Research Note

Sixth- and Tenth-Year Growth Measurements for Three Tree Species in a Load-Bearing Stone–Soil Blend Under Pavement and a Tree Lawn in Brooklyn, New York, U.S.

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In 1997, willow oak (*Quercus phellos* L.), swamp white oak (*Quercus bicolor* Willd.), and goldenraintree (*Koelreuteria paniculata* Laxm.) were planted in the right-of-way on Lorimer Street in Brooklyn, New York, U.S. This was one of the earliest commercial installations of the load-bearing stone–soil blends (hereafter called structural soil) developed at Cornell University’s Urban Horticulture Institute (Grabosky and Bassuk 1995). The north–south street segment bisects McCarren Park between Driggs Avenue and Bayard Street. Trees were planted as 5.1 to 7.6 cm (2 to 3 in) caliper trees on either side of the street. The west side trees were planted in a continuous trench of structural soil 0.6 m (2 ft) deep by 2.1 m (6.9 ft) wide down the entire block. The structural soil was used as the sidewalk base capped with concrete. Tree openings were 0.9 m by 1.5 m (3 × 5 ft), which were planted after paving and then covered by granite unit block pavers. The east side of the street was a tree lawn planted with the same tree species. The site and the trees have been observed and measured in 1999, 2000, 2003, and 2007. After 3 years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years, there were no substantial differences in either shoot extension growth or foliage quality between the two sites for the years. For those that survived, there were no significant differences in size between trees planted in the tree lawn or the sidewalk in Years 6 and 10 (Table 1). This is consistent with earlier observations in Year 3 (Grabosky et al. 2002). Increase in trunk diameter in *Q. phellos* from Year 6 to Year 10 was generally 10 to 13 cm (4 to 5.2 in), comparable to forest conditions (Schlaegel 1990). Similarly, *Q. bicolor* increases of 6 to 6.5 cm (2.4 to 2.6 in) of trunk diameter growth were comparable to observations in Ohio from high-quality urban and forest lot measures (Quigley 2004). Height increase, as an estimator of shoot growth, on the
K. paniculata was comparable with anecdotal landscape growth estimations of 0.31 to 0.46 m (1 to 1.5 ft) growth in height per year in a rounded form to a maximum size of 9.2 to 10.8 m (30.4 to 35.6 ft). There is general agreement in mature size for the species in the northeast U.S. region (Gerhold et al. 1993; Bassuk et al. 2003). Goldenraintrees on the test site increased in height 1.2 to 2 m (4 to 6.6 ft) in four seasons and are 55% to 65% of their expected mature size in the 10 years since planting.

CONCLUSIONS

After 10 years, trees growing in the paved situation (in a structural soil) were growing in a manner visually comparable with trees growing in a grassy tree lawn on the same project across the street. The growth observed in both situations is comparable to species growth expectations in nonurban situations. There has been higher mortality in the tree lawn, which could be explained by maintenance and infrastructure repair activities rather than treatment differences.

Acknowledgments. Many thanks to Fiona Watt, Chief of Forestry and Horticulture, City of New York Parks and Recreation, for her assistance and permissions throughout the installation/design phase. We also thank the students and staff who collected data in the 1999 and 2000 visits and Greg Dahle, graduate student; Jess Sanders, graduate student; Mike Gallagher, undergraduate honors student; and Carolyn Haines, student laboratory associate for assistance in the 2007 data collection.

LITERATURE CITED


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