OVERSTORY AND SEEDLING RESPONSE TO REPEATED FIRES IN EASTERN KENTUCKY

Heather D. Alexander[1†], Mary Arthur[2], David Loftis[3], and Stephanie Green[4]

Oak (*Quercus* spp.) regeneration failure throughout eastern deciduous forests has prompted forest managers to use prescribed fire as a potential tool to maintain oak communities. Within the Daniel Boone National Forest of eastern Kentucky, we tested the ability of repeated prescribed fires to increase oak seedling growth and survival by increasing light at the forest floor, decreasing competitor seedling survival, and enhancing oak seedling leaf characteristics. We measured stand structure, canopy cover, seedling survival, and seedling leaf characteristics in areas unburned, burned once, and burned twice. Pre-burn density measurements showed oaks dominated overstory classes but maples (*Acer* spp.) and other species dominated the midstory and understory. In areas burned twice, canopy cover temporarily decreased after the first fire but quickly returned to pre-burn levels after the second fire due to increased sprout density. Burning did not affect red oak (Erythrobalanus) survival, but white oak (Leucobalanus) survival decreased. Among competitor seedlings, burning had no effect on sassafras (*Sassafras albidum* (Nutt.) Nees)) survival, but maples (red and sugar maple combined) had the greatest mortality of all species. Within burned areas, competitor seedlings produced more leaves with greater leaf area than red or white oaks. Burning led to higher specific leaf mass (leaf thickness per unit area) for both oak groups compared to competitor seedlings; this increase was correlated with increased light levels. Repeated fires temporarily opened up the canopy but post-fire sprouting rapidly cancelled this positive effect. Burning also reduced the survival of red maple seedlings, but competitor seedlings that survived the fire grew more leaves and had higher leaf area than oaks. Burned oaks had thicker leaves but whether this leads to increased growth is unknown. These findings suggest multiple, repeated fires with short burn intervals may be needed to maintain canopy cover and sufficient understory competition to successfully regenerate oaks.

---

[1]Ph.D. Candidate, University of Kentucky, Forestry Department;
[2]Associate Professor, University of Kentucky, Forestry Department;
[3]Project Leader, USDA Forest Service, Bent Creek Experimental Forest;
[4]Senior Land Management Specialist, Southwest Florida Water Management District; [†]Corresponding author, T.P. Cooper Bldg., Lexington, KY 40546, 859-257-2806, email: heather.alexander@uky.edu