Blurring edges: A test of weed control methods used along edges of sage scrub patches to encourage shrub colonization into abandoned agricultural fields

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Figure 2. Aerial photograph of the northwest corner Johnson Ranch Ecological Preserve. Note obvious border between agricultural fields and native sage scrub. Plot locations are in green.

Figure 1. Aerial photograph of Johnson Ranch Ecological Preserve.

Figure 4. Mowing of treatment plot near RSS/NNG edge

Introduction

• Applying techniques to encourage native plants to colonize disturbed areas may be an effective alternative when time is less limiting than funds.

• Annual weeds have been shown to be highly competitive with many native species, and weed control is essential for natives to re-establish (Eliason and Allen 1997, Cione et al 2002).

• Treatment with grass-specific herbicide, namely Fusilade, as well as hand clipping have been shown to be an effective method of controlling exotic annual grasses and promoting establishment of seeded coastal sage scrub vegetation (Cione et al 2002).

• Little information is available to assess the most cost-effective method of passively (no supplemental planting or seeding) expanding existing sage scrub into adjacent disturbed areas.

Objective: Increase the total acres of sage scrub within a preserve in the most cost-effective way.

Question: What is the best combination of chemical (FusiladeII) and mechanical (mowing) weed treatments to encourage expansion of RSS in to NNG along sharply defined edges?

Methods

Study Site: Johnson Ranch is a 1,400 acre Ecological Preserve in southwestern Riverside County (Figure 1) consisting of remnant patches of Riversidian sage scrub (RSS) in a matrix of abandoned agricultural fields. The agricultural fields have converted to non-native annual grasslands (NNG), dominated by *Avena barbatus*, *Bromus spp*., *Brassica geniculata*, and *Raphanus sativus*.

Experimental design:

• 50 m x 50 m plots positioned on the edge of RSS patches and non-native grassland (Figure 2).

• A 6 m (20') wide strip along the edge of RSS patches was sprayed with a 2% solution of FusiladeII, a grass-specific herbicide, on both the treatments and the control. We did not want to leave any areas completely untreated due to the risk of degradation to the little RSS that is left on the Preserve.

• Through random block design, the plots were assigned one of three treatments (Figure 3):
  • Control: No additional treatment outside of 6 m Fusilade strip
  • Mow only: Mow rest of plot outside of 6 m Fusilade strip
  • Mow + Fusilade: Fusilade to 12 m, mow rest of plot

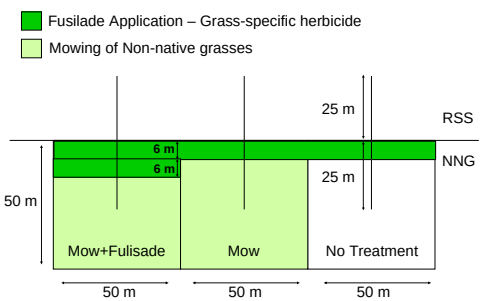

Figure 3. Diagram of an experimental block, which includes three treatment plots. Plots were placed on the borders of existing RSS patches that are surrounded by non-native grasslands. Various combinations of herbicide application and mowing will be used to determine the best method to encourage RSS expansion and reduction in non-native grass cover.

•Three blocks were treated, giving three replications of each treatment.

Treatment application:

• 2 % solution of Fusilade was applied with a boom sprayer pulled by a tractor.

• Mowing was done with a 62" wide mowing attachment on a tractor (Figure 4).

• Both treatments were applied simultaneously in the Spring when about 35% of grasses were flowering.

Data collection

Vegetation transects:

• Point transects are being used to document the effect of treatments on shrub and native plant recruitment.

• Species identity and heights of the herb and shrub layer are recorded every 0.5 m. In addition, a line intercept transect focusing on the shrubs is performed along the same transect to get a more detailed look at shrub recruitment.

• Transects were paired and placed perpendicular to the RSS/NNG interface (Figure 3). There is one 25 m transect in the NNG and one 25 m transect in the RSS, thus, data from the vegetation transects will be used to compare the treated area to the adjacent "target community".

• Transects are centered within each plot to minimize edge effects from nearby treatments (Figure 3).

Soil analysis:

• Three cm diameter and 10 cm deep soil cores were collected from meter 25 of each transect. Soil samples were taken in January, before the treatments were applied. The soil sample was then dried, homogenized, and analyzed for NH4+ and NO3-. Soil samples will be taken annually or biannually to determine the effects of our treatments on nitrogen concentrations in the soil.

Data analysis

• Two-Factor Analysis of Variance (ANOVA) will be used to determine the differences in % shrub cover, % native cover, and % non-native grass cover among the three treatments and vegetation zones (either RSS or NNG), and any interactions among treatments and vegetation zones.

Implementation

• After 3-5 years of treatment and data collection, we will implement the most effective weed management technique on all ecotonal areas within the Johnson Ranch Preserve in an attempt to encourage RSS expansion into disturbed NNG.

• Additionally, hand seeding with native seed will be part of the long-term RSS expansion plan to encourage faster expansion of natives.

Suggestions?

Literature cited
Cione, N.K., Padgett, P.E., and E.B. Allen. 2002. Restoration of a Native Shrubland Impacted by Exotic Grasses, Frequent Fire, and Nitrogen Deposition in Southern California. *Restoration Ecology*. 10: 376-384

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