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Integrated control of leafy spurge (*Euphorbia esula*) with ‘Bozoisky’ Russian wildrye (*Psathyrostachys juncea*) and ‘Luna’ pubescent wheatgrass (*Agropyron intermedium* var. *trichophorum*)

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Introduction

Herbicide research to control leafy spurge in Wyoming began in 1952 with 2,4-D, (Vore & Alley 1982). Picloram, available beginning in 1963, has proven to be the most reliable and effective herbicide for control of leafy spurge with a single application. However, control can be maintained for only three to five years. After this time, retreatment is necessary to maintain adequate leafy spurge control. Adequate control is a level where cattle are able to effectively utilize desirable forage growing in competition with leafy spurge. Hein (1988) found leafy spurge canopy cover exerted the greatest influence on grazing behavior and forage utilization by cattle. Leafy spurge canopy cover of 10% or less and shoot control of 90% or more were necessary to achieve 50% forage utilization by cattle in Montana. In North Dakota, moderate and high-density leafy spurge infestations were avoided until early fall when the milky latex in the spurge disappeared (Lym and Kirby 1987). Cattle only used 2% of the available forage when leafy spurge cover was less than 20%.

Although herbicides play an important part in the control of leafy spurge, alternative methods are available and may be used where persistent herbicides cannot be tolerated. One such method is plant competition. Grass competition has long been recognized as a method of leafy spurge control. Crested wheatgrass was used in Saskatchewan, Canada to decrease the rate of vegetative spread, limit density, reduce seed production, and suppress top growth of leafy spurge. If 2,4-D was applied to such stands twice a year the hay was safely removed for feed, and seed production was prevented (Selleck 1959a and b). Leafy spurge growth may also be suppressed by planting an early emerging crop such as crested

wheatgrass, that will compete with it for early soil moisture (Morrow *et al.* 1979). The purpose of this research was to determine the potential of perennial grass competition as an alternative to repetitive herbicide treatment for control of leafy spurge.

Materials and methods

Research was conducted near Devil's Tower, Wyoming to evaluate the effects of two perennial grass species on leafy spurge. Two applications of glyphosate (Roundup, Monsanto) at 1.5 and 1 quart of product per acre were broadcast with a tractor mounted sprayer delivering 13.5 gpa at 20 psi before seeding grasses in 1989. The first application was May 18, 1989 and the second application was July 19, 1989. Soils were classified as a silt loam with 1.8% organic matter and pH of 6.3. The herbicide, 2,4-D was applied at a rate of 1 lb ai/A on August 9, 1989 to control annual broadleaf weeds. An application of Ally at 0.25 oz/A plus 2 lb ai/A of 2,4-D low volatile ester was made May 14, 1990 to control annual mustards. Plots (33 by 174 ft) were arranged in a randomized complete block design with two factors and four replications. Factors were grass varieties and tillage (tilled or not tilled). Plots were tilled with a rototiller and packed on August 7, 1989 and grasses were seeded with a Tye drill, with 1/4 inch depth bands, on August 8, 1989. Evaluations of percent grass stand, grass number per 20 feet of row, grass yield, percent leafy spurge control, and percent downy brome infestation were taken September 12 and 13, 1991.

'Luna' pubescent wheatgrass and 'Bozoisky' Russian wildrye were selected on the basis of productivity, ability to establish in low moisture areas and ability to compete with leafy spurge. Luna was seeded at a rate of 11 pounds of pure live seed per acre and Bozoisky at a rate of 7 pounds of pure live seed per acre. Row spacing was 8 inches for both varieties.

Results and discussion

Grass stands in rototilled plots were 94% and 93% for Luna and Bozoisky, respectively (Table 1). Grass stands in no-till plots were 86% and 69% for Luna and Bozoisky, respectively. The rototilled plots also had significantly more plants per 20 ft of row than the no-till plots.

Leafy spurge control was excellent at 95% or better in both rototilled and no-till plots (Table 1). Downy brome infestation was considerably greater in the no-till plots. Bozoisky had 21% infestation in the rototilled plots compared to 73% infestation in the no-till plots. Luna had 6% infestation in the rototilled plots compared to 20% infestation in the no-till plots.

Grass production was very good for both the rototilled and no-till plots due to good early season moisture. Luna yielded 3068 lbs/A in the tilled plots and 2181 lbs/A in the no-till plots (Table 1). Bozoisky yielded 1463 lbs/A in the rototilled plots and 1046 lbs/A in the no-till plots.

Table 1. ‘Luna’ pubescent wheatgrass and ‘Bozoisky’ Russian wildrye grass stand, leafy spurge control, downy brome control, grass yield, and number of grass plants from rototilled (RT) and non-tilled (NT) plots.

Grass species	Grass stand		Leafy spurge control		Downy brome control		Grass yield		Number of grass plants	
	RT	NT	RT	NT	RT	NT	RT	NT	RT	NT
			%				— lbs/A —		no./20 ft row	
‘Luna’ pubescent wheatgrass	94	86	99	99	6	20	3068	2181	34	25
‘Bozoisky’ Russian wildrye	93	69	99	95	21	73	1463	1046	37	21
LSD (P<0.05)	5		3		8		716		5	

Grasses planted August 8, 1989.

Evaluations made on September 13, 1991.

Grass characteristics. Luna pubescent wheatgrass is considered to be better adapted to droughty, infertile and saline soils than intermediate wheatgrass. Luna was developed in New Mexico by the USDA-SCS (Onsager 1987). Excellent grass stands were established in both the tilled and no-till plots and provided excellent control of leafy spurge. This grass yielded more than Russian wildrye.

Russian wildrye is a cool-season perennial bunchgrass that has been widely used in the western U.S. and Canada. Once established, it has excellent drought and cold tolerance. The species is characterized by dense basal leaves that are high in nutritive value and palatable to grazing animals. Also, its nutritive value during the late summer and early fall is better than many other grasses, including crested and intermediate wheatgrass. Bozoisky, the cultivar used in this study, was recently obtained from the former Soviet Union. It has been significantly more productive and easier to establish on semi-arid range sites than other Russian wildryes (Onsager 1987). This grass established excellent stands in the tilled plots and fair in the no-till plots and provided excellent leafy spurge control, regardless of tillage treatment.

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