

HARDWOOD REGENERATION FOLLOWING PRESCRIBED FIRE AND THINNING IN MIXED-OAK FORESTS OF SOUTHEASTERN OHIO

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Stand thinning and prescribed fire are widely used forest management tools throughout the hardwood forests of the Central Appalachians. Recent changes in historical disturbance regimes are hypothesized to have altered the structure and composition of many oak-dominated forests. In particular, there are few oaks in the regeneration layer (especially 1 to 4 inches d.b.h.) throughout the understory of most oak-dominated forests. Restoration efforts likely will require significant changes in disturbance regimes to alter the current successional trajectory. We examined the patterns of hardwood regeneration in a replicated field experiment over 5 years. Three forests were selected for study in southern Ohio. Within each forest, four adjacent 20 to 30-ha stands were selected, with one each allocated randomly to the following treatments: control, prescribed burn, thin, and thin followed by prescribed burn. Seedlings and saplings were sampled in replicated study plots in the year prior to treatment (2000), the year following treatment (2001), and 3 years later (2004). Structural data (density) were analyzed by analysis of covariance; compositional data (relative abundance) were analyzed by ordination procedures. Treatments had various effects dictated by species life history, reproductive episodes, and stochastic events. A single prescribed fire reduced seedling and sapling densities of red maple, the understory dominant in these forests. However, red maple rapidly recovered to pretreatment levels in all units four growing seasons after the disturbances. Mechanical thinning treatments accelerated understory recruitment of early successional, shade-intolerant tree species that regenerated from seed, e.g., tuliptree, and resprouted from a seedling bank, e.g., sassafras. Tuliptree also was strongly influenced by burning, resulting in greatly enhanced reproduction and advancement into the sapling size class via fast growth rates. White oak showed no response, black oak increased slightly, and chestnut oak varied moderately with respect to treatment. Overall, the treatments were effective at advancing a greater proportion of tuliptree into the succeeding forest. However, the effects of treatment on oak regeneration are unclear, so additional longitudinal data will be needed. Subsequent periodic fires may help to slow mesic competitors over the long run.

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