

EVALUATION OF ROOT FORCE™ CONTAINER SEEDLINGS OF FOUR OAK SPECIES FOR BOTTOMLAND FOREST RESTORATION IN SOUTHERN INDIANA: 5-YEAR RESULTS

Dale R. Weigel

U.S. Forest Service, Hoosier National Forest
811 Constitution Avenue, Bedford, IN 47421

Daniel C. Dey and John M. Kabrick

U.S. Forest Service, Northern Research Station
202 Anheuser-Busch Natural Resources Building
Columbia, MO 65211

Bottomland forest restoration has become an area of interest in the last 10 to 15 years due to large scale bottomland flooding. Seed sources for heavy seeded species, such as the various native bottomland oaks (*Quercus* spp.), are nonexistent, thus planting seedlings is needed to increase the proportion of heavy seeded trees to diversify bottomland forests. Nursery-grown bareroot seedlings are not usually competitive and do not survive well in areas with heavy vegetation and grass, especially where herbicides cannot be used for competition control. Larger container-grown seedlings may be more competitive than bareroot seedlings in afforesting productive bottomlands.

We tested the field performance of 1-year-old, large-rooted Root Force™ seedlings grown in 3.8 liter (1 g) and 11.4 liter (3 g) containers and compared them with 1-0 bareroot seedlings at a bottomland restoration project along Otter Creek on the Hoosier National Forest in southern Indiana. Four bottomland oak species were used: bur (*Q. macrocarpa* Michx.), pin (*Q. palustris* Muenchh.), Shumard (*Q. shumardii* Buckl.), and swamp white (*Q. bicolor* Willd.). Seedlings were planted in a fescue-dominated bottomland pasture. Half of the seedlings had a weed control treatment that consisted of placing a 1.2 m by 1.2 m (3.9 ft by 3.9 ft) weed barrier mat around each seedling. The remaining seedlings grew in direct competition with fescue grass and other vegetation.

Survival for all species and stock types was similar after the first year, 99 to 100 percent, respectively. By the fifth year, survival ranged from 46 to 88 percent for all species and stock types, respectively. Although the 3.8 liter container-grown seedlings [shoot height, 30.9 cm (12 in), and diameter, 5.6 mm (0.22 in)] were the smallest at planting, their survival after 5 years was highest. Survival for the 11.4 liter container-grown seedlings was lowest even though their initial shoot diameter was larger than the 3.8 liter container-grown seedlings. Shumard oak had the lowest survival rate. Weed control had no influence on survival.

All stock types showed positive height growth the fifth year. After 5 years, the container-grown seedlings remained the shortest in total height [77.6 and 77.4 cm (30.6 in and 30.5 in)] for the small and large containers, respectively) while the bareroot seedlings were tallest (84.9 cm or 33.4 in). For all four species, bareroot seedlings had the lowest net height growth after 5 years. In the 5 years, the 3.8 l (1 g) container-grown seedlings grew 47.8 cm (18.8 in); the 11.4 liter container-grown seedlings grew 29.8 cm (11.7 in), and the bareroot seedlings grew 24.7 cm (9.7 in) in height. The height growth for all seedlings was influenced by deer browsing; thus there appeared to be no preference for any stock type. Five-year field performance provides no clear superior stock type.