Rooting Live Oak Rhizomic Shoots

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Live oak (Quercus virginiana Mill.) traditionally has been propagated by seed because vegetative propagation has not been successful on a commercial scale (Flemer, 1962; Maynard and Bassuk, 1987; Morgan and McWilliams, 1976). However, as a result of seedling variability, live oaks offered for sale exhibited varied growth forms with variable quality.

Live oaks may produce rhizomes from their crowns just below the soil surface. These rhizomes grow underground and develop shoots once the growing tip penetrates the soil surface (Fig. 1). Since these rhizomes originate from an area considered juvenile (de Muckadell, 1954), rhizomic shoots appear to be juvenile and may form adventitious roots with ease when used as cuttings. We determined the rooting capability of shoot cuttings from live oak rhizomes and aerial terminal shoots of a mature tree.

Terminal rhizomic shoots = 20 cm long located under a 40-year-old tree were taken on 29 Apr. 1987. The basal 2.5-cm section of each cutting was dipped for 5 sec in 50% ethanol containing IBA at 0, 1.25, 2.50, 5.00, or 10.0 g-liter⁻¹. Cuttings were rooted under mist propagation in a greenhouse. Maximum photosynthetic photon flux was 300 μmol-s⁻¹-m⁻². The rooting medium consisted of 3 perlite : 1 peatmoss (v/v). We used a randomized complete block with four replications. Cuttings were evaluated for rooting percentage, root number, and mean root length after 40 days. Nonrooted cuttings were returned to the propagation bed and checked for rooting after 70 and 100 days. Terminal shoot cuttings 15 to 20 cm long were taken from the canopy of the same tree (aerial shoot cuttings) on 6 June, providing a similar degree of stem maturity as the rhizomic shoots. These cuttings received the same IBA treatment and rooting condition and were evaluated after 40 days. After rooting was completed, 20 rooted rhizomic shoots and five rooted aerial shoot cuttings were planted and maintained in a greenhouse for observation.

Although this study was limited to the small number of uniform cuttings, rooting of rhizomic shoot cuttings was highly successful. Rooting percentage increased with increasing IBA concentration (Table 1). After 40 days, IBA at 10.0 g-liter⁻¹ resulted in 100% rooting. All cuttings treated with IBA rooted after 100 days, nearly twice that of the controls. Mean root number on rooted cuttings was not affected by IBA treatment due to the high variability (range 2.2 to 6.0). Average root length decreased as IBA concentration increased (Table 1). It may be beneficial to treat rhizomic shoots with IBA at 2.50 or 5.00 g-liter⁻¹ and root them for 70 days to achieve 100% rooting and obtain reasonably long roots. Although Morgan and McWilliams (1976) reported that rooting ability of shoot cuttings varies among live oaks, rhizomic shoots from two other live oaks of the same age all rooted successfully following treatment with IBA at 10.0 g-liter⁻¹.

Aerial shoot cuttings treated with IBA ≥ 2.50 g-liter⁻¹ had 25% success at 40 days (Table 1), a value not statistically different from untreated cuttings. Root number was unaffected (range 0 to 3.3); however, mean root length decreased with higher IBA concentration. Adventitious roots in live oak cuttings originated from the stem above the cut end and no roots were observed to have developed from the callus. After 40 days in the mist propagation bed, dipping callused but unrooted shoot cuttings in 100 mg IBA/liter of water failed to induce root formation on these cuttings.

New shoots produced in 1987 and 1988 by the rooted rhizomic shoot cuttings maintained in the greenhouse exhibited juvenile growth characteristics, i.e., long internodes and oblong, acuminate, and sharp-dentate leaves with three to four spines along each margin. Rooted aerial shoot tip cuttings had very limited growth and do not appear to be an economical source for cuttings as suggested by Morgan and McWilliams (1976).