FIRST-YEAR GROWTH FOR TWO OAK SPECIES AND THREE PLANTING STOCKS PLANTED ON AREAS DISTURBED BY HURRICANE KATRINA

Andrew Dowdy, Andrew W. Ezell, Emily B. Schultz, John D. Hodges, and Andrew B. Self[1]

ABSTRACT

Introduction

Bottomland hardwood forests were damaged by Hurricane Katrina in 2005 when it made landfall along the Gulf Coast. Regenerating these areas, which can be difficult without planning and artificial regeneration, has often been problematic when using 1-0 bare-root seedlings because of inconsistencies with the seedling quality. Some growers have begun producing containerized and large-container potted seedlings to provide a more consistent seedling. This study evaluated the first-year height and ground line diameter (GLD) growth of three different planting stocks (1-0 bare-root, conventional containerized, and EKOgrown® [EKOsystems Partners, Ithaca, NY] seedlings) of water oak (*Quercus nigra*) and swamp chestnut oak (*Q. michauxii)*.

Methods

Research was conducted on two privately owned tracts located in southeast Mississippi, near Hattiesburg and Lucedale. Soil series represented in this study were Freest-Susquehanna-Prentiss and Lenoir silt loam. Rainfall recorded for the sites from April through September 2005 was 826 mm for Hattiesburg and 1133 mm for Lucedale.

The Malone tract (31°23′47.93″ N, -89°28′33.24″ W) near Hattiesburg was a mixed stand of loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), and water oak prior to Katrina. After the hurricane, a salvage operation was performed and the tract has been kept open by periodic mowing with a tractor. The few remaining stems on the area were injected with a 20 percent aqueous solution of Arsenal® (Imazapyr; BASF Specialty Chemicals, Research Triangle Park, NC) to prepare for planting. A hardpan about 25 cm below ground was reported by the planting crews.

The second tract, the Welford tract (30°49′27.27″ N, -88°27′13.86″ W) near Lucedale, was also a mixed stand of loblolly pine and hardwoods prior to Katrina. A small drainage in the center of the tract contained several stems of pond cypress (*Taxodium ascendens*). According to the landowner, this tract floods during moist winters and springs because of its close proximity to the Escatawapa River. After Katrina, a salvage operation was performed and the remaining debris was piled. The tract has been mowed and plowed every year for a wildlife food plot. Remaining stems were injected with a 20 percent aqueous solution of Arsenal to prepare for planting.

The Malone tract has a study area established to accommodate 1,800 seedlings planted on a 3.05 m by 3.05 m spacing. The Welford tract has a study area to accommodate 1,800 seedlings planted on

[1]Graduate Research Assistant (AD), Professor and Forestry Department Head (AWE), Professor (EBS), and Professor Emeritus (JDH), Mississippi State University, College of Forest Resources, 775 Stone Boulevard, Mississippi State, MS 39762; and Assistant Extension Professor (ABS), Mississippi State University, Grenada, MS. AD is corresponding author: to contact, call 601-562-3932 or email at add157@msstate.edu.

a 2.74 m by 2.74 m spacing. Spacing was altered for the Welford tract because of its limited size. A compass and two 92-m surveyor's tapes were used to ensure row straightness and uniform tree spacing. Each study area was divided into three replicates. Six plots containing 100 planting locations were randomly assigned to groups of adjacent rows within each replicate to represent each of the six species and planting stock combinations. Pin flags of different colors were used to distinguish planting locations for species and planting stock combinations. A 1.2-m-long piece of rebar was placed at the beginning and end of each planting row and an aluminum tag was attached denoting the replicate, row number, species, and planting stock. The corners of each study area were marked with 3.0-m-long pieces of polyvinyl chloride pipe placed over a 1.2-m-long piece of rebar to prevent disturbance to the study area.

Seedling GLD was measured with a digital caliper to the nearest mm. Total height was measured with a meter stick to the nearest cm. Initial measurements of the seedlings were taken shortly after planting in late February 2013. First-year measurements were taken on November 2-3, 2013.

Results

Both sites had similar results. The conventional containerized seedlings had the most significant growth for GLD and total height for all three planting stocks. Ground line diameter growth and total height growth were significantly greater for bare-root seedlings than for EKOgrown seedlings but significantly less than for conventional containerized seedlings. The following tabulation shows GLD results for water oak and swamp chestnut oak seedlings; growth values followed by different letters are significantly different at the level of $\alpha = 0.05$.

EKOgrown seedlings exhibited a negative height growth on both sites for both species. We observed and recorded moderate to extreme dieback in these seedlings. Water oak bare-root seedlings exhibited browse damage from deer. Deer browse was observed on 50 percent of the water oak bare-root seedlings on both sites, which accounted for the overall lack of height growth in that species. The tabulation below shows height growth results; growth values followed by different letters differ significantly at the level of $\alpha = 0.05$.

	GLD (mm)	
Species/planting stock	Initial	Growth
Water oak/bare-root	6.52	1.15 B
Water oak/containerized	4.60	3.55 A
Water oak/EKOgrown	10.83	1.90 C
Swamp chestnut oak/bare-root	7.88	1.75 B
Swamp chestnut oak/containerized	6.20	1.95 A
Swamp chestnut oak/EKOgrown	10.98	0.65 C

	Height (cm)	
Species/planting stock	Initial	Growth
Water oak/bare-root	54.6	-2.7 B
Water oak/containerized	52.6	5.4 A
Water oak/EKOgrown	130.2	-11.4 C
Swamp chestnut oak/bare-root	45.8	2.9 B
Swamp chestnut oak/containerized	48.3	6.2 A
Swamp chestnut oak/EKOgrown	100.4	-14.9 C