IS THERE A MORPHOLOGICAL OR PHYSIOLOGICAL EXPLANATION FOR THE DRAMATIC INCREASE IN HYBRIDIZATION BETWEEN LOBLOLLY AND SHORTLEAF PINE?

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Hybrids between shortleaf pine (*Pinus echinata* Mill.) and loblolly pine (*P. taeda* L.) have dramatically increased since the 1950s (Stewart and others 2012). Fire suppression, planting nonnative seed sources, and other anthropogenic activities have the potential to break down ecological barriers that previously kept these species from interbreeding (Tauer and others 2012). We compared artificial F1 shortleaf x loblolly pine hybrids to their parents in a 3-year study in Oklahoma. Loblolly and hybrid seedlings had superior establishment and growth rates compared to shortleaf pine. When topkilled before and during the third growing season using a combination of topclipping and girdling with fire, resprouting was greatest in shortleaf (94 percent) and lower in hybrids (77 percent) and loblolly pine (35 percent). Number of sprouts for surviving seedlings followed the same pattern, 32, 23, and 12 percent, respectively, for shortleaf, hybrids, and loblolly pine. Formation of a basal crook, a presumed adaptation to protect dormant buds from fire, was greatest in shortleaf (82 percent) and lower in hybrids (35 percent) and loblolly pine (6 percent). In large part due to the crook, height to the lowest sprout was shortest in shortleaf (4 mm), intermediate in hybrids (8 mm), and greatest in loblolly pine (21 mm). Water-use efficiency of hybrid pine was similar to shortleaf pine and higher than loblolly pine. In the absence of fire, the hybrid seedlings perform at least as well as the parent species. In contrast, shortleaf pine has superior traits related to potential survival following topkill by fire. Fire appears necessary to eliminate hybrids and maintain the genetic integrity of shortleaf pine.

LITERATURE CITED

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