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Response of One-year-old Planted Native Grasses to Controlled Burns (California)

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Exotic forbs and annual grasses have overrun grasslands in the western United States so extensively that, often, only remnant populations of native perennial grassland species can be found. Prescribed burning can be a useful restoration technique to control exotic invasive species (Moyes and others 2005), especially prior to planting native perennial grasses (Corbin and others 2004). However, there is little information on the survival and recovery of recently planted perennial grasses after controlled burns (Dyer 2003, Corbin and others 2004, DiTomaso and others 2006). Here, we discuss the effects of prescribed burning on seedlings of two perennial grass species native to the Central Valley of California: purple needlegrass (*Nassella pulchra*) and blue wildrye (*Elymus glaucus*).

We conducted our experiment in a research field near the University of California-Davis campus that has a restored population of valley oak (*Quercus lobata*). Exotic annual grasses and the exotic annual forb, yellow star thistle (*Centaurea solstitialis*), dominate the herbaceous plant community at the site. In March 2003, we planted two blue wildrye and two purple needlegrass plugs, spaced 6.5 ft (2 m) apart, in the middle of each of fifty-four 6-m x 6-m plots. The grasses were nursery-grown, local ecotypes that were seeded in November 2002. In June 2003, we measured all surviving planted grasses in all plots, prior to applying fire treatments. We then burned 18 of the 54 plots in July 2003 (timed to simulate a star thistle control burn), and burned another 18 plots in May 2004 (timed to simulate an annual grass control burn). In May 2006, we assessed grass survival, and we measured plant growth by counting number of reproductive

tillers and by measuring the basal area of each plant. Survival was compared among treatments using chi-square tests and growth was compared using ANOVA.

While burning four months after planting purple needlegrass and blue wildrye significantly reduced survival of both species relative to unburned plants ($p = 0.04$ and $p = 0.0002$, respectively), survivorships were 36 percent and 64 percent, respectively, compared to grasses in the control plots (Table 1). Burning 14 months after planting had no significant effect on survival of purple needlegrass and blue wildrye (survivorships were 73 percent and 98 percent, respectively, relative to controls). Purple needlegrass was significantly more sensitive to fire than was blue wildrye when burned after four months ($p = 0.048$). This appeared to be the case at 14 months as well, although the difference was only weakly significant ($p = 0.08$). Trends in the data suggest that burning at four months caused purple needlegrass plants to produce more reproductive tillers and greater basal area in 2006 than did burning at 14 months or not burning at all (Table 1). This was not true for blue wildrye, which showed reductions, though not significant, in size and reproduction in burned plots (Table 1).

Although purple needlegrass was more sensitive to the four-month burn than was blue wildrye, it appears that the burn reduced competition from neighboring invasive annuals so that those native grasses that did survive were more vigorous almost three years later. Readers should keep in mind that the 4- and 14-month burns differed both in the years since planting and in their seasonal timing, so we cannot be sure which of these factors was responsible for the differences between the burns. However, we can say that a substantial number of native grasses were able to withstand burns fairly soon after plug planting, and that some survivors even benefited from burning. More vigorous weed control measures (repeated burning or other means) may have resulted in greater competitive release for the planted native grasses. However, we do not yet

have information on the effects of multiple burns on planted native grasses. We are planning additional burns.

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