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Department:Horticulture
Degree:PhD
Title:Evaluating flood tolerance measures for Missouri oak species

From 1993 to 2005, bottomland hardwood restoration work has been conducted on an estimated 160,000 to 182,000 ha of former agricultural cropland in the Lower Mississippi Alluvial Valley (LMAV) using a combination of direct seeding and seedling planting practices. In addition, similar afforestation efforts have been targeted along the Missouri and Mississippi Rivers in Missouri, following the devastating floods of 1993 and 1995. In spite of this significant focus on hardwood restoration, widespread planting success has remained elusive. This lack of understanding of how to predict success on such planting sites is indicative of their complexity. The aim of this research was to determine the effects of four flooding treatments on survival of seedlings from 45 seedlots of seven oak species at two sampling dates using logistic analysis, and to quantify growth responses to flooding of seedlings from 27 seedlots of swamp white oak (Quercus bicolor). Flooding treatments were initiated at the completion of the first growth flush. Significant species and flood treatment differences were detected at the end of the growing season (15 week post-flood) and again in the following year (45 weeks post-flood). Logistic analysis demonstrated that Q. bicolor was the most flood tolerant species, followed by Q. palustris and Q. macrocarpa. Seedlings of Q. shumardii, Q. rubra, Q. alba and Q. muehelenbergii were less flood tolerant based on survival odds ratios at 45 weeks post-flood.
Genetic differences in growth responses to flooding were detected among 27 seedling families of swamp white oak. No significant gains in flood tolerance were achieved using acorns derived from specific seed sources (or stands) along a hydrologic gradient. Flood tolerant swamp white oak families were identified in the recovery year following flooding by a flood tolerance index, which integrated four growth response variables. Of these four variables, the total number of elongating shoots and total leaf number after an over wintering flush were most highly correlated with flood tolerance.