at 16" double-row centers and 175,000 seeds/a. Plots were 4 double-rows by 20 ft arranged in a randomized complete block design with four replicates. Treatments were applied on May 16 (A), May 23 (B), June 1 (C), June 6 (D), June 16 (E), and June 24 (F). On July 7 (G) all treatments received Buctril @ 1 pt, Goal @ 2 pt and Prowl H2O @ 4 pt/a at the 5 leaf stage.

Date:		5/16/11	5/23/11	6/1/11	6/6/11	6/16/11	6/24/11	7/7/11
Treatment:		A	B	C	D	E	F	G
Sprayer:	GPA:	20	20	20	20	20	20	20
	PSI:	40	40	40	40	40	40	40
	Nozzle:	11002	11003	8002	11003	11003	11003	8002
Air Temperature (F):		63	62	62	82	75	71	76
Relative Humidity (%):		25	62	51	51	45	79	69
Wind (MPH):		15	11	9	9	11	7	4
Cloud Cover:		0	100	25	0	90	100	10
Soil Moisture:		Adequate	Adequate	Adequate	Inadequate	Adequate	Adequate	Adequate
Onion Stage:		Seed crack	Flag	Loop	1 leaf	2 leaf	3 leaf	5 leaf

					6/1/11
					Injury
Trt	Trt		Rate	App	%
No	Name	Rate	Unit/A	Code	
1	Roundup	22	floz	A	22.5b-e
	Goal Tender	2	floz	B,C,D,E	
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
2	Prowl H2O	2	pt	A	32.5bcd
	Goal Tender	2	floz	B,C,D,E	
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
3	Roundup	22	floz	A	40abc
	Prowl H2O	2	pt	A	
	Goal Tender	2	floz	B,C,D,E	
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
4	Goal Tender	2	floz	B,C,D,E	32.5bcd
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
5	Roundup	22	floz	A	30b-e
	Goal Tender	1	floz	B,C,D,E	
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
6	Prowl H2O	2	pt	A	27.5b-e
	Goal Tender	1	floz	B,C,D,E	
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
7	Roundup	22	floz	A	33.8bcd
	Prowl H2O	2	pt	A	
	Goal Tender	1	floz	B,C,D,E	
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
8	Goal Tender	1	floz	B,C,D,E	22.5b-e
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	

9	Roundup	22	floz	A	26.3b-e
	Goal Tender	1	floz	B,C,D,E	
	Buctril	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
10	Prowl H2O	2	pt	A	27.5b-e
	Goal Tender	1	floz	B,C,D,E	
	Buctril	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
11	Roundup	22	floz	A	21.3b-e
	Prowl H2O	2	pt	A	
	Goal Tender	1	floz	B,C,D,E	
	Buctril	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
12	Goal Tender	1	floz	B,C,D,E	41.3abc
	Buctril	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
13	Dacthal	10	lb	A	12.5de
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
14	Dacthal	10	lb	A	28.8cde
	Goal Tender	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
15	Dacthal	10	lb	A	18.8cde
	Buctril	4	floz	B,C	
	Buctril	2	floz	D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
	Goal Tender	2	floz	D,E	
16	Dacthal	10	lb	A	10de
	Roundup	22	floz	A	
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
17	Dacthal	10	lb	A	46.3ab
	Roundup	22	floz	A	
	Goal Tender	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
18	Dacthal	10	lb	A	11.3de
	Roundup	22	floz	A	
	Buctril	4	floz	B,C	
	Buctril	2	floz	D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
	Goal Tender	2	floz	D,E	
19	Nortron	2	pt	A	8.8de
	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
20	Nortron	2	pt	A	10de
	Buctril	4	floz	B,C	
	Buctril	2	floz	D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
	Goal Tender	2	floz	D,E	
21	Nortron	2	pt	A	40abc
	Goal Tender	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
22	Nortron	2	pt	A	8.8de
	Roundup	22	floz	A	

	Buctril	4	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
23	Nortron	2	pt	A	57.5a
	Roundup	22	floz	A	
	Goal Tender	2	floz	B,C,D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
24	Nortron	2	pt	A	16.3cde
	Roundup	22	floz	A	
	Buctril	4	floz	B,C	
	Buctril	2	floz	D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
	Goal Tender	2	floz	D,E	
25	Chateau	.75	oz	A	16.3cde
	Buctril	4	floz	B,C	
	Buctril	2	floz	D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
	Goal Tender	2	floz	D,E	
26	Buctril	4	floz	B,C	17.5cde
	Buctril	2	floz	D,E	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E	
	Goal Tender	2	floz	D,E	
	Chateau	2	oz	F	
27	Buctril	2	floz	B,C,E,F	11.3de
	Buctril	4	floz	D	
	Goal Tender	2	floz	E,F	
	Select	2	floz	B,C,D,E	
	Herbimax	1	pt	B,C,D,E,F	
28	Buctril	4	floz	B,C,D,E	15.3cde
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
29	Goal Tender	2	floz	B,C,D,E	23.6b-e
	Select	2	floz	B,C,D,E	
	Destiny	.5	%v/v	B,C,D,E	
30	Dacthal	10	lb	A	5e
	Buctril	1	pt	E	
	Goal	2	pt	E	
				LSD (P=.05)	14.7

The injury readings were 8 days after the first micro-rate (time B). Treatments with Goal Tender at 1 or 2 fl oz/a showed more injury than when Buctril was applied at 2 or 4 fl oz/a. Any treatments with >20% injury had Goal Tender applied at the first micro-rate. Weed control was excellent throughout the length of the trial, regardless of what herbicides were used due to low weed pressure in the grower's field.

Simulated glyphosate drift to Red Lasoda seed potatoes. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Growers Non-Irrigation Research site near Grand Forks, ND to evaluate Red Lasoda seed potatoes that had glyphosate drift during previous season. Simulated glyphosate drift was applied at 3 different growth stages in 2010; tuber initiation (A) early tuber bulking (B), and late tuber bulking (C) with a modified ATV sprayer. Roundup Weathermax with 4.5 pounds acid equivalent per gallon glyphosate and AMS at 4 pounds/100 gallons were used in this trial. Twenty tubers were saved in storage until one seed piece per tuber was planted July 5, 2011. Potatoes were machine harvested November 1 and graded November 15.

Trt	Trt		Rate	App	Total	<4oz	4-6oz	6-10oz	>10oz	>4oz	Total	<4oz	4-6oz	6-10oz	>10oz	>4oz
No	Name	Rate	Unit	Code	-----------------cwt/a--------------------						-------Tuber count in 20 feet-------					Tuber %
1	Untreated				170a	43ab	80a	29ab	18ab	128a	88a	45ab	31a	9a	3ab	50a
2*	GLY	.2	lb ae/a	A	140abc	52a	57ab	18abc	13ab	88abc	88a	57a	24a	5ab	2ab	35ab
3*	GLY	.1	lb ae/a	A	151ab	47a	58ab	22abc	24ab	104ab	85a	52a	23ab	6ab	4ab	39ab
4*	GLY	.05	lb ae/a	A	180a	42ab	73a	35a	30ab	138a	94a	51a	28a	10a	6a	47a
5*	GLY	.2	lb ae/a	B	38d	14b	14b	5c	6b	24c	25b	18b	5b	1b	1b	20b
6*	GLY	.1	lb ae/a	B	112a-d	29ab	43ab	20abc	19ab	82abc	58ab	33ab	16ab	6ab	3ab	42ab
7*	GLY	.05	lb ae/a	B	139abc	33ab	50ab	22abc	35a	106ab	66ab	36ab	18ab	6ab	6a	45a
8*	GLY	.2	lb ae/a	C	50cd	13b	14b	10bc	14ab	38bc	28b	18b	5b	3b	2ab	35ab
9*	GLY	.1	lb ae/a	C	91a-d	23ab	42ab	16abc	10ab	68abc	51ab	29ab	15ab	5ab	2ab	39ab
10*	GLY	.05	lb ae/a	C	66bcd	28ab	15b	8c	14ab	37bc	51ab	41ab	6b	2b	3ab	20b
*AMS added	LSD (P=.05)				61	19	30	13	16	47	32	21	12	4	3	16

The highest total yield treatment occurred when glyphosate was applied at the tuber initiation stage at the 0.05 lb ae/a rate with 180 cwt/a, followed by the untreated with 170 cwt/a. The lowest yielding treatments resulted from 0.2 lb at the early and late tuber bulking stage with 38 and 50 cwt/a, respectively. The late tuber bulking stage had 3 of the 4 lowest yielding treatments. Tuber counts indicated that increased glyphosate uptake into the seed tubers resulted in lower tuber set. Tuber counts from the untreated and tuber initiation stage averaged between 85 and 94, respectively, while tuber counts from the early and late tuber bulking stages ranged from 25 to 66.

Simulated glyphosate drift to Red Norland seed potatoes. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Growers Non-Irrigation Research site near Grand Forks, ND to evaluate Red Norland seed potatoes that had glyphosate drift during previous season. Simulated glyphosate drift was applied at 3 different growth stages in 2010; tuber initiation (A) early tuber bulking (B), and late tuber bulking (C) with a modified ATV sprayer. Roundup Weathermax with 4.5 pounds acid equivalent per gallon glyphosate and AMS at 4 pounds/100 gallons were used in this trial. Twenty tubers were saved in storage until one seed piece per tuber was planted July 5, 2011. Potatoes were machine harvested November 1 and graded November 15.

Trt	Trt		Rate	App	Total	<4oz	4-6oz	6-10oz	>10oz	>4oz	Total	<4oz	4-6oz	6-10oz	>10oz	>4oz
No	Name	Rate	Unit	Code	---------------------------cwt/a------------------------- ---						-------------Tuber count in 20 feet--------- ---					Tuber %
1	Untreated				112a	43abc	48a	13a	7a	69a	68a	43ab	20a	4a	1a	37a
2*	GLY	.2	lb ae/a	A	25c	15c	8bc	0b	1a	10bc	23bc	20bc	4bc	0b	1a	17bc
3*	GLY	.1	lb ae/a	A	106a	58a	39ab	7ab	2a	48abc	78a	59a	17ab	2ab	1a	23abc
4*	GLY	.05	lb ae/a	A	110a	56ab	41ab	10ab	2a	54ab	76a	54a	18a	3ab	1a	28ab
5*	GLY	.2	lb ae/a	B	19c	14c	4c	1ab	0a	5c	17c	15c	2c	1ab	0a	7c
6*	GLY	.1	lb ae/a	B	34bc	20c	8bc	6ab	0a	14bc	27bc	22bc	4bc	2ab	0a	15bc
7*	GLY	.05	lb ae/a	B	41bc	29bc	9bc	3ab	0a	12bc	44abc	39abc	4bc	1ab	0a	9bc
8*	GLY	.2	lb ae/a	C	73abc	43abc	23abc	5ab	1a	30abc	62a	51a	9abc	2ab	1a	17bc
9*	GLY	.1	lb ae/a	C	59abc	39abc	18abc	2ab	0a	19bc	54ab	46a	8abc	1ab	0a	14bc
10*	GLY	.05	lb ae/a	C	88ab	56ab	27abc	5ab	0a	32abc	73a	60a	11abc	2ab	0a	17bc
*AMS added		LSD (P=.05)			41	19	22	8	5	28	26	18	9	2	1	12

There were only 3 treatments that yielded over 100 cwt/a, untreated (112), 0.05 lb at the tuber initiation stage (110) and 0.1 lb at the tuber initiation stage (106). All other treatments had total yields under 88 cwt/a. Early tuber bulking stage treatments had significantly lower yields than the other stages, with 0.2 lb resulting in only 19 cwt/a. Tuber counts indicated that increased glyphosate uptake into the seed tubers during the early tuber bulking stage resulted in lower tuber set. Tuber counts from the untreated averaged 68 tubers in 20 ft or approximately 3.5 tubers/plant if all seed pieces emerged, while tuber counts from the early tuber bulking stage averaged 29 tubers in 20 ft or approximatley 1.5 tubers/plant if all seed pieces emerged.

Simulated glyphosate drift to Sangre seed potatoes. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Growers Non-Irrigation Research site near Grand Forks, ND to evaluate Red Lasoda seed potatoes that had glyphosate drift during previous season. Simulated glyphosate drift was applied at 3 different growth stages in 2010; tuber initiation (A) early tuber bulking (B), and late tuber bulking (C) with a modified ATV sprayer. Roundup Weathermax with 4.5 pounds acid equivalent per gallon glyphosate and AMS at 4 pounds/100 gallons were used in this trial. Twenty tubers were saved in storage until one seed piece per tuber was planted July 5, 2011. Potatoes were machine harvested November 1 and graded November 15.

Trt	Trt		Rate	App	Total	<4oz	4-6oz	6-10oz	>10oz	>4oz	Total	<4oz	4-6oz	6-10oz	>10oz	>4oz
No	Name	Rate	Unit	Code	-----------------cwt/a--------------------						-------Tuber count in 20 feet-------					Tuber %
1	Untreated				172 a	64 a	64 a	29 a	16 a	108 a	102 a	66 a	25 a	8 a	3 a	35 a
2*	GLY	.2	lb ae/a	A	152 ab	56 a	65 a	17 ab	14 a	96 a	94 a	60 a	26 a	5 ab	2 a	36 a
3*	GLY	.1	lb ae/a	A	150 ab	59 a	63 a	18 ab	11 a	92 a	92 a	60 a	25 a	6 ab	2 a	35 a
4*	GLY	.05	lb ae/a	A	159 ab	66 a	57 a	19 ab	17 a	92 a	100 a	69 a	23 a	5 ab	3 a	30 a
5*	GLY	.2	lb ae/a	B	23 c	10 c	8 b	3 b	1 a	13 b	17 c	13 c	3 b	1 b	.3 a	12 ab
6*	GLY	.1	lb ae/a	B	67 bc	25 bc	26 ab	9 b	7 a	42 ab	43 bc	29 bc	10 ab	3 b	1 a	23 ab
7*	GLY	.05	lb ae/a	B	124 ab	46 ab	54 a	18 a	6 a	79 a	80 ab	51 ab	22 a	6 ab	1 a	35 a
8*	GLY	.2	lb ae/a	C	22 c	11 c	6 b	4 b	1 a	11 b	16 c	12 c	2 b	1 b	.3 a	6 b
9*	GLY	.1	lb ae/a	C	23 c	10 c	9 b	2 b	3 a	13 b	19 c	15 c	4 b	1 b	1 a	19 ab
10*	GLY	.05	lb ae/a	C	100 abc	35 abc	41 ab	14 ab	10 a	65 ab	63 abc	41 abc	16 ab	4 ab	2 a	34 a
*AMS added		LSD (P=.05)			61	19	30	13	62.5	20.8	29.8	11.6	10.5	44.4	33.3	21.7

The highest total yielding treatment was the untreated with 172 cwt/a. Yield from treatments where glyphosate was applied to plants at the tuber initiation stage regardless of the rate yielded well compared to the early and late tuber bulking stages. Both yield and tuber counts were smaller at the 0.2 and 0.1 lb rates at the early and late tuber bulking stages. Results suggest that more glyphosate is moved into the tubers the later in the season the glyphosate drift occurred.

Cover crops and kill methods to control weeds in dryland potato. Grant H. Mehring, Harlene Hatterman-Valenti, Collin Auwarter, Bob Smith, and Blaine Schatz.

An experiment was conducted at the Carrington Research and Extension Center to evaluate alternative weed control methods for organic and low external input potato production. Cover crop, kill technique of the cover crop, and potato variety were the three factors investigated (Table 1). A randomized complete block with four replicates was the experimental design. The research commenced with the tilling of the previous barley crop following harvest in 2010 and came to a close with potato harvest in 2011 (Table 2). Cover crops were planted with a grain drill at the rates of 135 lbs/acre triticale, 120 lbs/acre rye, and 30 lbs/acre hairy vetch. Cover crop desiccation was performed with 22 fl oz/acre Roundup Weathermax, disk-till, or roller-crimping. Two ounce potato seed was planted with 36 inch row spacing and 12 inch plant spacing using a two row Iron Age potato planter. Treatments were evaluated for overall weed control using a visual scale from 0-100% three times throughout the season at 12, 28, and 46 days after planting. To further evaluate weed control weed density and weight inside a one foot quadrant were taken. Plots were cultivated once at 12 days after planting and due to wet conditions and potato row closure could not be cultivated again at 28 days as desired. Potatoes were harvested then graded in Fargo, ND.

Table 1. Treatments in the factorial arrangement.

Cover Crop	Kill	Potato variety
Triticale	Disk-till	Red Norland
Rye	Roller-crimp	Red Pontiac
Hairy vetch	Herbicide	
Rye/hairy vetch		
No cover crop		

Table 2. Schedule of field operations.

	Date	
Field operation	2010	2011
Cover crop planting	August 27	-
Burn-down herbicide of cover crop	-	June 6
Disk-till and roller-crimping termination of cover crop	-	June 29
Potato planting	-	June 30
Potato harvest	-	October 18, 20

Results: The dry weight biomass accumulation for all four cover crop treatments was adequate for weed suppression with cover crops (Table 3). With the late potato planting cover crops grew until June 29th, partly accounting for the very high biomass accumulation. Biomass for the no cover crop treatment came from the weed biomass present at collection. Weed control was at 85% or above for every treatment except the weedy check (Table 4). Roller-crimping recorded the lowest weed control for each cover crop. Weed density and weed weight were low throughout almost all treatments. Overall there was very little weed pressure throughout the experiment. Marketable yields were large enough to be considered acceptable but not exceptional (Table 5).

Table 3. Average dry weight biomass for cover crop treatments.

Treatment	Dry weight
	-------$kg \cdot ha^{-1}$-------
Hairy vetch	7661
Rye/hairy vetch	7603
Triticale	7415
Rye	4539
No cover crop	1286

Table 4. Effect of cover crop, kill, and variety treatments on total weed control, weed density, and weed weight.

Cover crop	Kill	Potato variety	Weed control	Weed density	Weed weight
			----%----	-density/ft^2-	-----g-----
Triticale	Disk-till	Red Norland	90	2	0.4
Triticale	Disk-till	Red Pontiac	90	1	1.6
Triticale	Roller-crimp	Red Norland	89	0	0.0
Triticale	Roller-crimp	Red Pontiac	89	0	0.0
Triticale	Herbicide	Red Norland	94	0	0.8
Triticale	Herbicide	Red Pontiac	94	0	0.4
Rye	Disk-till	Red Norland	93	0	0.3
Rye	Disk-till	Red Pontiac	93	0	0.3
Rye	Roller-crimp	Red Norland	90	0	0.0
Rye	Roller-crimp	Red Pontiac	90	0	0.3
Rye	Herbicide	Red Norland	95	0	0.3
Rye	Herbicide	Red Pontiac	95	0	0.9
Hairy vetch	Disk-till	Red Norland	96	0	0.8
Hairy vetch	Disk-till	Red Pontiac	96	0	0.2
Hairy vetch	Roller-crimp	Red Norland	85	0	10.7
Hairy vetch	Roller-crimp	Red Pontiac	85	0	1.6
Hairy vetch	Herbicide	Red Norland	94	0	0.1
Hairy vetch	Herbicide	Red Pontiac	94	0	0.6
Rye/hairy vetch	Disk-till	Red Norland	92	0	1.2
Rye/hairy vetch	Disk-till	Red Pontiac	92	0	0.0
Rye/hairy vetch	Roller-crimp	Red Norland	89	0	3.1
Rye/hairy vetch	Roller-crimp	Red Pontiac	89	0	1.5
Rye/hairy vetch	Herbicide	Red Norland	94	1	1.0
Rye/hairy vetch	Herbicide	Red Pontiac	94	0	0.0
No cover crop	Disk-till	Red Norland	89	0	1.6
No cover crop	Disk-till	Red Pontiac	89	0	17.1
No cover crop	Weedy check	Red Norland	54	0	0.1
No cover crop	Weedy check	Red Pontiac	54	0	37.4
No cover crop	Herbicide	Red Norland	93	0	0.2
No cover crop	Herbicide	Red Pontiac	93	0	0.0

Table 5. Effect of cover crop, kill, and variety treatments on total and marketable potato yield.

Cover crop	Kill	Potato variety	Total yield	Total marketable yield
			---CWT/A---	------CWT/A------
Triticale	Disk-till	Red Norland	195	139
Triticale	Disk-till	Red Pontiac	211	153
Triticale	Roller-crimp	Red Norland	94	48
Triticale	Roller-crimp	Red Pontiac	139	81
Triticale	Herbicide	Red Norland	153	97
Triticale	Herbicide	Red Pontiac	166	110
Rye	Disk-till	Red Norland	154	101
Rye	Disk-till	Red Pontiac	136	90
Rye	Roller-crimp	Red Norland	90	55
Rye	Roller-crimp	Red Pontiac	105	63
Rye	Herbicide	Red Norland	141	92
Rye	Herbicide	Red Pontiac	166	112
Hairy vetch	Disk-till	Red Norland	192	134
Hairy vetch	Disk-till	Red Pontiac	226	166
Hairy vetch	Roller-crimp	Red Norland	48	25
Hairy vetch	Roller-crimp	Red Pontiac	70	40
Hairy vetch	Herbicide	Red Norland	209	149
Hairy vetch	Herbicide	Red Pontiac	239	174
Rye/hairy vetch	Disk-till	Red Norland	174	119
Rye/hairy vetch	Disk-till	Red Pontiac	225	163
Rye/hairy vetch	Roller-crimp	Red Norland	78	49
Rye/hairy vetch	Roller-crimp	Red Pontiac	136	75
Rye/hairy vetch	Herbicide	Red Norland	122	66
Rye/hairy vetch	Herbicide	Red Pontiac	186	111
No cover crop	Disk-till	Red Norland	186	118
No cover crop	Disk-till	Red Pontiac	264	196
No cover crop	Weedy check	Red Norland	153	103
No cover crop	Weedy check	Red Pontiac	176	124
No cover crop	Herbicide	Red Norland	182	133
No cover crop	Herbicide	Red Pontiac	236	174

Cover crops and kill methods to control weeds in irrigated potato. Grant H. Mehring, Harlene Hatterman-Valenti, Collin Auwarter, Bob Smith, and Blaine Schatz.

An experiment was conducted at the Carrington Research and Extension Center to evaluate alternative weed control methods for organic and low external input potato production. Cover crop, kill technique of the cover crop, and potato variety were the three factors investigated (Table 1). A randomized complete block with four replicates was the experimental design. The research commenced with the tilling of the previous barley crop following harvest in 2010 and came to a close with potato harvest in 2011 (Table 2). Cover crops were planted with a grain drill at the rates of 135 lbs/acre triticale, 120 lbs/acre rye, and 30 lbs/acre hairy vetch. Cover crop desiccation was performed with 22 fl oz/acre Roundup Weathermax, disk-till, or roto-till. Two ounce potato seed was planted with 36 inch row spacing and 12 inch plant spacing using a two row Iron Age potato planter. Treatments were evaluated for overall weed control using a visual scale from 0-100% three times throughout the season at 13, 26, and 42 days after planting. To further evaluate weed control weed density and weight inside a one foot quadrat were taken. Plots were cultivated at 13 and 23 days after planting. Potatoes were harvested then graded in Fargo, ND.

Table 1. Treatments in the factorial arrangement.

Cover Crop	Kill	Potato variety
Triticale	Disk-till	Yukon Gold
Rye	Roto-till	Russet Norkotah
Hairy vetch	Herbicide	
Rye/hairy vetch		
No cover crop		

Table 2. Schedule of field operations.

	Date	
Field operation	2010	2011
Cover crop planting	August 27	-
Burn-down herbicide of cover crop	-	June 3
Disk-till and roto-till termination of cover crop	-	June 15
Potato planting	-	June 16
Potato harvest	-	October 13

Results: The dry weight biomass accumulations for hairy vetch and rye/hairy vetch cover crop treatments were adequate for weed suppression with cover crops (Table 3). Triticale and rye biomasses were lower than desired for weed control with cover crops. Biomass for the no cover crop treatment came from the weed biomass present at collection. Weed control was excellent and similar throughout every treatment besides the weedy check (Table 4). The weedy check averaged 80% weed control, which remains adequate despite being lower than the other treatments. Weed density and weed weight were negligible throughout all treatments. Overall there was very little weed pressure throughout the experiment. Marketable yields were large enough to be considered acceptable but not exceptional (Table 5).

Table 3. Average dry weight biomass for cover crop treatments.

Treatment	Dry weight
	-------kg·ha^{-1}-------
Hairy vetch	3996
Rye/hairy vetch	3580
Triticale	1850
Rye	1671
No cover crop	54

Table 4. Effect of cover crop, kill, and variety treatments on total weed control, weed density, and weed weight.

Cover crop	Kill	Potato variety	Weed control	Weed density	Weed weight
			----%----	-density/ft^2-	-----g-----
Triticale	Disk-till	Russet Norkotah	94	0	0.00
Triticale	Disk-till	Yukon Gold	94	0	0.00
Triticale	Roto-till	Russet Norkotah	96	0	0.00
Triticale	Roto-till	Yukon Gold	96	0	0.00
Triticale	Herbicide	Russet Norkotah	97	1	0.00
Triticale	Herbicide	Yukon Gold	97	0	0.00
Rye	Disk-till	Russet Norkotah	96	0	0.00
Rye	Disk-till	Yukon Gold	96	0	0.00
Rye	Roto-till	Russet Norkotah	97	0	0.00
Rye	Roto-till	Yukon Gold	97	0	0.00
Rye	Herbicide	Russet Norkotah	97	0	0.00
Rye	Herbicide	Yukon Gold	97	0	0.00
Hairy vetch	Disk-till	Russet Norkotah	96	0	0.00
Hairy vetch	Disk-till	Yukon Gold	96	0	0.00
Hairy vetch	Roto-till	Russet Norkotah	97	1	0.83
Hairy vetch	Roto-till	Yukon Gold	97	0	0.00
Hairy vetch	Herbicide	Russet Norkotah	94	0	0.00
Hairy vetch	Herbicide	Yukon Gold	94	1	0.33
Rye/hairy vetch	Disk-till	Russet Norkotah	95	0	0.00
Rye/hairy vetch	Disk-till	Yukon Gold	95	0	0.00
Rye/hairy vetch	Roto-till	Russet Norkotah	96	0	0.00
Rye/hairy vetch	Roto-till	Yukon Gold	96	0	0.00
Rye/hairy vetch	Herbicide	Russet Norkotah	94	0	0.00
Rye/hairy vetch	Herbicide	Yukon Gold	94	0	0.00
No cover crop	Disk-till	Russet Norkotah	94	0	0.42
No cover crop	Disk-till	Yukon Gold	94	0	0.00
No cover crop	Weedy check	Russet Norkotah	80	1	0.42
No cover crop	Weedy check	Yukon Gold	80	0	0.00
No cover crop	Herbicide	Russet Norkotah	97	0	0.08
No cover crop	Herbicide	Yukon Gold	97	0	0.00

Table 5. Effect of cover crop, kill, and variety treatments on total and marketable potato yield.

Cover crop	Kill	Potato variety	Total yield	Total marketable yield
			---CWT/A---	------CWT/A------
Triticale	Disk-till	Yukon Gold	163	133
Triticale	Disk-till	Russet Norkotah	265	230
Triticale	Roto-till	Yukon Gold	206	173
Triticale	Roto-till	Russet Norkotah	293	259
Triticale	Herbicide	Yukon Gold	182	140
Triticale	Herbicide	Russet Norkotah	312	255
Rye	Disk-till	Yukon Gold	128	99
Rye	Disk-till	Russet Norkotah	289	232
Rye	Roto-till	Yukon Gold	181	148
Rye	Roto-till	Russet Norkotah	227	199
Rye	Herbicide	Yukon Gold	132	102
Rye	Herbicide	Russet Norkotah	308	270
Hairy vetch	Disk-till	Yukon Gold	201	154
Hairy vetch	Disk-till	Russet Norkotah	303	260
Hairy vetch	Roto-till	Yukon Gold	163	127
Hairy vetch	Roto-till	Russet Norkotah	258	219
Hairy vetch	Herbicide	Yukon Gold	152	128
Hairy vetch	Herbicide	Russet Norkotah	272	233
Rye/hairy vetch	Disk-till	Yukon Gold	198	154
Rye/hairy vetch	Disk-till	Russet Norkotah	217	166
Rye/hairy vetch	Roto-till	Yukon Gold	208	172
Rye/hairy vetch	Roto-till	Russet Norkotah	327	290
Rye/hairy vetch	Herbicide	Yukon Gold	196	162
Rye/hairy vetch	Herbicide	Russet Norkotah	298	264
No cover crop	Disk-till	Yukon Gold	237	193
No cover crop	Disk-till	Russet Norkotah	321	278
No cover crop	Weedy check	Yukon Gold	209	172
No cover crop	Weedy check	Russet Norkotah	332	304
No cover crop	Herbicide	Yukon Gold	203	164
No cover crop	Herbicide	Russet Norkotah	317	262

Simulating herbicide carryover in Russet Burbank potatoes. Harlene Hatterman-Valenti and Collin Auwarter.This study was conducted at the Northern Plains Potato Growers Irrigation Research site near Inkster, ND to evaluate simulated herbicide carryover in Russet Burbank potatoes. Soybeans were grown in 2010. Plots were 4 rows by 20 ft arranged in a randomized complete block design with four replicates. 4 herbicides were included in this trial; Accent (nicosulfuron), Stinger (clopyralid), Beyond (imazamox), and FirstRate (cloransulam). The 2011 North Dakota Weed Control Guide was used to give us a base rate. 1/8, 1/16, and 1/32 of the medium use rate was applied on June 6 and incorporated immediately. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing on June 20, 2011. Potatoes were machine harvested October 27 and graded November 15.

Date:		6/9/11
Treatment:		PRE
Sprayer:	GPA:	20
	PSI:	40
	Nozzle:	8002
Air Temperature (F):		58
Relative Humidity (%):		57
Wind (MPH):		5
Soil Moisture:		Adequate
Cloud Cover (%):		25

Some herbicides can cause both foliar and tuber injury symptoms. However, very little difference was observed throughout the trial. All plants grew uniformly without cupped leaves, fiddle-neck stems or yellowed, chlorotic foliage. Yield and grading data followed the same theory having little differences.

Trt No	Trt Name	Rate	Rate Unit	Total	<4oz	4-6oz	6-12oz	>12oz	>4oz
				--------------------cwt/a--------------------					
1	Unt			516a	110a	118a	169a	119ab	406a
2	Accent	.156	oz/a	506a	100a	130a	178a	99ab	406a
3	Accent	.078	oz/a	495a	93a	100a	171a	131ab	401a
4	Accent	.039	oz/a	493a	108a	125a	179a	80b	384a
5	Stinger	.325	floz/a	494a	105a	114a	176a	98ab	389a
6	Stinger	.163	floz/a	510a	99a	112a	209a	90b	410a
7	Stinger	.081	floz/a	481a	103a	119a	171a	87b	377a
8	Beyond	.375	floz/a	506a	106a	113a	169a	118ab	400a
9	Beyond	.188	floz/a	525a	81a	115a	207a	121ab	444a
10	Beyond	.094	floz/a	521a	90a	113a	186a	133ab	431a
11	FirstRate	.075	oz/a	513a	72a	100a	172a	169a	441a
12	FirstRate	.038	oz/a	501a	87a	103a	188a	123ab	414a
13	FirstRate	.019	oz/a	475a	80a	112a	174a	108ab	394a
			LSD (P=.05)	57.8	22	23.4	42.4	44.2	59.4

Trt No	Trt Name	Rate	Rate Unit	Total	<4oz	4-6oz	6-12oz	>12oz	>4oz
				--------Tuber counts in 20 feet-------					% Tubers
1	Unt			221a	101a	51a	49a	20ab	55a
2	Accent	.156	oz/a	217a	93a	57a	51a	17ab	58a
3	Accent	.078	oz/a	203a	88a	43a	49a	23ab	57a
4	Accent	.039	oz/a	223a	102a	56a	52a	14b	54a
5	Stinger	.325	floz/a	217a	100a	50a	50a	17ab	54a
6	Stinger	.163	floz/a	219a	93a	50a	60a	17ab	58a
7	Stinger	.081	floz/a	215a	98a	53a	49a	15ab	54a
8	Beyond	.375	floz/a	215a	99a	50a	48a	19ab	54a
9	Beyond	.188	floz/a	205a	75a	50a	59a	21ab	63a
10	Beyond	.094	floz/a	205a	93a	50a	52a	21ab	60a
11	FirstRate	.075	oz/a	192a	71a	44a	49a	27a	63a
12	FirstRate	.038	oz/a	205a	85a	45a	54a	21ab	58a
13	FirstRate	.019	oz/a	191a	75a	49a	50a	17ab	61a
LSD (P=.05)				23.4	19.2	10.4	11.5	6.9	6.3

Weed control with Reflex, Boundary, and Dual Magnum for weed control in Russet Burbank potato. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Growers Irrigation Research site near Inkster, ND to evaluate the efficacy of Boundary, Reflex and Dual Magnum for weed control in Russet Burbank potatoes. Soybeans were grown in 2010. 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 3, 2011. Treatments were applied on June 24 (same day as hilling) to the middle 2 rows. Crop injury and weed control were evaluated 5, 17, and 24 DAA. All potatoes were emerged as hiller didn't throw soil to cover. Primarily common lambsquarters (COLQ) at 2/sq ft was seen in border rows. Potatoes were machine harvested October 27 and graded November 15.

Date:		6/24/11
Treatment:		PRE
Sprayer:	GPA:	20
	PSI:	40
	Nozzle:	8002
Air Temperature (F):		71
Relative Humidity (%):		63
Wind (MPH):		7
Soil Moisture:		Adequate
Cloud Cover (%):		100

Potato injury was the main factor in this trial as all potatoes were emerged at application. All treatments showed injury especially the ones with Reflex which had significantly greater injury. Injury ratings at 24 DAA were unacceptable with Reflex + Boundary at 40%, while Reflex + Boundary was 31% and Reflex alone was 19%. Weed control was very good. At 5 DAA, all treatments with Reflex had >90% COLQ control. Redroot pigweed (RRPW) pressure was low in this trial. At 24 DAA, Boundary + Reflex provided 96% COLQ control followed by Reflex + Dual Magnum with 93% control. Reflex alone had 90% COLQ control at 24 DAA.

				COLQ	RRPW	GRFT	Injury	COLQ	RRPW	GRFT	Injury	COLQ	RRPW	GRFT	Injury
Trt	Trt		Rate	--------------5 DAA----------------				----------------17 DAA--------------				----------------24 DAA---------------			
No	Name	Rate	Unit	-----% Control--------			%	---------% Control---------			%	---------% Control---------			%
1	Unt			0 b	0 b	0 b	0 d	0 c	0 b	0 b	0 d	0 b	0 b	0 b	0 c
2	Reflex	1	pt/a	90 a	98 a	100 a	28 c	90 b	98 a	100 a	23 c	90 a	98 a	100 a	19 b
3	Boundary	1.5	pt/a	88 a	95 a	99 a	6 d	91 b	93 a	100 a	6 d	91 a	94 a	100 a	3 c
4	Dual Magnum	2	pt/a	88 a	96 a	100 a	8 d	88 b	94 a	100 a	6 d	89 a	94 a	100 a	3 c
5	Reflex	1	pt/a	94 a	99 a	100 a	66 a	94 ab	99 a	100 a	49 a	93 a	100 a	100 a	40 a
	Dual Magnum	2	pt/a												
6	Reflex	1	pt/a	94 a	99 a	100 a	49 b	98 a	100 a	100 a	36 b	96 a	99 a	100 a	31 a
	Boundary	1.5	pt/a												
LCD (P=.05)				6	9	2	10	5	7	2	10	6	7	0	11

Overall yield showed little differences. The untreated had the greatest total yield at 446 cwt/a, all other treatments were set back from the early injury. The two treatments with the lowest yields were the tank-mixes, Reflex + Boundary at 327 cwt/a, and Reflex + Dual Magnum at 348 cwt/a. Marketable yield (>4 oz) mimicked total yield results with the untreated having a marketable yield of 335 cwt/a. The lowest marketable yielding treatments were Reflex + Boundary with 197 cwt/a, and Reflex + Dual Magnum with 225 cwt/a.

Weed control, efficacy, and selectivity of Solida (rimsulfuron) when applied PRE or early POST to Russet Burbank potatoes. Harlene Hatterman-Valenti and Collin Auwarter.

This study was conducted at the Northern Plains Potato Growers Irrigation Research site near Inkster, ND to evaluate weed control, efficacy, and selectivity of Solida when applied PRE or early POST to Russet Burbank potatoes. Soybeans were grown in 2010. Plots were four 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 3, 2011. Treatments were applied on June 24 (A), same day as hilling and July 7 (B) to the middle 2 rows. Crop injury and weed control were evaluated 5, 17, and 24 DAA "A". All potatoes were emerged as hiller didn't throw soil to cover. The primary weed was common lambsquarters (COLQ) at a population of 2/sq ft. Potatoes were machine harvested October 27 and graded November 15.

Date:		6/24/11	7/11/11
Treatment:		PRE	POST
Sprayer:	GPA:	20	20
	PSI:	40	40
	Nozzle:	8002	8002
Air Temperature (F):		71	73
Relative Humidity (%):		63	62
Wind (MPH):		7	9
Soil Moisture:		Adequate	Adequate
Cloud Cover (%):		100	25

Weed control was good throughout the trial. Common lambsquarters (COLQ) had the greatest population, followed by redroot pigweed (RRPW) and green foxtail (GRFT). All PRE treatments, (Solida at 0.0117, 0.0234, and 0.047 lb ai/a, and Matrix at 0.0234 lb ai/a) provided between 91 and 93% COLQ control at 5 DAAA. At 24 DAA "A" and 7 DAA "B", all POST treatments provided 95% COLQ control, while Solida at 0.0234 lb ai/a provided 91% control and Matrix at 0.234 lb ai/a provided 89% control.

					COLQ	RRPW	GRFT	Injury	COLQ	RRPW	GRFT	Injury	COLQ	RRPW	GRFT	Injury
Trt	Trt		Rate	App	---------------5 DAA---------------				--------------17 DAA------------				-------24 DAAA & 7 DAAB-------			
No	Name	Rate	Unit	Code	---------% Control---------			%	---------% Control----			%	---------% Control------			%
1	Unt				0 b	0 b	0 b	0 a	0 c	0 b	0 c	0 c	0 c	0 c	0 b	0 a
2	Solida	0.0117	lb ai/a	A	91 a	99 a	100 a	0 a	86 b	93 a	100 a	0 c	89 b	90 b	95 a	0 a
3	Solida	0.0234	lb ai/a	A	93 a	100 a	100 a	0 a	91 a	95 a	94 b	0 c	91 ab	95 ab	94 a	0 a
4	Solida	0.047	lb ai/a	A	91 a	100 a	99 a	0 a	93 a	99 a	95 b	0 c	93 ab	98 a	98 a	0 a
5	Matrix	0.0234	lb ai/a	A	91 a	100 a	99 a	0 a	89 ab	94 a	99 a	0 c	89 b	95 ab	99 a	0 a
6	Solida	0.0117	lb ai/a	B									95 a	95 ab	98 a	0 a
	Preference	0.25	% v/v	B												
7	Solida	0.0234	lb ai/a	B									95 a	95 ab	100 a	0 a
	Preference	0.25	% v/v	B												
8	Solida	0.047	lb ai/a	B									95 a	95 ab	96 a	0 a
	Preference	0.25	% v/v	B												
9	Matrix	0.0234	lb ai/a	B									95 a	95 ab	95 a	0 a
	Preference	0.25	% v/v	B												
LCD (P=.05)					4	1	2	0	3	6	3	0	3	4	5	0

Yields varied little. Matrix at 0.234 lb ai/a POST and Solida at 0.0234 lb ai/a POST were the only two treatments that had total yields >500 cwt/a. The lowest yielding treatments were Matrix at 0.234 lb ai/a with a total yield of 410 cwt/a and the untreated at 434 cwt/a.

Use of adjuvants with Rely for desiccation on Red Norland potatoes. Harlene Hatterman-Valenti and Collin Auwarter.

Field research was conducted at the Northern Plains Potato Grower's Association Research site near Grand Forks, ND to evaluate the use of adjuvants with Rely in Red Norland potato. Potatoes were planted July 14 and harvested November 1. Delayed planting was inevitable due to the wet spring/summer. Plots were 4 rows by 20 ft arranged in a randomized complete block design with three replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing. Treatments were applied on September 19 to the middle 2 rows.

Date:		9/19/11
Treatment:		A
Sprayer:	GPA:	20
	PSI:	40
	Nozzle:	8002
Air Temperature (F):		73
Relative Humidity (%):		29
Wind (MPH):		9
Soil Moisture:		Adequate
Cloud Cover (%):		50

Treatments 4 DAA showed little differences in leaf necrosis and no difference in stem necrosis. At 7 DAA, the treatment where Rely was applied alone had the greatest necrosis to both leaves and stems (40 and 17%), which was significantly different the other treatments. Similar results were seen at 16 DAA as the leaves had 90% and stems had 80% necrosis. All other treatments had between 70-83% leaf necrosis and 50-72% stem necrosis.

				Leaves	Stems	Leaves	Stems	Leaves	Stems
Trt	Trt		Rate	------4 DAA------		------7 DAA------		-----16 DAA------	
No	Name	Rate	Unit	----------------------% Desiccated--------------------					
1	Unt			0 b	0 b	0 c	0 c	0 c	0 c
2	Rely	3	pt/a	18 a	5 a	40 a	40 a	90 a	80 a
3	Rely	3	pt/a	15 a	5 a	27 b	10 b	75 ab	57 ab
	Class Act NG	2.5	% v/v						
	InterLock	4	floz/a						
4	Rely	3	pt/a	15 a	5 a	25 b	10 b	83 ab	72 ab
	AG8034	2	% v/v						
	InterLock	4	floz/a						
5	Rely	3	pt/a	10 ab	5 a	23 b	10 b	72 b	58 ab
	AG 08050	0.5	% v/v						
6	Rely	3	pt/a	12 ab	5 a	22 b	10 b	75 ab	55 ab
	Superb HC	0.5	% v/v						
	InterLock	4	floz/a						
7	Rely	3	pt/a	15 a	5 a	27 b	10 b	75 ab	50 b
	AG 10055	1	pt/a						
8	Rely	3	pt/a	13 a	5 a	22 b	10 b	78 ab	62 ab
	Destiny HC	0.5	% v/v						
	InterLock	4	floz/a						
9	Rely	3	pt/a	10 ab	5 a	23 b	10 b	70 b	53 ab
	Inergy	0.5	% v/v						
			LSD (P=.05)	8.8	0	7.6	1.7	11.3	17.5

Use of Diquat plus Pyraflufen-Ethyl combinations as a desiccant in Red Norland potatoes.
Harlene Hatterman-Valenti and Collin Auwarter.

Field research was conducted at the Northern Plains Potato Grower's Association Research site near Grand Forks, ND to evaluate the use of Diquat plus Pyraflufen-Ethyl combinations as a desiccant in Red Norland potato. A nonionic surfactant (Preference), was added to each application at a rate of 0.25% v/v. Potatoes were planted July 14 and harvested November 1. Delayed planting was inevitable due to the wet spring/summer. Plots were 4 rows by 20 ft arranged in a randomized complete block design with three replicates. Seed pieces (2 oz) were planted on 36 inch rows and 12 inch spacing. Treatments were applied on September 19 (A) and September 26 (B) to the middle two rows.

Date:		9/19/11	9/26/11
Treatment:		A	B
Sprayer:	GPA:	20	20
	PSI:	40	40
	Nozzle:	8002	8002
Air Temperature (F):		73	57
Relative Humidity (%):		29	75
Wind (MPH):		9	5
Soil Moisture:		Adequate	Adequate
Cloud Cover (%):		50	50

Treatments at 4 DAA showed little differences for leaf necrosis and no difference for stem necrosis when pyraflufen-ethyl (ET) was added with diquat. However, treatments with 0.50 lb/A Diquat showed greater leaf necrosis than 0.25 and 0.375 lb/A Diquat treatments. At 7 DAA, similar results were observed for both leaf and stem necrosis. At 16 DAA "A" and 9 DAA "B", treatments that were reapplied 1 wk after initial application, had significantly greater leaf necrosis than treatments applied once. Diquat at 0.50 lb/A plus 0.0012 lb/A pyraflufen-ethyl had 98% leaf necrosis when applied twice and 78% leaf necrosis when applied once. Diquat at 0.25 lb/A plus 0.0012 lb/A pyraflufen-ethyl showed no significant difference for necrosis of leaves (97%) or stems (90%) compared to 0.25 lb/A diquat alone.

Yields did not show any significant differences. The greatest total yield, marketable yield (> 4 oz), and tuber number occurred with the untreated (144 cwt/A, 69 cwt/A, and 104 tubers/20 row ft, respectively). Since the potatoes never reached maturity, necrosis was more difficult and generally simulated grower practices to obtain tubers at specific size categories. Only 22-28% of the tubers were greater than 4 oz, which was similar for all treatments.

					Leaves	Stems	Leaves	Stems	Leaves	Stems
Trt	Trt		Rate		--------4 DAAA-------		-------7 DAAA--------		--16 DAAA & 9 DAAB--	
No	Name	Rate	Unit	Time	--------------------------% Desiccated--------------------------					
1	Unt				0 b	0 b	0 b	0 b	0 e	0 e
2	Diquat	1	pt/a	AB	15 a	5 a	25 a	10 ab	97 a	90 a
	ET	0.75	floz/a							
	Preference	0.25	% v/v							
3	Diquat	1	pt/a	AB	15 a	5 a	25 a	10 ab	93 a	85 a
	Preference	0.25	% v/v							
4	Diquat	1.5	pt/a	AB	20 a	5 a	38 a	17 a	98 a	92 a
	ET	0.75	floz/a							
	Preference	0.25	% v/v							
5	Diquat	1.5	pt/a	AB	17 a	5 a	32 a	12 ab	95 a	88 a
	Preference	0.25	% v/v							
6	Diquat	2	pt/a	A	17 a	5 a	25 a	12 ab	78 b	70 b
	ET	0.75	floz/a							
	Preference	0.25	% v/v							
7	Diquat	2	pt/a	A	22 a	5 a	33 a	13 ab	77 b	70 b
	Preference	0.25	% v/v							
8	Diquat	1	pt/a	A	22 a	5 a	35 a	13 ab	80 b	68 b
	ET	2.75	floz/a							
	Preference	0.25	% v/v							
			LSD (P=.05)		8.9	0	17.3	8.5	7.5	11.1

Safflower desiccation with saflufenacil. Howatt, Roach, Harrington. 'Riveland' safflower was seeded near Fargo on May 26. Treatments were applied to safflower 3 days after anthesis of youngest flowers on August 16 with 62°F, 54% relative humidity, clear sky, 2.5 mph wind at 315°F, and dry soil at 69°F. Mature pigweed spp., common lambsquarters, Venice mallow, and yellow foxtail were present at low populations. 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 ft plots. The experiment was a randomized complete block design with three replicates.

		8/22	8/26	9/2	9/2	9/2	Seed size		
Treatment	Rate	Leaf	Leaf	Leaf	Head	Weeds	Mature	Medium	Young
	oz/A	%	%	%	%	%	--------- gm/100 ---------		
Saff+MSO+AMS	0.36+0.16G+24	40	67	92	96	40	3.4	3.1	2.06
Saff+MSO+AMS	0.72+0.16G+24	47	77	98	99	47	3.4	2.7	2.38
Saff+MSO+AMS	1.44+0.16G+24	53	85	99	99	68	3.2	2.7	1.85
Glyt+MSO+AMS	12+0.16G+24	13	27	73	83	82	3.1	3	2.52
Glyt+Saff+MSO+AMS	12+0.36+0.16G+24	57	83	99	99	94	3.3	2.7	2.14
NaCl03+NIS	96+0.25%	47	77	83	90	63	2.7	2.5	1.83
Paraquat+NIS	6+0.25%	87	99	99	99	85	2.7	2.3	1.77
Untreated	0	7	17	43	73	17	3.1	3	2.41
CV		10	6	6	4	11	12	10	12
LSD (P=.05)		8	7	8	6	12	0.6	0.5	0.5

Paraquat was the most effective safflower desiccant, but gave marginal weed desiccation and resulted in small size seeds compared to seed from several other treatments. Desiccation from saflufenacil was slower to develop and also gave poor weed desiccation, but did not reduce seed size until four times the field rate was applied. Glyphosate alone was a poor desiccant compared with other treatments; however, glyphosate plus saflufenacil provided good safflower desiccation, the best weed desiccation, and did not result in small seed size.

BroadAxe in sunflower. Zollinger, Richard K., Jerry L. Ries, and Angela J. Kazmierczak. An experiment was conducted near Valley City, ND, to evaluate weed efficacy and crop response to BroadAxe in sunflowers. Croplan '555' Clearfield sunflower was planted on June 7, 2011. PRE treatments were applied on June 9 at 1:40 pm with 65 F air, 65 F soil at a four inch depth, 75% cloud cover, 5 to 8 mph E wind, dry soil surface, and wet subsoil. Soil characteristics were: 40% sand, 20% silt, 40% clay, clay loam texture, 7.2% OM and 6.6 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

No sunflower injury observed (data not shown). Excessive rain caused flowing water to run across entire study after herbicide applications were made. Anthem is a premix of pyroxasulfone + Cadet. Cadet is for POST weed control, has no soil residue, and does not contribute to PRE weed control. Weed control from Anthem is entirely from pyroxasulfone. BroadAxe is a premix of Dual Magnum and Spartan. Weed control from BroadAxe is greater than either Dual Magnum or Spartan applied alone. The herbicide residue of several treatments controlled weeds the entire length of the growing season. Late ratings were taken due to late planting and slow sunflower growth after emergence from extensive rain and cool temperatures, and to measure residual weed control. (Department of Plant Sciences, North Dakota State University, Fargo).

Table. BroadAxe in sunflower (Zollinger, Ries, Kazmierczak).

		42 DAT - PRE								
Treatment	Rate	Fxtl	Bygr	Wimu	Rrpw	Colq	Ebns	Biww	Mael	Dande
	(product/A)	% control								
BroadAxe	25fl oz	90	90	99	95	99	99	73	92	43
BroadAxe	35fl oz	95	95	99	99	99	99	90	99	70
Spartan Charge	5.75fl oz	42	32	75	99	99	99	83	92	33
Prowl H_2O	2.5pt	83	57	23	90	90	0	20	0	0
BroadAxe + Select + PO	25fl oz+6fl oz+1.5pt	93	93	92	99	99	99	82	92	52
Dual Magnum	20fl oz	83	82	20	72	72	20	20	20	0
Anthem	8fl oz	93	91	99	99	96	99	75	90	67
Anthem	10fl oz	96	96	99	99	99	99	77	92	65
LSD (0.05)		6	11	5	3	4	5	7	4	13

Table cont. BroadAxe in sunflower (Zollinger, Ries, Kazmierczak).

		63 DAT - PRE								
Treatment	Rate	Fxtl	Bygr	Wimu	Rrpw	Colq	Ebns	Biww	Mael	Dande
	(product/A)	% control								
BroadAxe	25fl oz	87	88	99	96	99	99	73	92	43
BroadAxe	35fl oz	95	95	99	99	99	99	92	99	70
Spartan Charge	5.75fl oz	48	38	77	99	99	99	82	93	33
Prowl H_2O	2.5pt	83	53	23	90	90	0	20	0	0
BroadAxe + Select + PO	25fl oz+6fl oz+1.5pt	95	95	93	99	99	99	83	93	55
Dual Magnum	20fl oz	77	75	20	72	70	20	20	20	0
Anthem	8fl oz	95	95	99	99	97	99	77	90	70
Anthem	10fl oz	98	98	99	9	99	99	80	93	68
LSD (0.05)		5	8	5	2	3	3	6	4	8

Weed control in sunflower with BroadAxe (Jenks, Willoughby, and Hoefing) The objective of the study was to evaluate weed control in sunflower with BroadAxe, a new premix formulation of Spartan + Dual by FMC. Treatments were applied premergence on June 9. Select Max was applied POST to only two of the treatments listed in the table below. No crop injury was observed with any treatment. BroadAxe or Dual provided good to excellent foxtail control. Foxtail control with Prowl H2O alone weakened over time. The best foxtail control was from the high rate of BroadAxe or the low rate followed by Select Max. None of the preemergence treatments controlled volunteer wheat. All treatment generally provided good pigweed control, although the pigweed density was very light.

Table. Weed control in sunflower with BroadAxe. (1123)

		Injury		Weed Control[b]					
		Sunflower		Yeft		Vowh		Rrpw	
Treatment[c]	Rate	9-Jul	16-Jul	9-Jul	2-Aug	9-Jul	2-Aug	9-Jul	2-Aug
		-------%------		------------------------%------------------------					
BroadAxe	25 oz	0	0	96	89	23	15	100	100
BroadAxe	35 oz	0	0	97	94	32	27	100	100
Spartan Charge	5.75 oz	0	0	30	18	3	3	100	100
Prowl	2.5 pt	0	0	96	77	15	13	98	81
BroadAxe / Select[c]	25 oz / 9 oz	0	0	100	93	98	96	100	100
Dual Magnum	1.25 pt	0	0	97	91	23	18	100	100
Spartan + Prowl / Select[c]	3 oz + 2.5 pt / 9 oz	0	0	100	87	98	96	98	97
Untreated		0	0	0	0	0	0	0	0
LSD (0.05)		NS	NS	11	8	9	7	3	5
CV		0	0	8	7	13	12	2	3

[a] *All treatments applied PRE; Prowl=Prowl H20*

[b] *Yeft=Yellow foxtail; Vowh=Volunteer wheat; Rrpw=Redroot pigweed*

[c] *Select Max (9 oz)+ NIS (0.25%) applied POST*

Canada thistle control in CL-sunflower. Howatt, Roach, and Harrington. Two rows of two hybrid sunflower, CLHA and '8C410CL', were seeded in each plot near Fargo on May 26. Treatments were applied to six-leaf sunflower and 12 to 16 inch tall Canada thistle on July 8 with 76°F, 59% relative humidity, clear sky, 4 mph wind at 90°, and dry soil at 71°F. Treatments were applied with a backpack sprayer delivering 8.5 gpa at 35 psi through 11001 flat fan 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	Jul-13 CLHA	Jul-13 CL	Jul-28 CLHA	Jul-28 CL	Jul-28 cath	Aug-10 cath
	oz/A	%	%	%	%	%	%
Immx+MSO+AMS	0.5+1%+22	8	10	0	23	61	55
Immx+trib+MSO+AMS	0.5+0.016+1%+22	35	16	91	28	76	75
Immx+trib+MSO+AMS	0.5+0.032+1%+22	33	16	90	25	76	76
Immx+trib+MSO+AMS	0.5+0.063+1%+22	58	29	94	53	90	84
Immx+trib+MSO+AMS	0.5+0.094+1%+22	60	29	98	60	88	89
Immx+trib+MSO+AMS	0.5+0.125+1%+22	80	48	99	73	91	89
Untreated	0	0	0	0	0	0	0
CV		19	26	5	32	7	12
LSD 5%		11	8	5	18	7	12

Chlorosis was observed on July 13 for both sunflower lines treated with imazamox. Chlorosis of CLHA-sunflower from imazamox was not observed July 28 while imazamox caused 23% injury to CL-sunflower. Injury increased as tribenuron rate was increased with imazamox. The CLHA-sunflower were dramatically more susceptible to tribenuron than the CL-sunflower, and injury to either sunflower type included necrosis by July 13. Damage to CLHA-sunflower was at least 90% with any rate of tribenuron by July 28. However, tribenuron did improve control of Canada thistle with imazamox, especially later in the season.