

## A Marriage of Nursery Practices

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I often am asked the question, "If I were starting a nursery, how would I proceed?" Nursery production can range from plants field grown and harvested bareroot, balled in burlap or with tree spades or container grown in sizes ranging from a fraction of a gallon to hundreds of gallons or pot-in-pot or various other options. In my years of research, teaching, consulting and travel, nursery production practices are a mix of "the good news and the bad news".

**For field production, the good news is:** Trees and shrubs grown in good soil with good care typically have better foliage density and color, far superior stem diameter and taper from soil line to the top with more dense and natural branching and until harvested have good root systems. Further, the amount of irrigation water needed is much less per tree compared to growing the same size plant in a container and drip irrigation is simple and easy to set up and operate.

**The bad news is:** Harvesting is slow, labor intensive, is practical only when the plants are dormant and requires an extensive investment in machinery and labor. And worst of all, 95% or more of the plant roots are left in the field even though the soil balls are huge, heavy, and cumbersome.

**For production in containers the good news is:** Plants are mobile and easily moved. The entire root system is confined to the volume of the container, and if done correctly, no roots are lost at harvest. Root tips are active and quickly extend into the surrounding soil following planting in the landscape. **The bad news is:** Plant roots are damaged and some are killed by heating of the sidewall of the container even when the air temperatures are modest. Plant roots can be damaged and sometimes killed by winter's cold. Containers blow over. Much more irrigation water per plant is needed in containers compared to growing in the field and irrigation is more difficult to set up and maintain. Trees and most large shrubs are tall and spindly. Branching of trees is poor and sparse. Staking both in the nursery and after planting in the landscape is often required as trees have poor stem diameter and taper and strength. Roots in conventional containers are deformed and intertwined and often the plant is root bound. Deformed roots will **always** be in that position. Using toxic levels of copper on the inside of the container creates far more problems than it solves.

**For pot-in-pot production the good news is:** Plants do not blow over and the roots are protected from summer's heat and winter's cold. **The bad news is:** Roots are still in conventional containers with all of the spiraling and root deformities and the longer the plant is grown the more severe the problem. Using copper treated pots for only a few crop cycles pollutes the surrounding soil with copper so as to make it unsuitable for other crops in the future. Roots often escape from the inside pot and find their way to the holes in the socket pot so that harvesting is difficult if not impossible and the impact of the root loss on the plant can be as severe as B&B. The cost of setting up such a system is very expensive, and it only works on soils that drain well without the additional large expense of sub-drains.

*If you could marry the good news practices of both field and container production would you do it?* With the latest technology, not only is this possible, **it is one of the most economical and efficient production methods when all factors and costs are considered AND with less risk and less labor. Here is what I would do and why:**

To provide you all of the details would take more space than the magazine can afford to devote to an article. The long version will be available in the revised 2000 version of *Production of Landscape Plants* by Carl E. Whitcomb, Ph.D. available soon as either hardback or CD, watch future issues for details.

The abbreviated short version: Work with the plant and avoid restrictions to plant growth. Remember: a plant runs on energy and the more productive the leaves at manufacturing the energy necessary for growth of tops and roots, the better. Limit restrictions as much as possible by treating water to lower bicarbonates if this treatment is needed, applying modest rates of low water solubility herbicides so as to avoid root damage, focus on the entire nutrition of the plant because it is how the 11 essential elements work in concert not the effects of just one or two elements, etc.

Consider the following 21 steps:

- 1) Plant seed in RootMaker™ propagation containers which destroy the taproot within a few days after germination and stimulates secondary root branching by air-root-pruning not only at the bottom but on the sides as well. This creates a root system with root tips ready to grow radially as well as downward when transplanted. When done properly and timely, root systems far superior to what occurs in nature can be produced both faster and more consistently. (This procedure also works for cuttings.)
- 2) Transplant the seedlings after 10 to 16 weeks into one- or three-gallon Rootmaker™ containers which continues the air-root-pruning throughout the container sidewall to stimulate root branching and accelerates plant growth. Or transplant seedlings into knit bags in cinder blocks or the 5 gallon Rootmaker™ grounder if your soils drain well.
- 3) Leave side branches on the young trees. The only exception is to remove aggressive side branches that try to compete with the central leader. Continue to leave all lower limbs and leaves on for the first two growing seasons or longer. Remove the lower limbs only after good stem strength is achieved or roughly one growing season before the trees are to be sold at two to three inch stem diameter. The lower limbs on young trees are the main contributors of energy to stem diameter and root growth.
- 4) Prepare field soil by testing for nutrient levels and add any that are deficient or make adjustments for any in excess. Till the soil deep to improve aeration / oxygen for root growth.
- 5) During September or October of the first year, plant the vigorous, good quality seedlings into the field. Throw the runts away. Remember, it is better to throw away any marginal liner at this point versus growing it on for one or two more years only to realize that it is a cull.
- 6) Plant the trees in the field in fabric containers made of the latest knit fabric grow bag technology available from Rootmaker™ Products Company. All openings in this special knit fabric are 5/64 inch in diameter. This is the smallest opening though which a root of a woody plant will grow. As soon as the root increases even slightly in diameter it is girdled. Three-inch caliper trees can be grown and harvested in an 18-inch diameter knit fabric container.
- 7) Drip irrigate the first year and whenever rains are lacking in successive years if good quality water is available.
- 8) Fertilize, control diseases and insects as with conventional field production.
- 9) When the trees reach market size, harvest while they are dormant and demand for labor is lowest.
- 10) Harvest the trees using a double loop nylon strap around the trunk and a lifting arm on the back of a tractor or skid loader. I have harvested 80 dormant trees of roughly three-inch caliper in one hour with two straps and one helper.

Roots that have grown through the knit fabric container break at the outside face of the fabric as the tree is pulled from the earth.

- 11) Strip away the fabric. The knit fabric comes off far easier than the early versions of grow bags.

**This is where the marriage comes in:**

- 12) Place the root ball in above-ground containers and surround with a good container growth medium (mix) that contains micronutrients and slow-release fertilizer of a form that will last roughly six to eight months.
- 13) The new mix around the outside insulates the fibrous concentrated tree roots in the soil ball for the remainder of the winter in most areas of hardiness zones 6, 7, 8 and 9. Some additional protection may be needed in more northern areas depending the date of planting in containers. The center of the container with the roots in field soil holds water and nutrients well. The mix around the outside provides drainage, oxygen, and an excellent environment for root growth. Water the trees normally.
- 14) Complete the task of shifting plants from the field to containers BEFORE spring bud swell.
- 15) When spring bud swell occurs, a surge of new roots will extend from the root ball of field soil out into the container mix.
- 16) In north central Oklahoma, trees pulled and placed in containers in February or March are rooted out and generally ready to sell or ship approx. one month after leaves emerge. Establishment in the container does not require many months or a full growing season, it is far faster if mix, nutrition, watering and weed control are properly managed.
- 17) This procedure provides the quality of top that can only be achieved in the field with the convenience and mobility of plants grown in containers. Best of all, you have exceptional quality trees to sell all summer.
- 18) Because the expensive large containers and soilless mix are purchased only at time of harvest, you do not tie up valuable dollars for long periods of time.
- 19) No heavy equipment or tree spades are necessary. A 30 hp tractor with front loader or three point lifting arm will provide all the muscle you need.
- 20) Because the roots have not been in the container for years, the circling and deformity pit falls of conventional containers are less of a problem. An even more economical alternative is to use the RootBuilder™ container which continues the air-pruning process through a honeycomb of openings throughout the sidewall, yet is very easy to remove at time of planting into the landscape, and can be used over and over.
- 21) Growing trees in the field in the knit fabric grow bags, then establishing in containers prior to sales provides a maximum of energy for root growth. Plant trees grown with this procedure into the landscape during May through September, even the hottest day of August and by the following summer the trees are established. Losses should be few to none, stress tolerance is high and customer satisfaction is excellent.

At the present time this is my favorite way for growing trees and trees are available for sale when demand is greatest. The nursery industry needs to focus on selling shade in the summer when shade is a motivation to buy. Likewise, the best time to offer flowering trees for sale is when they are in full bloom. Using this procedure one can do this and 'sell the sizzle'. As one recent convert said, "The thing that convinced me was when we loaded large crapemyrtle trees in full flower in August, planted then in the landscape, and they never quit blooming. The customer thought we were magicians".

I am not saying that other nursery procedures do not work, but there are degrees of success and varying levels of return for your investment. My first vehicle was a 1939 Chevrolet coupe. It got me from point A to point B and fairly consistently. My current vehicle is a 1997 Chevrolet half-ton extended cab with air conditioning, radio, tape player, cloth bucket seats with lumbar support, power steering and with much more pep and nearly double fuel economy. Do I care to go back to my 39 Chevrolet? No, thanks. As the song goes, "It is hard to get them back on the farm after they have seen Patee".