Leafy spurge control with imazapic applied with BAS 800 H. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58106-6050). Research at North Dakota State University has shown that herbicide combinations such as picloram applied with 2,4-D or imazapic provided better long-term leafy spurge control than any of the herbicides applied alone. BAS 800 H (salflufenacil) has improved broadleaf weed control in cropland when applied with various herbicides. The purpose of this research was to compare imazapic applied alone or with two formulations of BAS 800 H for leafy spurge control.

The study was established at the Albert Ekre Research Center near Walcott, ND. Treatments were applied on September 19, 2007. Leafy spurge was 18 to 24 in tall with regrowth 1 to 2 in on the stem tips. Imazapic was applied alone or with BAS 800 01 H. BAS 800 03 H and BAS 802 00 H were evaluated alone for leafy spurge control. All treatments were applied with a hand-held sprayer delivering 17 gpa at 35 psi. The experiment was a randomized complete block design with four replicates, and plots were 10 by 30 feet. Control was based on a visual estimate of percent stand reduction as compared to the untreated check.

BAS 800 01 H, BAS 800 03 H, and BAS 802 00 H provided rapid leafy spurge top growth control in Oct 2007 (2 and 4 weeks after treatment) (Table). The plants desicated rapidly and the tissue was black. However, only BAS 802 provided satisfactory control the year after treatment which averaged 85% in June 2008 then declined to 10% by August 2008. In contrast, imazapic applied alone did not visibly injury leafy spurge the year of treatment, but provided 90% or better control in June 2008. In general, leafy spurge control was similar when imazapic was applied alone or with BAS 800 01 H.

Table. Evaluation of leafy spurge control with imazapic applied with various formulations of BAS 800.

		Evaluation			
Treatment	Rate	3 Oct 07	15 Oct 07	9 June 08	19 Aug 08
	oz/A	%			
BAS 800 01 H + Induce[1] + AMS	0.178 + 0.25% + 2%	100	100	5	7
BAS 800 01 H + Induce + AMS	0.357 + 0.25% + 2%	100	100	3	9
BAS 800 03 H + Induce + AMS	0.179 + 0.25% + 2%	99	100	0	4
Imazapic + Induce + AMS	0.75 + 0.25% + 2%	0	0	90	27
Imazapic + Induce + AMS	1.5 + 0.25% + 2%	3	8	96	82
Imazapic + BAS 800 01 H + Induce + AMS	0.75 + 0.178 + 0.25% + 2%	100	100	92	33
Imazapic + BAS 800 01 H + Induce + AMS	0.75 + 0.357 + 0.25% + 2%	100	100	96	51
Imazapic + BAS 800 01 H + Induce + AMS	1.5 + 0.178 + 0.25% + 2%	100	100	98	89
Imazapic + BAS 800 01 H + Induce + AMS	1.5 + 0.357 + 0.25% + 2%	100	100	98	90
BAS 802 00 H + Induce + AMS	1.47 + 0.25% + 2%	100	100	85	10
Picloram + Activator 90[1]	16 + 0.25%	98	100	96	97
LSD(0.05)		4	2	8	17

[1]Surfactant Induce Helena Chemical Co., Collierville, TN 38017. Activator 90 Loveland Products Inc., Greeley, CO 80632.

Aminopyralid applied at the maximum use rate for Canada thistle control. Rodney G. Lym. (Plant Sciences Department, North Dakota State University, Fargo, ND 58108-6050). Aminopyralid has become widely used for Canada thistle control and is generally applied at 0.75 to 1.75 oz ae/A. Aminopyralid is labeled for spot treatments at 3.5 oz/A which may provide better long-term control than when applied at lower rates and reduce or eliminate the cost of repeat applications. Diflufenzopyr is a semicarbazone herbicide which inhibits auxin transport in susceptible plants. The addition of diflufenzopyr has improved weed control of some species with certain herbicides. The purpose of this research was to evaluate aminopyralid at the maximum use rate alone or with diflufenzopyr for Canada thistle control.

The experiment was established near Eckelson, ND, on a dense stand of Canada thistle with relatively thick under story of smooth brome and Kentucky bluegrass. Treatments were applied using a hand-held boom sprayer delivering 17 gpa at 35 psi on June 19 or September 20, 2006. Spring treatments were applied to actively growing Canada thistle in the bolt to bud stage and fall treatments were applied to Canada thistle rosettes. Experimental plots were 10 by 30 feet and replicated four times in a randomized complete block design. Canada thistle control was evaluated visually using percent stand reduction compared to the untreated control.

Canada thistle control the year after treatment with aminopyralid was similar regardless of application rate and averaged 94 and 99% in September 2007 when spring or fall applied, respectively (Table). No grass injury was observed from any treatment. Canada thistle control with aminopyralid applied alone or with diflufenzopyr was similar.

Canada thistle control was better with aminopyralid applied in the spring at 3.5 compared to 1.75 oz/A in June 2008, 24 months after treatment (MAT) and averaged 96 and 76% control, respectively (Table). However, the same treatments applied in the fall provided similar control and averaged 89% in August 2008, 23 MAT. Control was similar with aminopyralid applied alone or with diflufenzopyr regardless of application or evaluation date.

In summary, Canada thistle control 24 MAT with aminopyralid applied at 3.5 compared to 1.75 oz/A was better when applied in June but not September. Land managers would need to consider herbicide cost (2X) compared to application costs of repeat treatments to determine if using aminopyralid at the maximum spot treatment use rate would be cost-effective for their weed control program.

Table. Aminopyralid applied at the maximum use rate in the spring or fall for spot treatment of Canada thistle in North Dakota.

		Control/ evaluation date				
		2006	2007		2008	
Treatment[1]	Rate	Aug.	June	Sept.	June	Aug.
Applied June 2006	– oz/A –	%				
Aminopyralid	1.75	99	96	96	76	74
Aminopyralid	3.5	99	96	92	96	92
Picloram	8	98	96	93	72	73
Aminopyralid + diflufenzopyr	1.75 + 0.7	99	96	93	87	89
Applied September 2006						
Aminopyralid	1.75		99	99	87	85
Aminopyralid	3.5		100	99	93	93
Picloram	8		99	91	73	67
Aminopyralid + diflufenzopyr	1.75 + 0.7		100	99	88	87
LSD (0.05)		NS	2.5	4.5	14	15

[1]Activator 90 was applied at 0.25% with all treatments, Loveland Products, Inc., Greeley CO 80632-1286.

Canada thistle control with aminopyralid plus diflufenzopyr. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). Aminopyralid is a member of the pyridinecarboxylic acid family of herbicides and controls several noxious weed species at lower use rates than other auxin-type herbicides. Diflufenzopyr is a semicarbazone herbicide which inhibits auxin transport in susceptible plants. The addition of diflufenzopyr has improved weed control of some species with certain herbicides. The purpose of this research was to evaluate aminopyralid alone or with diflufenzopyr for Canada thistle control.

Aminopyralid at 0.75 or 1.5 oz ae/A was applied alone or with diflufenzopyr at a 2.5:1 or 5:1 ratio (herbicide:diflufenzopyr) on Canada thistle at two locations in North Dakota. Picloram at 6 oz ae/A was included as a standard comparison. Treatments were applied June 12, 2006 near Fargo, ND on former crop-land and June 19, 2006 near Eckelson near a wind-break with a dense stand of perennial grasses using a hand-held boom sprayer delivering 17 gpa at 35 psi. Experimental plots were 10 by 30 feet with four replicates in a randomized complete block design. Canada thistle was in the bolt to early bud growth stage at both locations and varied in height from 6 to 24 inches at Fargo and 6 to 40 inches at Eckelson. Canada thistle stem density averaged 15 and 12 stems/m^2 at the Fargo and Eckelson locations, respectively. Control was visually evaluated using percent stand reduction compared to the untreated control.

Canada thistle control averaged 96% across all treatments and both locations 3 MAT (Table). However, long-term control declined rapidly at Fargo and only averaged 37% 12 MAT compared to 97% at Eckelson. Similarly, control with picloram averaged 92% 15 MAT at Eckelson but only 22% at Fargo. The increased long-term control at Eckelson compared to Fargo was likely due to the dense grass cover which competed with Canada thistle compared to little competition in the relatively bare ground at Fargo. Canada thistle control was similar whether aminopyralid was applied alone or with diflufenzopyr regardless of application rate at both locations. Control declined rapidly at Eckelson 24 MAT despite the dense grass cover. Aminopyralid at 1.75 oz/A was the only treatment to provide satisfactory control (79%) by the end of the study. In summary, Canada thistle control with aminopyralid was similar whether applied at 0.75 or 1.5 oz/A and with or without diflufenzopyr. Long-term control was better when the site contained perennial grasses compared to generally bare ground.

Table. Aminopyralid plus diflufenzopyr applied for Canada thistle control in June 2006 at two locations in North Dakota.

		Fargo/MAT[2]			Eckelson /MAT			
Treatment[1]	Rate	3	12	15	3	12	15	24
	— oz/A —				% control			
Aminopyralid	0.75	92	29	19	90	96	70	31
Aminopyralid	1.5	96	31	24	98	97	88	53
Aminopyralid + diflufenzopyr	0.75 + 0.3	93	36	29	95	96	84	51
Aminopyralid + diflufenzopyr	0.75 + 0.15	92	41	28	98	97	88	54
Aminopyralid + diflufenzopyr	1.5 + 0.6	97	47	24	98	97	83	59
Aminopyralid + diflufenzopyr	1.5 + 0.3	97	33	26	98	99	86	70
Aminopyralid	1.75	96	43	35	98	99	93	79
Picloram	6	96	38	22	97	96	92	59
LSD (0.05)		NS	NS	NS	NS	NS	NS	NS

[1]Surfactant Activator 90 at 0.25% was applied with all treatments, Loveland Products, Inc., Greeley, CO 80632-1286.
[2]Months after treatment.

The effect of mowing and time of treatment for Canada thistle control with aminopyralid. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). Aminopyralid is a member of the pyridinecarboxylic acid family of herbicides and controls Canada thistle at lower use rates than other commonly used herbicides. Previous research has found that aminopyralid will control Canada thistle when applied in the spring prior to flowering or in the fall. Canada thistle is often found along roadsides and waste areas that are mowed during the summer, but the effect of mowing prior to aminopyralid application is unknown. The purpose of this research was to evaluate aminopyralid applied in the spring or fall for Canada thistle control on plants that were mowed in mid-summer.

Aminopyralid at 1.25 or 1.75 oz ae/A was applied to Canada thistle at two locations in North Dakota. Picloram at 6 oz ae/A was included as a standard comparison. Treatments were applied June 5, Sept. 19, Oct.1, or Oct. 29, 2007, near Fargo, ND on former crop-land. The same treatments were applied on June 20, Sept. 14, Oct. 1, or Oct. 29, 2007, near Eckelson, ND along a wind-break with a dense stand of perennial grasses. Herbicides were applied using a hand-held boom sprayer delivering 17 gpa at 35 psi. Whole plots were 10 by 30 feet and were subdivided by mowing the front or back half of each plot (10 by 15) in July 2007. There were four replicates in a randomized split-block design. Canada thistle was in the bolt to early bud growth stage when treated in June. Plants were in the rosette stage in the mowed plots at all fall treatment dates and varied from post seed-set in mid-September to plants with brown top growth and stems following several hard frosts by the late October application date in the non-mowed plots. Canada thistle stem density averaged 15 and 12 stems/m^2 at the Fargo and Eckelson locations, respectively. Control was visually evaluated using percent stand reduction compared to the untreated control.

In general, long-term Canada thistle control was higher at the Eckelson compared to the Fargo location and the data could not be combined (Tables 1 and 2). Canada thistle control in June 2008 averaged over all treatments applied in June 2007 (12 months after treatment) was 46% at Fargo compared to 97% at Eckelson. The dense grass stand at Eckelson likely competed with Canada thistle and reduced regrowth compared to the generally bare ground following treatment at Fargo. Mowing did not effect Canada thistle control regardless of treatment or application date at either location. For instance, control in August 2008 at Eckelson was 89 and 92% averaged over all non-mow and mow treatments, respectively.

Aminopyralid provided excellent Canada thistle control even when applied after several killing frosts in late-October. All plants in the mowed treatment were green and in the rosette growth stage compared to plants in the non-mowed areas which had brown stems and little or no green tissue remaining. Control from all aminopyralid treatments applied in late-October averaged 93 and 96% at Fargo and Eckelson, respectively, 10 months after treatment. Canada thistle control in August 2008 with picloram at the Fargo location declined from an average of 92 to 44% when applied in September compared to late October. However, control was similar regardless of fall application date at Eckelson and averaged 93% in August 2008.

In summary, aminopyralid provided excellent Canada thistle control when applied in the fall, even after several killing frosts. Long-term control was enhanced when there was good grass cover to compete with Canada thistle regrowth compared to little or no cover. Mowing did not affect control regardless of application date or treatment.

Table 1. Effect of time of treatment and mowing on Canada thistle control with aminopyralid applied at four application dates near Fargo, ND.

		Evaluation date/mowing treatment[1]					
		6 Aug. 2007		17 June 2008		20 Aug. 2008	
Treatment[2] / date	Rate	Mow	No mow	Mow	No mow	Mow	No-mow
	— oz/A —	%					
Applied 5 June 2007							
Aminopyralid	1.25	99	97	41	39	42	31
Aminopyralid	1.75	99	99	72	58	57	56
Picloram	6	92	92	38	28	31	35
Applied 19 Sept. 2007							
Aminopyralid	1.25			92	99	98	96
Aminopyralid	1.75			99	100	95	96
Picloram	6			100	99	92	92
Applied 1 Oct. 2007							
Aminopyralid	1.25			99	99	98	97
Aminopyralid	1.75			100	100	96	99
Picloram	6			96	99	82	77
Applied 29 Oct. 2007							
Aminopyralid	1.25			99	100	93	89
Aminopyralid	1.75			99	99	93	95
Picloram	6			84	80	45	44
LSD(0.05)		NS		19		22	

[1]Front or back half of each plot mowed on 9 July 2007.
[2]Surfactant Activator 90 at 0.25% v/v was applied with all treatments, Loveland Products, Greeley, CO 80632.

Table 2. Effect of time of treatment and mowing on Canada thistle control with aminopyralid applied at four application dates near Eckelson, ND.

		Evaluation date/mowing treatment[1]					
		17 Aug. 2007		24 June 2008		13 Aug. 2008	
Treatment[2] / date	Rate	Mow	No mow	Mow	No mow	Mow	No mow
	— oz/A —	— % —					
Applied 20 June 2007							
Aminopyralid	1.25	91	91	99	97	69	90
Aminopyralid	1.75	94	94	95	99	90	84
Picloram	6	93	93	96	95	75	65
Applied 14 Sept. 2007							
Aminopyralid	1.25			100	100	98	94
Aminopyralid	1.75			99	99	97	90
Picloram	6			99	99	92	93
Applied 1 Oct. 2007							
Aminopyralid	1.25			99	100	93	81
Aminopyralid	1.75			100	100	99	97
Picloram	6			100	100	98	97
Applied 29 Oct. 2007							
Aminopyralid	1.25			98	100	95	96
Aminopyralid	1.75			100	99	99	94
Picloram	6			100	100	97	82
LSD(0.05)		— NS —		— 3 —		— 15 —	

[1]Front or back half of each plot was mowed on 11 July 2007.
[2]Surfactant Activator 90 at 0.25% v/v was applied with all treatments, Loveland Products, Greeley, CO 80632.

Evaluation of DPX KJM44-062 for weed control in pasture and rangeland. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). DPX KJM44-062 is a new and currently non-classified herbicide from E. I. DuPont company with a proposed common name of aminocyclopyrachlor. Little is known about the efficacy of this herbicide or if the new compound could be useful in general or invasive weed control programs. The purpose of this research was to evaluate DPX KJM44-062 for control of invasive and troublesome weeds in pasture and rangeland.

For all studies, herbicides were applied using a hand-held boom sprayer delivering 17 gpa at 35 psi. Experimental plots were 10 by 30 feet and replicated three or four times in a randomized complete block design. Control of each species was evaluated visually using percent stand reduction compared to the untreated control. Results were compared to other commonly used herbicides applied at the general use rate for each weed species.

The first and second studies evaluated the control of leafy spurge with DPX KJM44-062 applied alone from 1 to 3 oz ai/A in the spring or fall. The first experiment was established near Walcott, ND in an ungrazed area of pasture with a dense stand of leafy spurge (92 stems/m^2). Treatments were applied June 5, 2007 when leafy spurge was in the true-flower growth stage. The second experiment was established on abandoned cropland near Fargo, ND on September 19, 2007 when leafy spurge was in the fall regrowth stage with a stand density of 30 stems/m^2.

DPX KJM44-062 applied at 2 oz/A or higher provided better long-term leafy control than the standard treatments of picloram at 8 oz/A or picloram plus imazapic plus 2,4-D at 4 + 1 + 16 oz/A (Table 1). For instance, DPX KJM44-062 applied at 2 oz/A provided 90 and 88% leafy spurge control in June and August 2008, respectively, compared to 58 and 45% control respectively, with picloram at 8 oz/A. The major grass species present were Kentucky bluegrass and smooth brome and less than 5% grass injury was observed 2 MAT (months after treatment) with DPX KJM44-062 compared to an average of 12% when the treatment included picloram.

Leafy spurge control 11 MAT with DPX KJM44-062 applied in the fall increased from 89 to 99% as the application rate increased from 1 to 3 oz/A (Table 2). Control was similar to picloram at 16 oz/A and no grass injury was observed with either herbicide.

The third study was established near Fargo, ND on June 5, 2007 to evaluate control of Canada thistle, perennial sowthistle, curly dock, and common dandelion with DPX KJM44-062. Dandelion was in the flowering growth stage, while the other three species were vegetative to beginning to bolt.

Initial Canada thistle and perennial sowthistle control with DPX KJM44-062 tended to be lower than the commonly used treatments of picloram at 8 oz/A or aminopyralid at 1.5 oz/A (Table 3). For instance, DPX KJM44-062 at 2 oz/A provided 79 and 75% Canada thistle and perennial sowthistle control, respectively, approximately 3 weeks after application compared to 96 and 88%, respectively, with picloram. DPX KJM44-062 provided complete control of dandelion but did not control curly dock regardless of application rate.

Canada thistle control with DPX KJM44-062 at 1.5 oz/A or higher provided an average of 96% Canada thistle control in September 2007 (3 MAT) compared to 88 and 92% with picloram and aminopyralid, respectively. Canada thistle control with DPX KJM44-062 remained high the year after treatment. Control in June and September 2008 with DPX KJM44-062 at 1.5 oz/A or more averaged 97 and 95%, respectively, compared to 58% or less with picloram and aminopyralid. DPX KJM44-062 provided excellent control of perennial sowthistle in the year of treatment, but control averaged less than 50% by 12 MAT regardless of application rate.

The fourth experiment was established to evaluate yellow toadflax control with DPX KJM44-062. The experiment was located on a wildlife production area near Valley City, ND which contained a dense stand of yellow toadflax and smooth bromegrass. Treatments were applied as previously described on July 20, 2007 when yellow toadflax was in the vegetative to flowering growth stage.

DPX KJM44-062 applied at 1 to 3 oz/A averaged less than 30% yellow toadflax the year of treatment (Table 4). Controlled increased to 82% in July 2008 (12 MAT) the year after treatment with DPX KJM44-062 at 3 oz/A but declined rapidly and only averaged 54% by September 2008. Picloram at 32 oz/A provided 90% yellow toadflax control in August 2008.

In summary, DPX KJM44-062 provided similar or better control of leafy spurge, Canada thistle, and perennial sowthistle than commonly used herbicides. DPX KJM44-062 did not provide adequate control of curly dock or yellow toadflax. This herbicide shows promise for broadleaf weed control including several invasive species and should be further evaluated. The soil residual potential of DPX KJM44-062 to move off site or into groundwater is not yet known.

Table 1. Evaluation of DPX KJM44-062 for leafy spurge control applied in June 2007 near Walcott, ND.

		Control/evaluation date				
		2007		2008		
		6 Aug.		9 June	17 July	19 Aug.
Treatment	Rate	Leafy spurge	Grass injury	Leafy spurge	Leafy spurge	Leafy spurge
	—— oz/A ——			%		
DPX KJM44-062 + MSO[1]	1 + 1%	92	1	79	66	55
DPX KJM44-062 + MSO	1.5 + 1%	98	2	87	75	71
DPX KJM44-062 + MSO	2 + 1%	99	4	90	90	88
DPX KJM44-062 + MSO	2.5 + 1%	99	4	97	97	92
DPX KJM44-062 + MSO	3 + 1%	99	4	96	96	92
Picloram + MSO	8 + 1%	86	12	58	40	45
Picloram + imazapic + 2,4-D + MSO	4 + 1 + 16 + 1 qt	97	13	45	62	56
LSD(0.05)		7	5	31	32	23

[1]MSO was Scoil, by AGSCO, 1168 12th St NE: Grand Forks ND 58201.

Table 2. Evaluation of DPX KJM44-062 for leafy spurge control applied in September 2007 at Fargo, ND.

Treatment	Rate	Control/2008 evaluation 20 June	20 Aug
	— oz/A —	%	
DPX KJM44-062 + MSO[1]	1 + 1%	93	89
DPX KJM44-062 + MSO	2 + 1%	99	97
DPX KJM44-062 + MSO	3 + 1%	100	99
Picloram + MSO	16 + 1%	99	97
LSD(0.05)		NS	7

[1]MSO was Scoil, by AGSCO, 1168 12th St NE: Grand Forks ND 58201.

Table 3. Evaluation of DPX KJM44-062 for Canada thistle, and perennial sowthistle, curly dock, and dandelion control at Fargo, ND.

		Control./evaluation date									
		2007							2008		
		29 June				5 September			20 June		26 Sept.
Treatment	Rate	CT[1]	PEST	Curly dock	Dande lion	CT	PEST	Curly dock	CT	PEST	CT
	— oz/A —	%									
DPX KJM44-062 + MSO[2]	1 + 1 %	43	35	0	100	54	100	25	56	0	43
DPX KJM44-062 + MSO	1.5 + 1 %	75	71	0	100	93	99	0	95	6	88
DPX KJM44-062 + MSO	2 + 1 %	79	75	0	100	100	100	0	97	45	95
DPX KJM44-062 + MSO	2.5 + 1 %	82	77	0	100	99	100	0	98	47	99
DPX KJM44-062 + MSO	3 + 1 %	84	77	5	100	93	100	38	97	39	97
Picloram + MSO	8 + 1 %	96	88	41	100	88	98	100	5	86	0
Aminopyralid + Act 90[3]	1.5 + 0.25 %	92	80	16	96	92	92	100	30	58	58
LSD(0.05)		12	15	8	NS	17	5	35	29	43	39

[1]Abbreviations: CT = Canada thistle, PEST = perennial sowthistle.
[2]MSO was Scoil, by AGSCO, 1168 12th St NE: Grand Forks ND 58201.
[3]Activator 90 surfactant by Loveland Products, Inc. P.O. Box 1286 Greeley, CO 80632.

Table 4. Evaluation of DPX KJM44-062 applied in July 2007 at flowering for yellow toadflax control near Valley City, ND.

		Control/evaluation date			
		2007		2008	
Treatment	Rate	15 Aug.	14 Sept.	14 July	13 Aug.
	— oz/A —	—	—	% —	—
DPX KJM44-062 + MSO[1]	1 + 1 %	5	29	10	0
DPX KJM44-062 + MSO	1.5 + 1 %	9	32	23	22
DPX KJM44-062 + MSO	2 + 1 %	7	23	37	8
DPX KJM44-062 + MSO	2.5 + 1 %	13	26	48	31
DPX KJM44-062 + MSO	3 + 1 %	14	24	82	54
Picloram + MSO	8 + 1 %	8	31	36	33
Picloram + MSO	32 + 1 %	29	46	91	90
LSD(0.05)		6	NS	31	35

[1]MSO was Scoil, by AGSCO, 1168 12th St NE: Grand Forks ND 58201.

Purple loosestrife control with aminopyralid applied alone or with 2,4-D or triclopyr. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). Purple loosestrife (lythrum) was introduced as an ornamental into North America in the early 1800s. Although slow to spread in the relatively dry climate of North Dakota, the plant was added to the state noxious weed list in 1999 and currently infests approximately 250 A in 22 counties. Nearly all infestations are located in aquatic sites such as rivers, streams, and drainage areas where most herbicides cannot be used. The purpose of this research was to evaluate aminopyralid applied alone or with 2,4-D or triclopyr for purple loosestrife control.

The experiment was located in a green area along a drainage ditch within the city limits of Fargo, ND. Purple loosestrife had invaded the area which otherwise had a near complete cover of cattails. Herbicides were applied with a single nozzle back-pack sprayer and plants were sprayed until wet (approximately 75 gpa). Herbicides were applied on July 6, 2006 when purple loosestrife was in the bloom growth stage and ranged from 3 to 5 feet tall. Purple loosestrife and associated vegetation was sprayed until wet but run-off was avoided. The experimental design was a randomized complete block with three replicates. Plots were 30 feet long and 5 feet wide in the first rep and 30 by 10 feet wide in the second and third reps. Control was visually evaluated using percent stand reduction compared to the untreated control. Glyphosate at 1.5% (herbicide:water v:v) and triclopyr at 1% (v:v) were included as standard treatments for comparison.

In general, aminopyralid provided long-term purple loosestrife control at lower rates than the standard treatments of glyphosate or triclopyr (Table). For instance, aminopyralid applied at 0.2% (v:v) provided 86% purple loosestrife control 13 MAT compared to only 56 and 23% with glyphosate or triclopyr, respectively. Purple loosestrife control increased as the aminopyralid rate increased and averaged 36, 54, and 86% control 13 MAT when applied at 0.05, 0.1, and 0.2% (v:v), respectively. Aminopyralid at 0.2% (v:v) was the only treatment that provided satisfactory (78%) purple loosestrife control the second yr (23 MAT). Purple loosestrife control increased when 2,4-D but not triclopyr was applied with aminopyralid compared to aminopyralid alone at comparable use rates. Cattails were killed by glyphosate but unaffected by any other treatment in the study (data not shown).

Aminopyralid provided very good purple loosestrife control at much lower use rates than currently used herbicide treatments. Also, aminopyralid is safe to use under or near many tree species commonly found in areas infested by purple loosestrife.

Table. Purple loosestrife control with aminopyralid compared to triclopyr or glyphosate applied during the full bloom growth stage on July 6, 2006 in Fargo, ND.

			Evaluation/months after treatment				
Treatment[1]	Rate		1	2	11	13	23
	— % solution —	–oz/A[2] –	—	—	% control	—	—
Aminopyralid	0.05	1.2	91	83	72	36	12
Aminopyralid	0.1	2.4	97	90	85	54	36
Aminopyralid	0.2	4.8	99	97	97	86	78
2,4-D + aminopyralid[3]	0.223 + 0.027	1.8 + 0.9	99	97	97	77	53
Triclopyr + aminopyralid[4]	0.435 + 0.075	5.2 + 0.9	76	73	66	28	5
Triclopyr + aminopyralid[4]	0.66 + 0.09	7.9 + 0.11	91	88	82	63	50
Glyphosate	1.5	72	95	98	88	56	17
Triclopyr	1	48	84	82	63	23	13
LSD (0.05)			13	17	21	29	27

[1]Adjuvant X-77 at 0.25% added to all aminopyralid at 0.05 and 0.1% treatments and at 0.75% to all other treatments.
[2]Herbicide rate estimation was based on an average of 75 gpa applied, but actual rate was dependent on purple loosestrife and associated vegetation height.
[3]Commercial formulation - Forefront by Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268-1189.
[4]Experimental formulation - GF-1883 by Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268-1189.

Evaluation of propoxycarbazone applied alone or with metribuzin for smooth brome and quackgrass control in non-cropland. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). Propoxycarbazone provides good control of downy brome (*Bromus tectorum*), Japanese brome (*Bromus japonicus*), and cheatgrass (*Bromus secalinus*) in winter wheat. Smooth brome (*Bromus inermis*) is a perennial brome grass that is invasive in pasture, range, and wildlands. To date, glyphosate has been the most effective herbicide for smooth brome control. However, because glyphosate is non-selective, treated areas often have a large percentage of bareground that is vulnerable to Canada thistle and other non-desirable species. The purpose of this research was to evaluate propoxycarbazone applied alone and with metribuzine for smooth brome and quackgrass control in non-cropland.

The study was established at the experiment station in Fargo in an area that had been seeded to quackgrass for research purposes and was later invaded by smooth brome. Propoxycarbazone was applied alone or with metribuzine or 28% nitrogen in October 12, 2007, or May 21, 2008. Propoxycarbazone alone was also applied as a split-treatment on both dates. Imazapic at 1.5 oz ae/A was included as a standard comparison. Treatments were applied using a hand-held boom sprayer delivering 17 gpa at 35 psi. Surfactant X-77 at 0.25% was applied with all treatments. Experimental plots were 10 by 30 feet with four replicates in a randomized complete block design. Quackgrass was 15 to 20 inches tall and smooth brome 30 to 36 inches tall at the October application. Both species were mostly brown with some green tissue near the soil surface following several frosts. In May 2008, both species were in the 2 to 4- leaf growth stage and approximately 6 inches tall. Control was visually evaluated using percent stand reduction compared to the untreated control.

No treatment applied in October 2007 controlled either smooth brome or quackgrass the following growing season (Table). There likely was very poor absorption of the herbicides when applied to mostly brown vegetation in October. Propoxycarbazone applied at 0.86 oz/A as a split-treatment in October 2007 and May 2008 or in June alone with 28% N provided 70 to 84% control of both grass species 1 month after treatment. However, control declined rapidly to less than 50% by August 2008. Propoxycarbazone plus 28% N applied in May 2008 provided better smooth brome and quackgrass control than propoxycarbazone plus metribuzin at all evaluation dates. Imazapic did not provide adequate control of either species regardless of application date. In summary, propoxycarbazone applied with 28% N provided better short-term smooth brome and quackgrass control than when applied alone or with metribuzin, but no treatment controlled either species for the entire growing season.

Table. Smooth brome and quackgrass control with propoxycarbazone applied alone or with metribuzin at two timings near Fargo, ND.

		Evaluation date					
		18 June 08		23 July 08		20 Aug. 08	
Treatment[1] / date	Rate	Smooth brome	Quack-grass	Smooth brome	Quack-grass	Smooth brome	Quack-grass
	– oz/A –	%					
October 2007 applied							
Propoxycarbazone-Na	0.86	0	8	0	0	0	0
Propoxycarbazone-Na + 28% N	0.86 + 1 qt	0	0	0	0	0	0
Imazapic	1.5	0	0	0	0	0	0
Propoxycarbazone-Na + metribuzine	0.86 + 3	0	0	0	0	0	0
October 2007 / May 2008 applied							
Propoxycarbazone-Na / Propoxycarbazone-Na	0.86 / 0.86	70	81	67	55	29	45
May 2008 applied							
Propoxycarbazone-Na	0.86	55	59	18	35	3	4
Propoxycarbazone-Na + 28% N	0.86 + 1 qt	84	79	40	65	20	35
Imazapic	1.5	11	14	9	8	0	0
Propoxycarbazone-Na + metribuzin	0.86 + 3	67	54	23	46	24	8
Untreated	...	0	0	0	0	0	0
LSD (0.05)		18	14	14	14	17	24

[1]Surfactant X-77 at 0.25% was applied with all treatments, Loveland Products Inc.,Greeley, CO 80632.

Curly dock (*Rumex crispus*) control in Roundup Ready/STS soybean. Friesen, Shane and Mark Ciernia. An experiment was established at Fargo North Dakota to assess perennial weed control with the STS herbicide system, the Roundup Ready herbicide system, or combinations of the two systems in wide-row soybean (30") crops. The experiment was designed as an RCBD with four replications. Pioneer soybean variety 90M93, which possesses both the Roundup Ready and STS herbicide tolerance systems, was planted on May 21st 2008. Perennial weeds present were curly dock, Canada thistle (*Cirsium arvense*), and dandelion (*Taraxacum officinale*). Each plot received single applications of herbicide (see Table 1) . Perennial weeds were well established and large at the time of herbicide application. Low efficacy was observed for Canada thistle and dandelion in all herbicide treatments. Significant control of curly dock was exhibited by all herbicide treatments, including thifensulfuron alone. Thifensulfuron alone appeared to work better than the low dose of glyphosate alone. Control was rated 30 days after treatment.

Table 1. Curly dock control attained using thifensulfuron alone, thifensulfuron plus glyphosate at 3 glyphosate doses, or glyphosate alone at 3 doses in Roundup Ready/STS soybean grown at NW22. A rating system of 0-100 was utilized, where 0 = no control and 100 = complete foliage kill.

Treatment	Treatment Description	Control
1	Untreated	16%
2	Thifensulfuron (0.25 oz ai/a) NIS[1] (0.25% v/v) Ammonium Sulfate (4 lb/a)	87%
3	Thifensulfuron (0.25 oz ai/a) Glyphosate (0.38 lb ae/a) NIS (0.25% v/v) Ammonium Sulfate (17 lb/100 gal.)	91%
4	Thifensulfuron (0.25 oz ai/a) Glyphosate (0.75 lb ae/a) NIS (0.25% v/v) Ammonium Sulfate (17 lb/100 gal.)	88%
5	Thifensulfuron (0.25 oz ai/a) Glyphosate (1.1 lb ae/a) NIS (0.25% v/v) Ammonium Sulfate (17 lb/100 gal.)	88%
6	Glyphosate (0.38 lb ae/a) Ammonium Sulfate (17 lb/100 gal.)	83%
7	Glyphosate (0.75 lb ae/a) Ammonium Sulfate (17 lb/100 gal.)	91%
8	Glyphosate (1.1 lb ae/a) Ammonium Sulfate (17 lb/100 gal.)	91%
	LSD (0.05)	19%

[1] Activator 90, Loveland Industries, Greeley, CO 80634