

# SURVIVAL OF HARDWOOD SEEDLINGS AND SAPLINGS ONE YEAR FOLLOWING A PRESCRIBED FIRE AND OVERSTORY THINNING IN SOUTHEASTERN OHIO

Joanne Rebbeck, Robert P. Long, and Daniel A. Yaussy<sup>†</sup>

Prescribed fires in combination with thinning are being investigated as silvicultural tools to improve oak regeneration in mixed-oak forests of southeastern Ohio. Stands were thinned from below (29% reduction in basal area) 4 months prior to spring 2001 burns at the Raccoon Ecological Management Area, at the Tar Hollow and Zaleski State Forests. Each site was divided into four treatments of 20 ha each: control (C), burn only (B), thin only (T), or thin plus burn (TB). Within each treatment area, ten 50- by 20-m plots were established across a range of moisture conditions (three xeric, four intermediate, and three mesic) determined with an integrated moisture index (IMI) (Iverson and others 1997). Within each plot, the health and mortal status of 10 seedlings (three size classes: small, <10 cm tall; medium, 10-50 cm tall; and large, 50.1-139 cm tall) and 10 saplings (three size classes: small, >140 cm tall and <3 cm DBH; medium, 3-6 cm DBH; and large, 6.1-9.9 cm DBH) were evaluated every June and August since 2000. The 1080 seedlings monitored were either oak, red (*Quercus rubra* and *Q. velutina*) and white (*Quercus alba* and *Q. prinus*), or hickory (*Carya* spp.); while the 1080 saplings were either maple (*Acer rubrum* L. and *A. saccharum* Marsh.), blackgum (*Nyssa sylvatica* Marsh.) or hickory.

At 14 months postburn, sapling mortality was greatest in TB units, while small oak seedling mortality was greatest in B units. In B units, small white oak seedling mortality was slightly higher (67%) than red oaks (50%). However, mortality of medium-sized red oak seedlings (28%) and white oaks (37%) did not vary between B and TB plots. Among saplings, small and medium maples (red and sugar) had the greatest amount of mortality, 27 and 22% in TB plots, respectively. In contrast, mortality of large maple saplings (3.1%) was similar to equivalent-sized blackgum and hickory (4%). Small hickories were the most prolific sapling resprouters (86%) and large blackgum the least (9%). Maple sapling resprouting ranged from 26-50%. The percentage of medium and large saplings with declining crown vigor (50% or more dieback) ranged from 24-79% in the B and TB units. Large blackgum and maple (31%) saplings appeared to have fewer individuals with declining crown vigor compared with medium (72%) and large (67%) hickories.

These results demonstrate that thin-barked red and sugar maples are more susceptible to fire than thicker-barked blackgum and hickory only when stems are small (<6 cm DBH). This suggests that a single low-intensity dormant season prescribed fire is not sufficient to remove larger non-desirable species such as maple and that more aggressive measures such as repeated higher intensity fires combined with herbicide treatments maybe needed.

## Acknowledgments

We thank David Hosack, Zachary Traylor, Mary Ann Tate, Kristy Tucker, Brad Tucker, Ben Crane, Robert Ford, Justin Wells, Jeff Matthews, and Lisa Pesich for assistance in data collection and processing. This is a contribution of the National Fires and Fires Surrogate Project (FFS), funded by the U.S. Joint Fire Science Program.

## Literature Cited

Iverson, L.R.; Dale, M.E.; Scott, C.T.; and Prasad, A. 1997. A GIS-derived integrated moisture index to predict forest composition and productivity of Ohio forests (U.S.A.). *Landscape Ecology* 12: 331-348.

---

<sup>†</sup>Plant Physiologist (JR), Research Plant Pathologist (RPL), Research Forester (DAY), respectively, Northeastern Research Station, U.S. Department of Agriculture, Forest Service, Delaware, OH. Phone: (740)368-0054; fax: (740)368-0152; email at jrebbeck@fs.fed.us