Pink Section **Perennial and Noxious Weed Control** **Page**

Long-term control of leafy spurge with aminocyclopyrachlor. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). Aminocyclopyrachlor (KJM44-062 or MAT28) is a new and currently non-classified herbicide from E. I. DuPont company. Initial evaluations of this compound for general pasture and invasive weed control was promising on a variety of species. The purpose of this research was to evaluate aminocyclopyrachlor applied twice for both leafy spurge control and possible grass injury.

Aminocyclopyrachlor methyl ester (DPX KJM44-062) was initially applied alone from 1 to 3 oz ai/A in the spring or fall of 2007. 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. All herbicides were reapplied on June 30, 2009 to evaluate long-term control and potential grass injury. 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.

Treatments 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 for the fall and spring study, respectively, in a randomized complete block design. Leafy spurge control was evaluated visually using percent stand reduction compared to the untreated control.

Aminocyclopyrachlor applied at 2 oz/A or higher provided better long-term leafy spurge 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, aminocyclopyrachlor 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. Control averaged >80% with aminocyclopyrachlor at 2 to 3 oz/A in June 2009, 24 MAT (months after treatment) but had declined to 48 to 65% with aminocyclopyrachlor applied at 1 to 1.5 oz/A.

Long-term leafy spurge control tended to be higher 15 MAT following a second application compared to a single treatment. For instance, leafy spurge control averaged 89% compared to 55% in August 2010 or August 2008 (15 MAT), respectively, when aminocyclopyrachlor at 1 oz/A was applied twice. Also, the commonly used treatment of picloram + imazapic + 2,4-D provided 83% leafy spurge control in August 2010 (15 months after second application) compared to only 56% in August 2008 (15 months after single application). The major grass species present were Kentucky bluegrass and smooth brome and less than 5% grass injury was observed following either the 2007 or 2009 treatment applications (data not shown).

Leafy spurge control 11 MAT with aminocyclopyrachlor 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 . Grass injury was not observed with either herbicide (data not shown). Leafy spurge control averaged over treatments was 93% in June 2010 but declined to 86% by September (36 MAT). This was much better control than normally observed with the standard treatment of picloram at 16 oz/A. In summary, aminocyclopyrachlor provided better long-term leafy spurge control than commonly used treatments with little grass injury.

Table 1. Evaluation of aminocyclopyrachlor for leafy spurge control applied in June 2007 and again in June 2009 near Walcott, ND.

		Leafy spurge control/evaluation date						
		2007	2008		2009		2010	
Treatment	Rate	6 Aug	9 June	19 Aug	10 June	18 Aug	15 June	20 Aug
	oz/A	%						
Aminocyclopyrachlor[1]	1	92	79	55	48	92	93	89
Aminocyclopyrachlor	1.5	98	87	71	65	95	92	86
Aminocyclopyrachlor	2	99	90	88	81	95	98	96
Aminocyclopyrachlor	2.5	99	97	92	86	98	99	97
Aminocyclopyrachlor	3	99	96	92	87	100	99	95
Picloram	8	86	58	45	41	98	76	79
Picloram + imazapic + 2,4-D	4 + 1 + 16	97	45	56	38	95	89	83
LSD (0.05)		7	31	23	36	NS	15	17

[1] MSO was added to all treatments at 1% v/v except at 1 qt/A with picloram + imazapic + 2,4-D. Scoil by AGSCO, 1168 12th St NE, Grand Forks, ND 58201.

Table 2. Evaluation of aminocyclopyrachlor for leafy spurge control applied in September 2007 at Fargo, ND.

		Leafy spurge control/evaluation date					
		2008		2009		2010	
Treatment	Rate	20 June	20 Aug	12 June	3 Sept	10 July	8 Sept
	oz/A	%					
Aminocyclopyrachlor[1]	1	93	89	92	74	90	78
Aminocyclopyrachlor	2	99	97	98	85	93	82
Aminocyclopyrachlor	3	100	99	98	89	97	95
Picloram	16	99	97	98	82	90	88
LSD (0.05)		NS	7	4	NS	NS	NS

[1] MSO was added to all treatments at 1% v/v except at 1 qt/A with picloram. Scoil by AGSCO, 1168 12th St NE, Grand Forks, ND 58201.

Aminopyralid applied in combination with imazapic and picloram for leafy spurge control. Rodney G. Lym. (Plant Sciences Department, North Dakota State University, Fargo, ND 58108-6050). Aminopyralid is widely used to control invasive species such as Canada thistle and spotted knapweed, but does not control leafy spurge even when applied at twice the labeled rate. Previous research at North Dakota State University found that picloram applied with imazapic in the spring provided much better long-term leafy spurge control than either herbicide applied alone. The purpose of this research was to evaluate aminopyralid applied with imazapic for leafy spurge control.

The study was established on the Albert Ekre Research Station near Walcott, ND on September 16, 2009. Leafy spurge was in the fall regrowth stage with 1 to 2 inch branches from the main stems which were 18 to 24 inches tall. Herbicides were applied using a hand-held boom sprayer delivering 17 gpa at 35 psi. Experimental plots were 10 by 30 feet and replicated four times in a randomized complete block design. Leafy spurge control was evaluated visually using percent stand reduction compared to the untreated control.

Leafy spurge control averaged 93% regardless of treatment in June 2010, 9 MAT (months after treatment) (Table). However, leafy spurge regrew rapidly and no treatment provided satisfactory control by August 2010, 11 MAT. Control was similar with or without the addition of diflufenzopyr. The combination of aminopyralid applied with imazapic or imazapic plus picloram, generally provided less than 50% leafy spurge control 11 MAT and would not be a viable treatment to control this weed. Leafy spurge control is increased when picloram is applied with imazapic in the spring but not the fall when this study was established. However, it does not seem likely aminopyralid applied with imazapic and picloram would provide satisfactory leafy spurge control as a spring applied treatment, since aminopyralid alone does not control this weed.

Table. Aminopyralid applied with imazapic, picloram, and diflufenzopyr for leafy spurge control established near Walcott, ND on September 16, 2009.

		2010 evaluation	
Treatment[1]	Rate	8 June	20 Aug
	— oz/A —	— % control —	
Imazapic	1.09	86	9
Imazapic	2	92	78
Picloram	8	91	25
Picloram + imazapic	5.14 + 1.29	90	30
Aminopyralid + imazapic	1.25 + 1.09	90	19
Aminopyralid + imazapic + diflufenzopyr	1.25 + 1.09 + 0.243	91	31
Aminopyralid + imazapic + picloram	1.25 + 1.09 + 4	94	34
Aminopyralid + imazapic + picloram + diflufenzopyr	1.25 + 1.09 + 4 + 0.8	95	51
Aminopyralid + imazapic	1.25 + 1.46	90	21
Aminopyralid + imazapic + diflufenzopyr	1.25 + 1.46 + 0.243	95	56
Aminopyralid + imazapic + picloram	1.25 + 1.09 + 6	97	50
Aminopyralid + imazapic + picloram	1.25 + 1.46 + 4	96	53
Aminopyralid + imazapic	1.75 + 1.51	92	31
Picloram + imazapic + diflufenzopyr	5.14 + 1.29 + 1.03	95	26
LSD (0.05)		NS	29

[1] All treatments applied with MSO Scoil 1 qt/A. Scoil from UAP 1168 12th St. NE, Grand Forks, ND 58201.

Evaluation of aminocyclopyrachlor for plumeless thistle control. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). Aminocyclopyrachlor (KJM44-062 or MAT28) has been evaluated for control of several perennial weed species but the effect on non-perennial invasive weeds is generally unknown. The purpose of this research was to evaluate aminocyclopyrachlor for long-term control of the biennial invasive species plumeless thistle (*Carduus acanthoides* L.).

The experiment was established on former pastureland on the campus of North Dakota State University on June 19, 2009. Plumeless thistle was in the rosette growth stage and beginning to bolt. 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 times in a randomized complete block design. Control of plumeless thistle 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 this weed.

Aminocyclopyrachlor provided excellent long-term plumeless thistle control, but initial injury was slower than with aminopyralid (Table). For instance, plumeless thistle injury a month after treatment averaged 90% with aminopyralid at 1.25 oz/A compared to 75% with aminocyclopyrachlor at 1.5 oz/A. Control gradually increased over the summer and averaged 95 to 100% when aminocyclopyrachlor was applied at 1 to 2 oz/A. Control was similar whether aminocyclopyrachlor was applied alone or with metsulfuron or chlorsulfuron. The following growing season plumeless thistle control was 99 to 100% regardless of treatment (May 2010). Thus, 2,4-D at 16 oz/A would be the most cost-effective treatment in this study. Grass injury was not observed with any treatment. In conclusion, aminocyclopyrachlor applied at 0.25 oz/A or more provided near complete control of plumeless thistle by the following growing season, but plants died at a much slower rate than those treated with aminopyralid.

Table. Plumeless thistle control with aminocyclopyrachlor applied on June 19, 2009 at Fargo, ND.

		2009			2010
Treatment	Rate	15 July	14 Aug	17 Sept	27 May
	— oz/A —	% injury	—	% control	—
Aminocyclopyrachlor + NIS[1]	0.25 + 0.25 %	42	53	71	100
Aminocyclopyrachlor + NIS	0.5 + 0.25 %	50	70	80	99
Aminocyclopyrachlor + NIS	1 + 0.25 %	73	95	95	100
Aminocyclopyrachlor + MSO[2]	1 + 0.25 %	77	93	100	99
Aminocyclopyrachlor + NIS	1.5 + 0.25 %	75	98	96	99
Aminocyclopyrachlor + NIS	2 + 0.25 %	90	100	100	100
Aminocyclo[3] + metsulfuron + NIS	1 + 0.2 + 0.25 %	70	98	98	100
Aminocyclo + chlorsulfuron + NIS	1 + 0.125 + 0.25 %	65	90	100	99
Aminocyclo + 2,4-D + NIS	1 + 8 + 0.25 %	80	95	100	99
Aminopyralid + NIS	1.25 + 0.25 %	90	100	100	99
2,4-D + NIS	16 + 0.25 %	60	57	77	100
Untreated	...	0	0	10	0
LSD (0.05)		7	9	15	1.5

[1] NIS was Induce from Helena Chemical Co., Collierville, TN 38017.
[2] MSO was Scoil, by UAP, Grand Forks, ND 58203.
[3] Amincocyclo = aminocyclopyrachlor.

Evaluation of aminocyclopyrachlor for Russian olive control. Rodney G. Lym. (Department of Plant Sciences, North Dakota State University, Fargo, ND 58108-6050). Aminocyclopyrachlor (KJM44-062 or MAT28) has been evaluated for control of wide spread invasive weeds such as leafy spurge and Canada thistle. However, the effect of aminocyclopyrachlor on other invasive or troublesome weeds is largely unknown. The purpose of this research was to evaluate aminocyclopyrachlor efficacy on Russian olive (*Elaeagnus angustifolia* L.) applied as a cut-stump or basal bark treatment.

The first study evaluated aminocyclopyrachlor as a cut-stump treatment for control of Russian olive regrowth and was established on the Sheyenne National Grassland in cooperation with the U.S. Forest Service near McLeod, ND. Russian olive originally had been planted as part of a shelter belt but had spread into an adjacent pasture. The trees were 15 to 25 feet tall and ranged from approximately 10 to over 50 years old. The trees were cut by Forest Service personnel on April 21, 2008 and herbicides were applied to the stumps on May 8, 2009. Each treatment was applied to 3 trees (reps) and each replicate consisted of similar size tree stumps. The first replicate contained the smallest tree stumps which averaged 11 inches in diameter while replicate three contained the largest diameter stumps which averaged 20 inches.

Herbicides were applied on a percent solution basis in a petroleum based oil (herbicide:oil v:v) with a single nozzle hand-held pump sprayer. The aminocyclopyrachlor formulation was DPX MAT28-067 2 SL. Stumps were thoroughly covered to the point of run-off. Control was evaluated by counting the number of shoots arising from the stump and root collar of treated compared to non-treated stumps.

All cut-stump treatments provided excellent control of Russian olive regrowth (Table 1). An average of 127 stems/stump regrew from untreated trees in 2009 compared to no regrowth from any of the treated stumps. No regrowth was observed on any treated stump in 2010, 13 MAT, compared to an average of 24 stems/stump in the untreated control. Previous studies had found that the aminocyclopyrachlor spray solution became increasingly viscous and difficult to apply as the application rate increased. However, with the MAT28-067 2 SL formulation, the solution remained much less viscous and was not difficult to apply. Grass and brush species surrounding the cut-stumps also died even though the herbicide was not directly applied to these plants. The area of total vegetation control around each stump increased as the aminocyclopyrachlor application rate increased.

The second study evaluated aminocyclopyrachlor as a basal bark treatment and was established on private land near the first experiment. Herbicides were applied in bark oil on July 8, 2009 as previously described, except the application was made to the bark of uncut Russian olive trees. The herbicide was applied in an 8-inch band around the tree about 12 inches above the soil. If the tree had more than one stem, the largest was chosen for treatment. Each treatment was applied to four trees (reps). Each replicate had similar size trees which ranged from an average 5 inch circumference in Rep one to 13 inches in Rep four.

Aminocyclopyrachlor slowly controlled Russian olive when applied as a basal bark treatment (Table 2). Injury increased from 54 to 75% 6 weeks after treatment (18 Aug) as the aminocyclopyrachlor rate increased from a 5 to 15% solution. Aminocyclopyrachlor at 5% solution killed all but the largest trees and averaged 90% control by June 2010 (13 months after treatment). All Russian olive trees died when aminocyclopyrachlor was applied as a 10 or 15% solution. Control was similar with triclopyr applied alone at 25% or with imazapyr at 20 + 1%, respectively. As with the cut-stump study, all vegetation surrounding the treated tree was killed and the size of the area increased to over 6 ft in diameter, as the aminocyclopyrachlor rate increased. The largest area of injury was observed when the treatment included imazapyr.

In summary, aminocyclopyrachlor provided excellent Russian olive control when applied as a cut-stump or basal bark treatment. Aminocyclopyrachlor provided 100% control of regrowth when applied as a 2.5% solution in bark oil blue to cut-stumps, but had to be applied at a 10% or more solution to kill well established trees. Aminocyclopyrachlor should be applied as a 10% or less solution to reduce the application costs and non-target plant injury.

Table 1. Evaluation of aminocyclopyrachlor in combination with a bark oil as a cut stump treatment for Russian olive control applied on June 19, 2009 on the Sheyenne National Grassland, near McLeod, ND.

		Evaluation		
		2009		2010
Treatment[1]	Rate	8 July	18 Aug	16 June
	— % —	— Stems/stump —		
Aminocyclopyrachlor	2.5	0	0	0
Aminocyclopyrachlor	5	0	0	0
Aminocyclopyrachlor	10	0	0	0
Aminocyclopyrachlor	15	0	0	0
Triclopyr ester[2]	30	0	0	0
Triclopyr ester + imazapyr[3]	20 + 1	0	0	0
Aminocyclopyrachlor + imazapyr	10 + 1	0	0	0
Untreated	...	124	129	24
LSD (0.05)		72	47	3

[1] Herbicide treatments applied in Bark Oil Blue LT from UAP Distribution Inc., 7251 West 4th St., Greeley, CO 80634.
[2] Commercial formulation - Garlon 4 from Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268-1189.
[3] Commercial formulation - Stalker from BASF Corporation, 100 Campus Drive, Florham Park, ND 07932.

Table 2. Evaluation of aminocyclopyrachlor as a basal bark treatment applied on July 8, 2009 for Russian olive control near McLeod, ND.

		Evaluation			
		2009		2010	
Treatment[1]	Rate	22 July	18 Aug	16 June	26 Aug
	— % —	— % injury —		— % control —	
Aminocyclopyrachlor	5	30	54	83	90
Aminocyclopyrachlor	10	41	79	100	100
Aminocyclopyrachlor	15	35	75	100	100
Triclopyr ester[2]	25	63	96	99	100
Triclopyr ester + imazapyr[3]	20 + 1	46	88	93	99
Aminocylopyrachlor + imazapyr	10 + 1	45	68	99	100
Untreated	...	0	0	0	0
LSD (0.05)		21	25	12	8.5

[1] Herbicide treatments applied in Bark Oil Blue LT from UAP Distribution Inc., 7251 West 4th St., Greeley, CO 80634.
[2] Commercial formulation - Garlon 4 from Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268-1189.
[3] Commercial formulation - Stalker from BASF Corporation, 100 Campus Drive, Florham Park, ND 07932.

Aminopyralid applied alone or in combination with metsulfuron for western snowberry and Canada thistle control. Rodney G. Lym. (Plant Sciences Department, North Dakota State University, Fargo, ND 58108-6050). Western snowberry (*Symphoricarpos occidentalis* Hook.) also known as buckbrush, is perennial native forb species that often grows 4 to 5 feet tall in dense patches. Western snowberry can become weedy when grasses are over-grazed or removed by herbicides. Western snowberry is often found in areas previously treated with high rates of picloram for leafy spurge control as this species tolerates repeated picloram applications. The purpose of this research was to evaluate aminopyralid applied with metsulfuron for western snowberry and Canada thistle control.

The study was established on unused land near the campus of North Dakota State University in Fargo. The area had been heavily infested with leafy spurge, but repeated picloram applications combined with *Aphthona* spp. biocontrol agents had eliminated the weed. Western snowberry and Canada thistle had replace leafy spurge in the area. The treatments were applied June 19 or July 13, 2009. Western snowberry was in the vegetative to early flowering growth stage and 36 to 48 inches tall when treated in June while plants were post-flower to seed-set when herbicides were applied in July. Canada thistle was commonly found in the under story prior to treatment.

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 times in a randomized complete block design. Weed control was evaluated visually using percent stand reduction compared to the untreated control.

Herbicide treatments applied in June generally gave better initial western snowberry control (96%) than the same treatments applied in July (85%) (Table). However, control declined rapidly for all treatments. For instance, aminopyralid plus metsulfuron provided an average of 80 and 75% western snowberry control in June and September 2010 regardless of application date. Western snowberry control averaged 84 and 80% in June and August 2010 with 2,4-D at 32 oz/A which would be the most cost-effective treatment evaluated.

None of the treatments in this study provided satisfactory long-term Canada thistle control (Table). Generally aminopyralid at 1.25 to 1.75 oz/A provides better than 90% Canada thistle control for 1 to 2 yr in North Dakota, but in this study Canada thistle control from aminopyralid applied at similar rates averaged less than 50% control. The reason for the reduced control is likely from poor coverage during application. The western snowberry canopy was very dense and little herbicide likely reached Canada thistle or the soil. Once the brush species was injured Canada thistle tended to increase in the treated areas rather than decline.

In summary, aminopyralid applied with metsulfuron or metsulfuron plus 2,4-D provided similar western snowberry control to 2,4-D alone and would not be a cost-effective treatment for this species. A better approach for controlling Canada thistle growing in western snowberry would be to first reduce the brush species with 2,4-D and then apply aminopyralid to control the thistle.

Table. Aminopyralid plus metsulfuron applied at various rates alone and with 2,4-D in June or July 2009 for western snowberry and Canada thistle control at Fargo, ND.

		Evaluation date/species					
		17 Sept 09		9 June 10		20 Aug 10	
Treatment[1]		WESN[2]	CT	WESN	CT	WESN	CT
	— oz/A —	— % control —					
June application							
Aminopyralid + metsulfuron[3]	1.05 + 0.19	100	70	74	60	62	22
Aminopyralid + metsulfuron	1.32 + 0.23	93	70	74	56	66	27
Aminopyralid + metsulfuron	1.58 + 0.28	96	97	80	69	73	47
Aminopyralid + metsulfuron + 2,4-D amine	1.05 + 0.19 + 16	98	78	86	62	75	48
Aminopyralid + metsulfuron + 2,4-D amine	1.05 + 0.19 + 8	93	88	84	73	79	43
Aminopyralid + metsulfuron + 2,4-D ester	1.05 + 0.19 + 8	100	88	87	90	80	52
2,4-D amine	32	90	77	86	75	78	17
Chlorsulfuron + metsulfuron[4]	0.076 + 0.24	100	65	93	63	82	30
July application							
Aminopyralid + metsulfuron	1.05 + 0.19	95	100	91	92	85	35
Aminopyralid + metsulfuron	1.32 + 0.23	77	100	77	87	67	52
Aminopyralid + metsulfuron	1.58 + 0.28	87	99	73	84	69	30
Aminopyralid + metsulfuron + 2,4-D amine	1.05 + 0.19 + 16	86	85	78	61	75	30
Aminopyralid + metsulfuron + 2,4-D ester	1.05 + 0.19 + 8	93	100	79	62	80	35
Aminopyralid + metsulfuron + 2,4-D amine	1.05 + 0.19 + 8	88	90	78	78	83	37
2,4-D amine	32	59	80	82	69	88	27
Chlorsulfuron + metsulfuron	0.076 + 0.24	96	100	82	83	86	13
LSD (0.05)		13	32	24	38	28	NS

[1] All treatments applied with NIS Activator 90 at 0.25%. Activator 90 from United Agri Products 7251 W. 4th St., Greeley, CO 80634.

[2] Abbreviations: WESN = western snowberry; CT=Canada thistle.

[3] Commercial formulation - Chaparral from Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268-1189.

[4] Commercial formulation - Cimarron Plus from DuPont Crop Protection P.O. Box 80705 CRP 705/L1S11, Wilmington, DE 19880-0705.

Aminopyralid applied alone or in combination with clopyralid for Canada thistle control.
Rodney G. Lym. (Plant Sciences Department, North Dakota State University, Fargo, ND 58108-6050). Aminopyralid is generally applied at 1.25 to 1.75 oz ai/A for Canada thistle control in North Dakota. Prior to the release of aminopyralid, clopyralid was commonly used to control Canada thistle, especially in cropland. The purpose of this research was to evaluate aminopyralid applied alone or at reduced rates with clopyralid for long-term Canada thistle control.

The study was established along a drainage ditch that had become heavily infested with Canada thistle on the North Dakota State University Agricultural Experiment Station in Fargo. The treatments were applied June 30 or September 24, 2009. June treatments were applied to Canada thistle in the bolted to early bud growth stage and 30 to 48 inches tall while plants were post-flower with woody stems and 36 to 48 inches tall when herbicides were applied in the fall.

Herbicides were applied using a hand-held boom sprayer delivering 17 gpa at 35 psi. Experimental plots were 10 by 30 feet and replicated four times in a randomized design with replications established length wise along the ditch. Canada thistle control was evaluated visually using percent stand reduction compared to the untreated control.

Canada thistle control was similar when herbicides were applied in June or September of the previous year (Table). For instance, aminopyralid applied at 1.25 to 1.75 oz/A alone provided an average of 97% control when applied in June or September, 12 to 15 MAT (months after treatment) (August 2010). In general, aminopyralid applied at 0.5 to 1 oz/A with clopyralid provided similar Canada thistle control to aminopyralid applied alone at higher rates regardless whether treatments were applied in June or September. Clopyralid at 6 oz/A applied alone in September did not provide satisfactory Canada thistle control (47%).

In summary, the combination of aminopyralid plus clopyralid at reduced rates generally provided similar Canada thistle control to aminopyralid alone at 1.75 oz/A the maximum labeled use rate. Aminopyralid at 1.25 oz/A provided the most cost-effective long-term Canada thistle control at $14/A.

Table. Aminopyralid plus clopyralid for Canada thistle control applied on June 30 or September 24, 2009 at Fargo, ND.

		Evaluation/date			
		2009	2010		
Treatment[1]	Rate	28 Aug	14 June[2]	20 Aug	Cost[3]
	— oz/A —	——— % control ———			$/A
June application					
Aminopyralid[4]	1.25	99	99	92	14
Aminopyralid	1.75	99	100	99	19
Clopyralid[5]	6	88	96	92	44
Aminopyralid + clopyralid	0.5 + 2.295	92	93	86	17
Aminopyralid + clopyralid	0.75 + 3.45	99	99	98	25
Aminopyralid + clopyralid	1 + 4.61	98	100	99	44
Aminopyralid + clopyralid	1.25 + 5.74	98	100	99	56
September application					
Aminopyralid	1.25		98	98	14
Aminopyralid	1.75		100	98	19
Clopyralid	6		64	47	44
Aminopyralid + clopyralid	0.5 + 2.295		88	71	17
Aminopyralid + clopyralid	0.75 + 3.45		98	91	25
Aminopyralid + clopyralid	1 + 4.61		100	94	44
Aminopyralid + clopyralid	1.25 + 5.74		98	98	56
Untreated		0	0	0	
LSD (0.05)		4	9	17	

[1] All treatments applied with NIS Activator 90 at 0.25%. Activator 90 from United Agri Products 7251 W. 4th St. Greeley, CO 80634.
[2] Only two replications (reps 3 and 4) could be evaluated in June 2010 because the other two had been mowed.
[3] Based on Milestone and Transline at $350/gal each and does not include surfactant or application costs.
[4] Commercial formulation - Milestone and [5]Transline, from Dow AgroSciences LLC, 9330 Zionsville Road, Indianapolis, IN 46268-1189.

Yellow toadflax control with DPX-MAT28. Jenks, Willoughby, and Hoefing.The study objective was to evaluate DPX-MAT28 (aminocyclopyrachlor)for long-term yellow toadflax control in rangeland compared to Tordon. DPX-MAT28 was applied at 1.5 or 3 ozai/A or at 2 oz tank mixed with Telar. Tordon was applied at 2 pt/A. Treatments were applied at vegetative stage, flowering, and late fall. Treatments were applied in 2008 and evaluated in 2009 and 2010. Toadflax density was measured before application in 2008 and again in 2009 and 2010. Tordon provided poor toadflax control at any stage. DPX-MAT28 provided excellent control after 1 year with any rate. However, after 2 years, control with the 1.5 oz rate dropped off significantly, while the 3 oz rate still maintained excellent control. Toadflax control with DPX-MAT28 + Telar was 8-13% lower than with 3 oz. No treatment caused more than 6% grass injury.

Table. Yellow toadflax control with DPX-MAT28. (0949)

			Yellow toadflax control		Yellow toadflax density			Grass injury	
Treatment[ab]	Rate	Timing	Jul 8 2009	Sep 10 2010	Aug 4 2008	Jul 14 2009	Sep 15 2010	Jul 8 2009	Sep 10 2010
			----------%----------		----------sqft----------			----------%----------	
Untreated			0	0	9.6	11.9	8.7	0	0
DPX-MAT28	1.5 oz	Vegetative	93	55	8.3	0.2	3.1	5	0
DPX-MAT28	1.5 oz	Flowering	95	62	6.1	1.0	3.4	1	0
DPX-MAT28	1.5 oz	Fall	90	64	7.8	1.0	1.7	1	0
DPX-MAT28	3 oz	Vegetative	100	98	8.3	0	0	5	0
DPX-MAT28	3 oz	Flowering	100	99	7.6	0	0	3	0
DPX-MAT28	3 oz	Fall	100	99	5.9	0	0	3	0
Tordon	2 pt	Vegetative	23	0	6.2	5.8	7.2	1	0
Tordon	2 pt	Flowering	32	0	10.0	6.8	7.0	1	0
Tordon	2 pt	Fall	60	13	6.4	2.9	3.8	1	0
DPX-MAT28 + Telar	2 oz + 0.75 oz	Vegetative	99	85	7.9	0.1	0.6	4	0
DPX-MAT28 + Telar	2 oz + 0.75 oz	Flowering	100	91	7.1	0	0.3	6	0
DPX-MAT28 + Telar	2 oz + 0.75 oz	Fall	100	92	8.6	0	0.7	3	0
Untreated			0	0	6.1	6.4	5.0	0	0
LSD (0.05)			7	15	NS	2.4	2.8	NS	NS
CV			6	17	40	56	57	111	0

[a]*All treatments applied in 2008 (Jul 8, Sep 11, and Oct 16).*

[b]*DPX-MAT28 and Tordon applied with MSO (1%)*

Perennial weed control with aminopyralid and aminocyclopyrachlor, Sheridan County.
(Greg Endres)

A field study was conducted by the NDSU Carrington Research Extension Center on the Ducks Unlimited Coteau Ranch near Denhoff, ND to examine perennial weed control with aminopyralid (Milestone, ForeFront R&P, and Chaparral) and aminocyclopyrachlor (MAT28). Experimental design was a randomized complete block with three replications. Herbicide treatments were applied with a backpack-type plot sprayer delivering 11 gal/A at 35 psi through 8001 flat fan nozzles to the center 6.7 ft of 10- by 25-ft plots. Weeds were mowed during the summer of 2008. Fall herbicide treatments were applied on October 3, 2008 to 3- to 12-inch tall absinth wormwood, 2- to 10-inch tall Canada thistle, and $\leq$ 24-inch tall (rosette to mature) perennial sowthistle. Summer herbicide treatments were applied on July 1, 2009 to 13- to 40-inch tall absinth wormwood, 5- to 29-inch tall (bud stage) Canada thistle, and 6- to 28-inch tall perennial sowthistle.

Absinth wormwood control was excellent (99%) and perennial sowthistle control was good (83-87%) 12 months after application (MAA) with fall application of Milestone, ForeFront R&P and Chaparral (Table 1). Canada thistle control 12 MAA was 85% with fall-applied Milestone at 7 fl oz/A. All summer herbicide treatments provided excellent control of absinth wormwood and perennial sowthistle, except wormwood control with MAT28 plus Telar (Table 2). Summer-applied MAT28 or MAT28 plus Telar provided excellent control (98%) of Canada thistle 12 MAA. Also, Milestone at 7 fl oz/a provided greater Canada thistle control compared to the lower rate.

Table.1 Perennial weed control with fall herbicide treatments[1]

Herbicide		Weed control					
		1-Jul-09			30-Sep-09		
Treatment[2]	Rate	Absinth wormwood	Canada thistle	Perennial sowthistle	Absinth wormwood	Canada thistle	Perennial sowthistle
	product/A		%				
Untreated check	x	0	0	0	0	0	0
2,4-D	32 fl oz	65	33	0	62	13	0
Milestone	7 fl oz	99	98	89	99	85	87
Milestone	5 fl oz	99	84	80	99	75	83
ForeFront R&P	32 fl oz	99	89	86	99	71	83
Chaparral	3 oz wt	99	90	94	99	75	88
C.V. (%)		11.6	23.2	15.8	10.8	18.1	16.9
LSD (0.05)		16	28	17	15	17	17

[1]Application on October 3, 2008.

[2]2,4-D=LV4 (Loveland); All treatments except 2,4-D include NIS=Preference (Winfield Solutions) at 0.25% v/v .

Table.2 Perennial weed control with summer herbicide treatments[1]

Herbicide		Weed control					
		30-Sep-09			2-Jul-10		
Treatment[2]	Rate	Absinth wormwood	Canada thistle	Perennial sowthistle	Absinth wormwood	Canada thistle	Perennial sowthistle
	product/A		%				
Untreated check	x	0	0	0	0	0	0
2,4-D	32 fl oz	96	72	93	91	65	93
Milestone	7 fl oz	99	94	93	98	86	95
Milestone	5 fl oz	99	83	93	95	72	90
Chaparral	3 oz wt	99	87	98	93	71	99
MAT28	2 oz wt	94	96	98	93	98	98
MAT28 + Telar	2 + 0.167 oz wt	89	93	99	78	98	98
C.V. (%)		7.9	6.8	4.4	5.1	9.4	3.2
LSD (0.05)		12	9	6	7	12	5

[1]Application on July 1, 2009.

[2]2,4-D=LV4 (Loveland); All treatments except 2,4-D include NIS=Preference (Winfield Solutions) at 0.25% v/v .