

THE EFFECTS OF PERIODIC PRESCRIBED FIRE ON THE GROWTH AND SURVIVAL OF RED MAPLE AND OAK SEEDLINGS ON XERIC RIDGE TOPS IN EASTERN KENTUCKY

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Declines in oak (*Quercus* spp.) advanced regeneration have been accompanied by increases in more shade tolerant species such as red maple (*Acer rubrum*), which successfully outcompete oak seedlings and saplings in lower light levels. It has been proposed that a lack of fire has contributed to these changes. A long term seedling population study was established on the Stanton District of the Daniel Boone National Forest in 1998 to quantify effects of repeated prescribed fires on survival and growth of oak (including *Q. alba*, *Q. coccinea*, *Q. prinus*, and *Q. velutina*) and red maple seedlings. Burn treatments were conducted in the early spring in different years on two non-contiguous ridges. Treatments included fire excluded, twice burned, and 3 times burned. On Klaber Ridge, prescribed fires were conducted in 1995, 1999, and 2000 for the treatment with three burns, and in 1996 and 2000 for the treatment with two burns. On Whittleton Ridge, fires were prescribed in 1995, 1999, and 2002 for the 3x burned, and in 1997 and 2002 for the 2x burned. Both ridges had 'fire excluded' treatments as well. Seedling height, annual growth, and survival have been measured since 1999. Basal diameter has been measured since 2001. Light measurements using hemispherical photography were taken over seedling clusters in 2001, 2002, and 2003.

Height growth was greatest in the first season after fire, as surviving seedlings resprouted. In 2002, red maple seedlings were tallest on 3x burned treatments (30.1 cm) and shortest on fire-excluded treatments (18.2 cm), whereas oak seedlings were tallest on the fire-excluded sites (18.1 cm) and shortest on 2x burned treatments (12.0 cm). Basal diameters were similar for red maple and oak species on all treatments (red maple: 3.5 mm; oak spp: 3.2 mm). Oak seedling survival was higher on burned sites (80 percent) compared to maples (73 percent), whereas seedling survival was similar for oaks and maple on fire-excluded treatments (87-90 percent).

Our data suggest little beneficial effect of prescribed burning on oak seedling growth, despite a slightly higher survival rate of oak versus maple seedlings with burning. Burned sites were characterized by prolific sprouting by fire-damaged or killed trees, resulting in considerable occlusion of light. Due to moderate intensity and severity, prescribed fires have not effectively killed rootstocks, which continue to sprout after successive fires. We plan to continue this study to determine long term survival and growth of oak and red maple seedlings in response to fire.

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