

ESTABLISHING NATIVE AND INTRODUCED PERENNIAL GRASSES FOR WEED SUPPRESSION IN THE INTERMOUNTAIN REGION OF NORTHERN CALIFORNIA

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Introduction

Thousands of non-crop acres in California are infested with invasive weeds. The weeds destroy wildlife habitat, alter soil and water resources, invade cropland, decrease grazing productivity, and decrease recreation value. Weeds also commonly spread into suburban areas costing landowners thousands of dollars in management and land value loss. California land managers spend millions of dollars on non-crop weed control each year, but unfortunately, most weed control efforts do not produce long-term weed suppression or increases in land productivity.

Range and wildland ecology experts suggest artificial re-vegetation is critical to restoring vegetation health and land-use productivity on weedy sites. Research has also demonstrated re-vegetation of disturbed land can greatly improve long-term weed suppression. This research project addressed the importance of vegetation restoration in an integrated weed management program and developed successful re-seeding strategies for non-crop areas and pastures within Northeast California. The re-vegetation treatments were designed to maximize establishment success, minimize noxious weeds, and restore productivity of weedy sites to meet the needs of wildlife, recreation, and agriculture.

Specific objectives included:

- Evaluating different native and introduced perennial species on the basis of establishment success, vigor, and ability to prevent weed invasion
- Determining perennial species' tolerance to pre and post-emergent herbicides commonly used for range and wildland establishment
- Assessing different herbicide + seeded species combinations on their ability to suppress weeds during and after grass establishment

Materials and Methods

The experiment was conducted at six sites. Sites in Doyle, CA and Tulalake, CA (IREC) were established in fall 2003. Four additional sites were established in fall 2004 at the Tulalake National Wildlife Refuge, Yreka, CA, Likely, CA, and Susanville, CA. The experiment at all sites was arranged in a split block with three replications. Whole block treatments consisted of five or six different herbicide treatments (chosen based on weed species present on-site) applied to control weeds during establishment. The goal of herbicide treatment was to limit weed competition and prevent weed seed production and vegetative spread of creeping-root perennial weeds. Sub-block treatments consisted of seeding 15 to 17 native and introduced perennial species.

Field sites were disked and packed to control existing weeds and prepare a seedbed. Grass species were seeded around March 1st using a drill. Herbicides were applied with a CO₂ backpack sprayer at 20 GPA when grasses reached the three to five leaf stage the year of establishment and one to two months after grass green-up the year following establishment. Grass species establishment and vigor was evaluated in June and/or August each year. The percentage of drill row occupied by the seeded species, seeded grass cover, and weed species cover was measured in each plot. Data was collected using point-intercept counts and visual estimation of percent cover in 1 m² quadrats.

Results

Several native and introduced plant species successfully established under dryland conditions on weedy sites in Northern California. Cover measurements showed dense, perennial grass stands in combination with herbicides provided superior weed suppression compared to using herbicides alone the year after grass establishment. At locations with heavy weed competition, herbicide treatment the year of seeding and year after seeding was critical for successful establishment. Without herbicide treatment, weed cover was greater than 70 % and seeded grass cover was less than 5 % at weedy sites one year after planting. In herbicide-treated plots with effective weed control, seeded species cover was 10 to 20 fold greater than untreated plots. Telar, 2,4-D ester, Transline + 2,4-D ester, Banvel + 2,4-D ester, and Pursuit caused minimal injury to perennial grasses when applied at the 3 to 5 leaf stage during establishment. Pursuit was safe on seedling alfalfa.

Seeded grass cover differed between sites and was correlated to soil moisture. Sites with the highest soil moisture the year of seeding had the highest average grass cover. Although soil moisture increased grass cover, weed control remained the most important factor affecting species establishment success. At the site with the highest soil moisture (Tulelake Wildlife Refuge), average seeded grass cover was 5 % in untreated plots whereas it was > 50% in herbicide treated plots one year after seeding.

When comparing individual species, their establishment and persistence differed between sites. The differences were related to soil type and soil moisture trends the year of establishment. Averaged across sites, crested wheatgrass, tall wheatgrass, western wheatgrass (native), and bluebunch wheatgrass (native) had the highest cover 1 year after seeding. Squirreltail and orchardgrass had the lowest cover 1 year after seeding. Results collected over the next few years will provide an indication of species' long-term establishment success and potential for long-term weed suppression.