

ROOT DEVELOPMENT OF TRANSPLANTED SEEDLINGS INITIALLY IN BOTTOMLESS MILK CARTONS¹

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Abstract. Pecan, *Carya illinoensis* 'Western' and sawtooth oak, *Quercus acutissima* seedlings were grown in containers 5½ × 2¾ × 2¾" without bottoms and on a wire bench for 10 weeks prior to being planted into the field. The tree seedlings were dug after 30 days and evaluated for root growth. Both species had produced numerous new roots in excess of 8 inches in length. However, the pecan roots were coarse and had few branches, whereas, the sawtooth oak had a very fibrous root system.

Studies by Davis & Whitcomb (1), Hathaway and Whitcomb (2), Tinus (3) and others have shown that tree seedlings grown in bottomless containers establish very quickly. With a complete slow release nutritional program of 18-6-12 Osmocote @ 6 lbs./cu. yd. container tree seedlings are easy to manage and grow very rapidly compared to bed grown seedlings (2). Tree seedlings have been transplanted successfully into containers or the field and their performance has been excellent. In this case, we wanted to determine how fast a seedling grown with this method becomes established in the field during late May when planting of bed grown seedlings would be impossible. When tree seedlings are begun in March or April, the seedlings reach plantable size just as the summers heat begins. To hold these seedlings until September or October means excessive growth, crowding, and probably stunting. Therefore, it is important to know how fast roots establish following transplanting and if tree seedlings can survive and grow when planted at this time.

Methods and Materials: Seed of pecan and sawtooth oak were planted in unused half pint milk cartons (5½" tall × 2¾" square) filled with a growing medium of 2-1-1 by volume, ground pine bark, peat and sand. The growing medium was amended with perk (micronutrient fertilizer manufactured by Kerr McGee Chemical, Jackson-

ville, FL), single superphosphate and 18-6-12 Osmocote at rates of 2, 4, and 8 lbs./cu.yd. respectively. All seedlings were grown in full sun on raised wire benches and watered by overhead sprinklers as needed. A total of 50 seedlings of both species were grown, however, only 25 of the most uniform were selected for planting in the field.

When the seedlings were 10 weeks old they were removed from the milk cartons and planted into a clean cultured field (May 20) and watered. The planting holes were approximately twice the size of the seedling root ball and the same depth. The fertility of the clay loam field soil was low and no additional nutrients were added at time of planting.

Results: After 30 days (June 20), all trees were alive and the seedlings were dug and evaluated for root growth. No additional water had been received either from irrigation or rainfall since the seedlings were planted. The plant tops showed no signs of stress and new growth was developing. At the time of evaluation, the soil was very dry and cloddy making root recovery below 14" deep, impractical.

The pecan roots, although very fibrous in the container were coarse in the field soil and had few branches although they had grown more than 8" below the base of the original seedling container (Figure 1). Close examination showed that most of the root growth on the pecans had come from the base of the primary taproot. Some fibrous roots had grown into the field soil near the base of the container but were very fine and broke readily during excavation. Differences in root development among plants were slight and since the roots extended below the plow layer, exact depths of rooting could not be determined.

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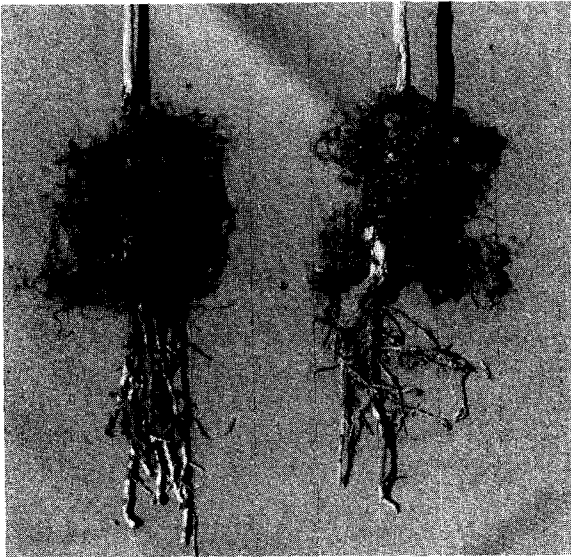


Figure 1. Pecan root development 30 days after being planted in the field from square, bottomless containers 5½" tall and 2¾" square. Roots had grown more than 8 inches beyond the base of the containers.

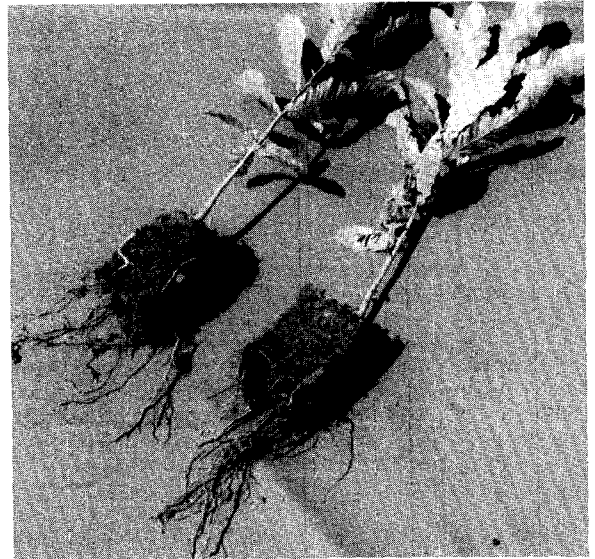


Figure 2. Sawtooth oak development 30 days after being planted in the field from square, bottomless containers. This root system is much more fibrous than the pecan, however, most roots develop from the base of the container rather than from the sides.

Root development of the sawtooth oak into the field soil was much more fibrous with no large coarse roots as seen on the pecan although depth of penetration into the soil was similar (Figure 2). However, most roots developed from the base of the container. This is expected since as roots develop on the seedling they grew downward and to the corners and were air pruned at the bottom of the container. Thus the base of the container became a mass of air pruned root tips with the potential to regenerate roots very quickly. Roots of the sawtooth oak spread horizontally as well as downward and were more variable than the pecan, perhaps due to greater seedling variation, but all plants were well established.

This study demonstrated that in 30 days and with only one initial watering, tree seedlings, grown in this manner, can establish new roots very quickly, thus avoiding the stress generally associated with transplanting. This could greatly reduce maintenance and watering of new plantings while reducing losses and improving root system quality. Milk cartons have about 90° corners therefore preventing root circling which

could cause girdling roots in the future.

A complete summary of the container growing system for tree seedlings is available in Bulletin #755 of the Oklahoma Agriculture Experiment Station. Copies are available from Carl E. Whitcomb, 360 Ag Hall, Oklahoma State University, Stillwater, Oklahoma, 74078.

Literature Cited

1. Davis, Randy E. and Carl Whitcomb. 1975. *Effects of Propagation Container Size on Development of High Quality Tree Seedling*. Proc. Int. Plant Prop. Soc. 25: 448-453.
2. Hathaway, Robert D. and Carl E. Whitcomb. 1977. *Propagation of Quercus Seedlings in Bottomless Containers with Osmocote*. J. Arboric. 3(11): 208-212.
3. Tinus, R.W. and Stephen E. McDonald. 1979. *How to Grow Tree Seedlings in Containers in Greenhouses*. Tech. Report Rm-60 of the Rocky Mountain Range Experiment Station. U.S. Forest Service.

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