

Integrating Herbicides and Re-vegetation on a Leafy Spurge Infested Pasture in the Bitterroot Valley, Montana

by

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Abstract

Leafy spurge is one of the more problematic and economically significant noxious weeds in Montana because it reduces livestock forage and because herbicidal management is costly and short term. On a cattle ranch in south western Montana, picloram or imazapic (two herbicides used to control leafy spurge) were sprayed, and five competitive, forage grass species were seeded as monocultures in a controlled, replicated study to determine the effects of these treatments on leafy spurge suppression and grass establishment. Bluebunch wheatgrass, orchard grass, and thickspike wheatgrass established where herbicides suppressed leafy spurge density. Bluebunch wheatgrass and orchard grass reduced the biomass production of leafy spurge indicating competitive suppression of leafy spurge by these grasses. Results suggest that herbicides are necessary to establish grasses and to increase forage production on degraded pastures infested with leafy spurge. Regeneration of leafy spurge where grasses established indicates that control of leafy spurge by insect, goat, or sheep herbivory, and prescribed cattle grazing will be needed for sustainable management of leafy spurge.

Introduction

Leafy spurge (*Euphorbia esula* L.) has been reported in every county in Montana making it one of the more widespread noxious weeds in Montana. It infests an estimated three million acres in 29 western states. On pasture and rangeland, livestock forage availability in leafy spurge infestations is reduced because leafy spurge suppresses the productivity of forage grasses and because cattle avoid grazing in leafy spurge infestations. On many infested pastures, perennial forage grasses have been replaced by leafy spurge and less palatable grasses such as bulbous bluegrass (*Poa bulbosa* L.), three-awn (*Aristida purpurea* Nutt.), and cheatgrass (*Bromus tectorum* L.). On these sites, controlling leafy spurge using herbicides, biological control insects, or grazing with sheep or goats may not restore forage quality or production. This technical note reports three years of data collected on a re-vegetation demonstration of a leafy spurge infested pasture in the Bitterroot Valley, Montana.

Objectives

The overall objectives of the study were to establish a demonstration of integrated management of leafy spurge that included herbicide, re-vegetation, biological, and grazing control methods,

(Disclaimer: Any mention of products in this publication does not constitute a recommendation by the NRCS. It is a violation of Federal law to use herbicides in a manner inconsistent with their labeling.)

and to use re-vegetation and herbicides to improve forage production. Specific objectives were to determine the establishment success of grass species, their competition with leafy spurge, and herbicidal control of leafy spurge for grass establishment.

Study Area

The study area is located on a privately owned cattle ranch southeast of Lolo, Montana. The area is level and the long-term (30-year) average annual precipitation ranges from 15 to 19 inches (380 to 480 mm). The soils are classified as Bigarm gravely-loam (loamy-skeletal, mixed, frigid Typic Haploxerolls) 0 to 11 inches (0-280 mm) deep, 7 to 18 percent clay, 2 to 4 percent organic matter, and a pH range of 6.6 to 7.3. The historic habitat-type is classified as *Festuca scabrella/Agropyron spicatum*. The plant community composition at the start of the study in 2002 was predominantly leafy spurge with Canada bluegrass (*Poa compressa* L.), cheatgrass, bulbous bluegrass, three awn, spotted knapweed (*Centaurea maculosa* Lam.), intermediate wheatgrass [*Thinopyrum intermedium* (Host) Barkworth & D.R. Dewey], and bluebunch wheatgrass [*Pseudoroegneria spicata* (Prush) A. Löve].

Study Design

The study was designed as a split-plot with six grass seeding treatments (including a no seeding control) as whole-plots and three herbicide treatments (including a no herbicide control) applied within the seeding treatments as sub-plots. Each grass seeding treatment plot was 14 by 45 feet divided into three 14 by 15 foot herbicide treatment plots. The herbicide treatments were randomized within each grass seeding treatment, and the grass seeding treatments were randomized within four replications on two sites. The study was first applied in 2002 and fenced with an eight-foot wildlife fence to exclude cattle and wildlife (fenced site). The study was repeated in 2003 on a second adjacent site but was not fenced (unfenced site).

The six grass seeding treatments consisted of five grass species and a no seeding control. Grass species and seeding rates are listed in Table 1. All grass species are cool season, drought tolerant, long-lived perennial grasses that, with the exception of orchard grass, are native to North America. These species were chosen because they are adapted to the moisture and soil conditions of the site and because of their livestock forage value.

The herbicide treatments included a no herbicide control, picloram applied at one quart product/acre (0.56 kg a.e./ha), and imazapic applied at ten-ounce product/acre (0.03 kg a.i./ha) in solution with one quart/acre methylated seed oil. The herbicides were applied in September before the first hard frost, which is one of the optimum times recommended for herbicidal control of leafy spurge. Grasses were seeded using a rangeland no-till drill on November 11, 2002, in the fenced site and on October 27, 2003, in the unfenced site.

Table 1. The common and scientific names, seeding rates, and characteristics of the grass species seeded in the study.

Common name	Scientific name	rate lb/acre	Origin	habit
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	10-14	Washington	bunchgrass
Big bluegrass	<i>Poa ampla</i>	2-4	Oregon	bunchgrass
Great basin wild rye	<i>Leymus cinereus</i>	6-11	Saskatchewan	short rhizomes
Orchard grass	<i>Dactylis glomerata</i>	2-4	Turkey	bunchgrass
Thickspike wheatgrass	<i>Elymus lanceolatus</i>	6-11	OR,WA,ID,CA	rhizomatous

Sampling

The sites were sampled in mid-summer beginning in the summer following seeding in 2003, 2004, and 2005. The densities of the seeded grasses and leafy spurge were counted in 0.2 by 0.5 m frames (Daubenmire) placed at random in each treatment plot. Biomass production was sampled within one 1.0 by 1.0 m frame placed at random in each treatment plot. All leafy spurge and seeded grasses were clipped to ground level (3 cm) within the frame. The clipped material was oven dried to constant weight and weighed. Analysis of variance was used to determine significant seeding and herbicide treatment effects on the densities and biomass of seeded grass and leafy spurge.

Results

Grass density. Grass establishment as measured by density was improved by fencing to exclude grazing animals. While there was no statistical comparison, grass density was observed to be nearly ten times greater on the study inside the fence than outside the fence (see Figures 1 and 2). Protecting establishing grasses from grazing during the first year will improve establishment because it takes one year for the rooting system to develop and prevent the plants from being uprooted by grazing animals.

Grass establishment differed depending on the species seeded regardless of grazing during establishment. Orchard grass, thickspike wheatgrass, and bluebunch wheatgrass established well at both sites (see Figures 1 and 2). Big bluegrass had better establishment on the unfenced site than the fenced site. This difference may be due to differences in the temperature or precipitation associated with the year of seeding rather than a grazing effect. Great Basin wild rye did not establish consistently on either site. Establishment of Great Basin wild rye may have been greater if it had been seeded in the spring, as opposed to fall.

The densities of grasses that did establish were greater where herbicides suppressed leafy spurge compared to the no herbicide control at both sites. The result was the same for picloram and imazapic. Clearly, herbicidal suppression of leafy spurge is a requirement for consistent establishment of forage grasses in leafy spurge infested pastures.

