

RESTORING LONGLEAF PINE-WIREGRASS ECOSYSTEMS: LOW-RATE HEXAZINONE APPLICATION ENHANCES EFFECTS OF PRESCRIBED FIRE

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ABSTRACT

A longleaf pine-wiregrass ecosystem in the sandhills of north central Florida, upon which turkey oak gained dominance following a wildfire, was treated with low-rate (1.1 or 2.2 kilograms per hectare) applications of the herbicide hexazinone in May 1991. All applications successfully reduced oak in the overstory and understory, mortality ranging from 83–93%. The declining competition from oaks was associated with progressive increases in foliar cover of wiregrass and all graminoids and forbs over time. Plant species diversity declined in the initial year, but recovered by the second growing season. Species richness increased overall, while evenness declined with the continuing expansion of wiregrass. The entire site was then burned in June 1995 by prescribed fire, which caused a decline in the cover of oaks, shrubs, wiregrass, and all graminoids and forbs, and in plant species richness and diversity, on all plots during the initial postfire growing season. By the second postburn growing season, the cover of forbs became greater and that of oaks remained significantly lower on hexazinone-treated plots than on controls. The cover of forbs, graminoids, shrubs and longleaf pines continued to increase with time. Both rates of liquid hexazinone applied on a 2 × 2-meter spot-grid resulted in the highest values for species richness (25) and diversity (1.80). The broadcast application method exposed a greater number of understory plants to direct contact with hexazinone, resulting in initial decreases in forb cover, species richness, and diversity. Although recovery occurred in subsequent years, the lower selectivity of broadcast application makes it a less suitable restoration technique. Spot application of liquid hexazinone was more selective in its effect upon the plant community.

Application rates of 1.1 and 2.2 kilograms per hectare, though producing an initial-year reduction in diversity and evenness, resulted in increases in the cover of all graminoids and forbs and the greatest species richness and diversity. The 2.2 kilogram per hectare application rate is most effective in controlling woody plant competition and enhancing vascular plant diversity and is therefore recommended for restoring xeric sandhills and similar longleaf pine-wiregrass ecosystems. Low-rate hexazinone application followed by prescribed fire accelerates the rate of ecosystem restoration over that achievable by using prescribed fire alone. The ecological benefits of controlling competition and rebalancing composition achieved rapidly through this combination of treatments would likely require numerous cycles of prescribed fire, if used as a single treatment, over several decades.

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