

## Container Production of Oaks: A Successful Reality

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The production of oaks in the field can pose several problems, most of which begin with the liner. For many species the problem in the past has been availability. With others it has been an insufficient root system or coarse-rooted liners that fail to break uniformly if at all. Oaks are notoriously bad transplanters with frequent high losses due to slow root regeneration.

Conventional field whip production practices take up to 5 years to produce salable plants. In the first year, seeds are sown in fall or spring and seedlings are harvested at 1 or 2 years of age. These seedlings are then lined out in field rows for 1 or 2 more years and then cut back to 2 in. in height in spring to produce a vigorous young whip of 5 to 8 ft. This entire process takes 3 to 5 years to produce a 1-year whip. The resulting plant generally has a coarse root system with little to no fibrous roots and at best recovers slowly and in too many cases not at all. For example, root regeneration in red oak via new root initiation occurs almost exclusively in spring and can take 40 days under standard greenhouse conditions. Consequently, field-grown coarse-rooted species are difficult to transplant because they have virtually no intact root tips when harvested.

To meet these challenges we have adapted with some modifications the Ohio Production System (Struve and Rhodus, 1990) for the production of oaks as well as other species of shade and flowering trees. Our primary objective was to produce a cost-effective container-grown liner with an improved root system that would be more vigorous when transplanted to the field.

The oaks we grow originate in two ways. The secondary source is from purchased 1-year seedlings preferably of known provenance of species we cannot collect ourselves. The first and most important source is the acorns we harvest or have harvested for us from known sources. This gives us the best control on the finished tree because we know something about the parent tree or at least the area from which it comes. Records are kept on sources of seed or seedlings to determine how they perform. After collecting, we place the seed in a plastic bag with moth balls for 3 days to rid the acorns of any insect larvae. The seeds are then sown in trays of damp sand for germination. Members of the white oak group germinate within days. Members of the red oak complex are chilled until January or February and then warmed sufficiently to induce germination. Germinating acorns are removed from the sand when the radical is 1/2 in. to 1 in. long and placed in the corner of 2-7/8 in. × 5 in. Anderson Bands which have an open bottom. The acorn is only lightly pressed into the medium with the radical pointed downward in the corner of the pot which acts as a "grow straight" for the root. The bands are placed in flats which are held above bottom-heated benches by an inverted flat to air prune the tap roots. Supplemental lighting is supplied at night to promote additional growth.

In mid to late May the seedlings are removed from the greenhouse to a 70% shaded polyhouse for acclimatization. This is an important step to avoid severely shocking the plants. After 2 weeks the plants can be removed from the shade and transplanted to 2-gal containers treated with Spin Out<sup>TM</sup>. Research at Ohio State University has

shown that plants growing in copper-treated pots have improved root morphology and distribution in the container. As a result, plants are able to use water and nutrients more efficiently. Our medium is a 60% pine-bark-based mix with Osmocote 18N-6P<sub>2</sub>O<sub>5</sub>-12K<sub>2</sub>O 8- to 9-month or Polyon 24N-5P<sub>2</sub>O<sub>5</sub>-12K<sub>2</sub>O 6 month fertilizer incorporated in the mix. The plants are staked and grown under overhead irrigation in our container area for the balance of the growing season. At the end of the growing season, the oaks will vary greatly in height, depending on species, and generally range from 2 to 5 ft. Container size is a limiting factor in production. When plant root systems reach the capacity before the end of the growing season the plants stop growing.

In October the trees are graded and the best seedlings preferably 30 in. or taller are planted in the field on widely spaced rows for large-caliper shade-tree production 1 year after falling from the tree as an acorn. Trees that do not make grade are stored in unheated polyhouses and grown for a second season before moving to the field.

We have found that these trees will quickly reach salable size with almost perfect stands with a more fibrous root system than a field-grown whip and at a reduced cost and without the transplant losses. We have proven from a nursery viewpoint that from little acorns mighty oak trees grow.

#### LITERATURE CITED

**Struve, D.K. and T. Rhodus.** 1990. Turning copper into gold. Amer. Nurseryman. August 15.

**GUY STERNBERG:** Are you pruning to encourage a branched root system?

**BILL HENDRICKS:** The open-bottomed pots allow for air pruning and this encourages branching.

**GUY STERNBERG:** I was thinking of pruning when the root is about 1/2 in. long to produce a fibrous root system immediately below the acorn instead of just at the bottom of the initial pot.

**BILL HENDRICKS:** I think I will try that.

**MIKE YANNY:** We obtained good root systems when we pinched the roots at an early stage when we grew them in pots but when we tried it in the field, the method did not produce good seedlings.