EFFECTS OF FIRE AND THINNING ON OAK AND OTHER HARDWOOD SPECIES REGENERATION IN MIXED OAK FORESTS OF SOUTHEASTERN OHIO

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We conducted a study of hardwood regeneration in the mixed oak forests of unglaciated southeastern Ohio following various silvicultural practices. Our study was conducted at three separate forests within the region.

Each forest contained a control stand and three treatment stands. The treatments included prescribed fire, thinning, and thinning followed by prescribed fire. Thinnings were conducted in the winter of 2000-2001 and prescribed fires were implemented in the spring of 2001. Within each treatment unit (12 total) we placed ten 20- x 50-m vegetation plots (120 total), stratified by an integrated moisture index. Within each 20- x 50-m plot, we designated three 10- x 10-m sub-plots as regeneration plots (360 total), and recorded height on all woody stems < 10 cm diameter at breast height (d.b.h.). Woody regeneration was sampled prior to treatment (summer 2000) and immediately following treatments (summer 2001).

Seedlings responded as a function of size class. Small seedling (< 10 cm tall) density increased dramatically following treatments that utilized prescribed fire. Seedling densities in the medium size class (10 to 50 cm tall) were unresponsive to treatments. Stem densities in the large seedling size class (50 to 140 cm tall) increased ($P < 0.05$) in the thinning treatments. Likewise, saplings responded differentially by size class. The smallest saplings (140 cm ht to 2.5 cm d.b.h.) decreased as a result of prescribed fires while the largest saplings (6.0 to 10.0 cm d.b.h.) were not reduced.

Prescribed fire was effective at reducing mesophytic competitors (e.g., *Acer* spp.) with oak (*Quercus* spp.). However, oak seedlings and saplings did not respond to the treatments within the first post-fire growing season. Prescribed fire, but not thinning, resulted in a decline in both the seedling stratum and sapling stratum in species richness and Shannon-Weiner diversity. Community composition differences were greatest in those treatments receiving prescribed fire.

In summary, we found treatments to cause heterogeneous community responses as a function of species, size class, and moisture availability. In the absence of additional treatments and time, the effect on oak regeneration is unclear.