

UPLAND OAK REGENERATION RESPONSE TO PRESCRIBED FIRE AND CANOPY GAP DISTURBANCES

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Abstract—In the Central Hardwood and southern Appalachian regions, fire suppression contributes to oak (*Quercus*) regeneration failure and compositional shifts toward more shade-tolerant fire-sensitive species. Prescribed fire may maintain upland oak ecosystems by removing competing species and increasing understory light; however, the most appropriate fire regimes to meet these objectives have yet to be identified. In Kentucky, single and multiple (2x, 3x) prescribed fires were implemented over 3- and 5-year periods. Each growing season, canopy cover, annual growth, height, and basal diameter were quantified for oak (*Q. alba*, *Q. coccinea*, *Q. montana*, *Q. rubra*, *Q. velutina*), hickory (*Carya glabra*, *C. tomentosa*), and competing red maple (*Acer rubrum*) and American beech (*Fagus grandifolia*) seedlings in three burned and two unburned plots at six treatment sites. Tree regeneration within canopy gaps of varying age and size within both burned and unburned areas was also quantified to identify gap influences on regeneration dynamics of oaks and competing species. Thus far, results suggest single fires are ineffective at promoting oak growth, while multiple fires have modest positive impacts on oak growth relative to competing species. This difference may be because single fires had no impact on canopy cover, whereas multiple fires caused approximately 5 percent reduction in canopy cover. Canopy gap data suggest gaps influence species composition and stand dynamics, with larger gaps having greater oak dominance than smaller gaps. This study could demonstrate how prescribed fire can help maintain upland oak ecosystems and determine future dynamics of upland forests with continued fire suppression.

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