

Testing Multiple Herbicides for control of *Erodium* species

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Exotic annual filarees (*Erodium* spp.) germinate at high densities and early in the growing season. This is a particular problem in restoration situations, where they germinate a dense carpet that makes it difficult for native species to establish and survive. This study was set up to compare five different herbicides at a variety of rates on two of the most common filaree species. These herbicides included glyphosate (broad-spectrum herbicide), triclopyr and aminopyralid (two herbicides selective for broadleaf weeds), and clethodim and fluazifop (two herbicides selective for grasses). The grass specific herbicides were tested because fluazifop had been documented to control redstem filaree (*Erodium cicutarium*) in the desert where it was applied for grass control. Studies in Australia have also shown *Erodium* species to be sensitive to a grass-specific herbicide not available in the U.S. A grass-specific herbicide that was also selective for *Erodium* species would be useful in the restoration of filaree-invaded plant communities such as coastal sage scrub, where native species are predominantly forbs and shrubs that would be injured by broadcast application of broad-leaf herbicides. However, field reports of the effectiveness of grass-specific herbicides on filaree in non-desert environments of southern California were highly variable. Therefore, while glyphosate and the broadleaf herbicides were tested at high and low label rates, the grass-specific herbicides were tested at both labeled rates and rates higher than allowed by the label to better determine at what rates and in what situations the grass-specific herbicides might be used to control filaree.

Plots were established at two sites in San Diego County, one dominated by broadleaf filaree (*E. botrys*) and the other dominated by redstem filaree. Herbicides were applied in early winter in both 2009 and 2010. Visual damage ratings were performed at 2-, 4- and 8-week intervals after application, and percent cover readings and density counts were taken at some point after the 8-week rating and as close to peak flower for the plant community as possible.

In the broadleaf filaree trials, triclopyr at both 1 and 2 quarts/acre and glyphosate at both 1 and 2 quarts/acre had the highest damage ratings in 2009, and the differences were significant from the control even 8 weeks after application. In 2010, triclopyr and glyphosate were also the highest at the 4-week damage rating, and by the 8-week reading the ratings for triclopyr and glyphosate while still in the most effective group were slightly less and statistically similar to aminopyralid at 7 oz/acre. In 2009, fluazifop at 12 and 18 oz/acre rates (within the range allowed by the label) showed mid-range damage ratings that were statistically different than the control. However, by 8-weeks, fluazifop at 72 oz/acre (three times the concentration allowed by the label) was the only grass-specific treatment showing damage greater than the control, and it was significantly lower than the damage ratings of triclopyr and glyphosate. The mean percent cover of broadleaf filaree was less than 3% in all the glyphosate and triclopyr plots more than 8 weeks after application in 2009. The mean percent cover of broadleaf filaree was not significantly different in any of the fluazifop or clethodim plots than in the control plots in either 2009 or 2010.

The redstem filaree trials showed similar patterns. Redstem filaree showed more visual damage to damage than broadleaf filaree in the fluazifop treatments. However, the the 12 and 18 oz rates of fluazifop did not provide complete or season long control of redstem filaree. In 2009, 8-week damage ratings at above-label 36 oz and 72 oz rates of fluazifop were statistically similar to the triclopyr and glyphosate as the most effective treatments against redstem filaree. However, in 2010 only the triclopyr treatment had a significantly higher damage rating than the control plots after 8 weeks.

Triclopyr at 2 qts/acre was the most effective herbicide treatment in controlling both species of filaree. Glyphosate at 2 qts/acre and triclopyr at 1 qts/acre was statistically similar results to the triclopyr 2 qts/acre for both species and years. Label rates for fluazifop showed some damage on both species (more on redstem filaree) but did not control either species. Fluazifop at 72 oz per acre controlled redstem filaree, indicating that multiple applications within a growing season might provide control of redstem filaree. Aminopyralid showed activity, but did not control as effectively as the previously discussed herbicides.