Full Titles of Proceeding Abstracted in This Issue

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Governor's Restoration Forum: Economic and Public Benefits of Restoring Western Landscapes. Held June 8-9, 2006 in Billings, MT in conjunction with the 10th Billings Land Reclamation Symposium. Presentations and summaries available online: www.restorationforum.mt.gov.

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Grasslands

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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), both species survived reasonably well, 36 percent and 64 percent, respectively (Table 1). Burning 14 months after planting had no significant effect on survival of purple needlegrass (73 percent) and blue wildrye (98 percent) 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.

Table 1. Survivorship and growth (measured in June 2006) of purple needlegrass (*Nassella pulchra*) and blue wildrye (*Elymus glaucus*) planted as plugs in March 2003, and subjected to either a July 2003 burn or a May 2004 burn, or left unburned. The blue wildrye basal area and tiller data omit two statistical outliers, which did not affect conclusions. Size and reproductive statistics were based on means of individual burn blocks (n = 18 per treatment).

Planted native grass species	Treatment	Survivorship	Survivorship relative to control	Basal area (cm^2) (mean ±S.E.)	Reproductive tillers (mean ±S.E.)
Purple needlegrass	2003 burn	22.8%	36%	16.4 ±3.8	35.5 ±7.3
	2004 burn	48.5%	73%	7.8 ±2.7	14.2 ±5.1
	Control	66.7%		7.7 ±2.2	18.6 ±4.3
Blue wildrye	2003 burn	45.5%	64%	3.2 ±1.3	9.1 ±2.3
	2004 burn	69.7%	98%	3.8 ±1.0	8.1 ±1.7
	Control	71.4%		5.9 ±0.9	13.6 ±1.6

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Effects of Summer Burning and Post-fire Grazing in the Northern Great Plains. 2005. Rose, J., L. Vermeire and D.B. Webster. **Texas Tech University Research Highlights—2005 Range, Wildlife, and Fisheries Management** 36:27.

A three-year study indicated that precipitation determines the effect of fire and sheep grazing on native plant communities in the Great Plains. The authors found that burning in August followed the next year by a wet spring had no significant effect on aboveground biomass, but productivity was lower when spring precipitation was below average. In contrast, sheep grazing reduced aboveground biomass when post-fire conditions were wet, but had no significant effect after a dry spring. Western wheatgrass (*Pascopyrum smithii*) and threadleaf sedge (*Carex filifolia*) were not influenced by either grazing or burning while needle-and-thread (*Hesperostipa comata*) density decreased after a dry post-fire spring, but was not affected by grazing. The authors recommend that grassland managers consider precipitation conditions when determining stocking rates of livestock.

Woodlands

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Restoring Butternut to Southeastern Forests: Determining a Genetic Basis of Disease Resistance (Tennessee)

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Populations of butternut (*Juglans cinerea*) are being devastated across eastern North America because of an introduced funal pathogen, *Sirococcus clavigignenti-juglandacearum,* that causes butternut canker disease. The disease causes multiple branch and stem cankers that eventually girdle trees. It affects all age classes, belowground portions of the tree, and seeds (Nicholls 1979, Ostry and others 1994). Unlike the American chestnut (*Castanea dentata*), which has been devastated by chestnut blight but can still survive as sprouts, entire populations of butternut are lost due to the disease. In addition, butternut is being eliminated from some ecosystems as a result of natural forest succession, limited harvesting in riparian areas, and other land use changes. Mortality has exceeded 80 percent in some areas, leading to low genetic diversity in surviving populations.

Almost three decades ago, Robert Anderson and Leon LaMadeleine (1978) stressed the need for a response to butternut canker disease. Fortunately, healthy, canker-free butternut trees have been found close to diseased trees, indicating genetic resistance to the disease may exist (Ostry and others 1994). If resistance is genetically based, a breeding approach could be a feasible strategy to produce butternut trees that are resistant to butternut canker disease (Ostry and others 1994, Schlarbaum and others 1997). However, the relationship between punitively