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# Establishing Native Grasses in a Big Sagebrush-Dominated Site: An Intermediate Restoration Step

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## Abstract

Many semiarid rangelands in the Great Basin, U.S.A., are shifting dominance to woody species as a consequence of land degradation including intense livestock grazing and fire suppression. Whereas past rehabilitation efforts in Big sagebrush (*Artemisia tridentata*) steppes removed the shrub and added introduced forage grasses to successfully shift communities from shrublands to grasslands, current consensus is that native species should be included in restoration projects and that retention of some woody plants is desirable. We examined the potential for interseeding grasses into dense shrub communities as a precursor to thinning shrubs and releasing grasses from shrub interference. We compared seedling establishment of the native grass, Bluebunch wheatgrass (*Pseudoroegneria spicata*), with that of the Eurasia grass, Crested wheatgrass (*Agropyron desertorum*), in dense *Ar. tridentata* stands. Shrubs may play an important role as nurse plants for seedling establishment (reduced solar radiation, "island of fertility" effect) but result in highly contrasting light environments and root interference for seedlings. In experimental plots, we examined effects of *Ar. tridentata* shade levels (0, 40, 70, and 90% reduction of solar radiation) and initial root exclusion (present/absent) on the establishment and growth of *P. spicata* and *Ag. desertorum* seedlings. With this design we evaluated the interference effects of

*Ar. tridentata* on the two grasses and identified the most beneficial microsites for grass restoration in *Ar. tridentata*-dominated communities. We predicted seedling survival and growth to be greater under moderate shade (40% reduction) and limited root competition than under no or strong shade conditions (0 and 90%) and unrestricted root interactions. Fifty to 85% of the *P. spicata* and *Ag. desertorum* seedlings survived the dry summer months of 1995 and 1996 and the intervening winter. Neither shading nor root exclusion from *Ar. tridentata* affected final seedling survival of either species. Seedling biomass of both grass species was negatively affected by initial root interactions with *Ar. tridentata*. However, the analysis of seedling biomass variability (coefficient of variation) indicated that in all shade and root-exclusion treatments, some seedlings of both species developed to large individuals to survive in *Ar. tridentata*-dominated rangelands. Thus, the use of interseeding techniques shows promise for restoring herbaceous species in dense *Ar. tridentata* stands and should be given further consideration when shrub retention is an important consideration.

**Key words:** *Agropyron desertorum*, *Artemisia tridentata*, degraded rangelands, native and introduced grass species, *Pseudoroegneria spicata*, restoration, shoot and root interference, survival.