

COMMERCIAL PRODUCTION OF DECIDUOUS TREE CULTIVARS

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Trees like to grow in the forest. They don't like to grow, and often won't survive in the city. In the forest, they have fresh air, rich soil, and ample moisture. In the city, they have just the opposite. In the forest, each tree is surrounded by other trees; in the city, each tree is surrounded by concrete.

In the forest, trees grow in any form they wish; in the city, we expect to be able to dictate acceptable form. In the forest, trees reproduce naturally and abundantly; in the city, they generally don't reproduce at all.

Commercial nurseries fill the gap between the forest and the city. Taking advantage of plants' various natural reproductive powers, nurseries produce trees by the millions. Taking advantage of the natural variation found within populations, they select and grow distinct cultivars with desirable forms.

The nursery world is a world of cultivars. Customers expect consistent, repeatable performance and features. Named cultivars provide this. Our sales demand is 89% for cultivars and

11% for seedling grown plant material. Half of the 11% seedling sales is in the genus Quercus. If we had the technology to reproduce plants of this genus successfully by grafting, cuttings, or micropropagation, cultivar production would become even more dominant.

METRIA is concerned with trees on city streets. Before they get to the city, there are three general phases in the production of these trees, and in many cases, three nurseries may be involved.

- 1) Propagator: germinates the seed, roots the cutting, or micropropagates the plant in culture. The propagator grows these starts on to a typical size of 18" height and 1/4" stem diameter. one to two years involved.
- 2) Primary Grower: turns these propagules into what we recognize and call "a tree". Secondary propagation is often done here by grafting or budding a cultivar onto a seedling rootstock. The primary grower produces trees ranging from unbranched 4' "whips" to 15' tall branched trees. Generally these

are sold bare root. Two to four years involved.

- 3) Caliper Tree Grower: Grows the trees produced by the primary grower on to larger caliper size, generally 2" to 8" stem diameter. These are dug, balled and burlapped and planted on city streets and large commercial landscape projects. Two to eight or more years involved.

The finished trees produced fall into four categories:

- 1) Seedling. Genetically diverse, no vegetative propagation involved.
- 2) Own root. A true clone, vegetatively propagated by micropropagation or cuttings.
- 3) Budded or grafted onto clonal rootstock.
- 4) Budded or grafted onto seedling rootstock.

At present, our production consists of:

11% Seedling Quercus, Celtis, some Betula and Crataegus)

21% Own Root (Acer rubrum, Prunus)

14% Budded/grafted on clonal root (Malus)

54% Budded/grafted on seedling root (most other trees)

Most trees begin their life as a seedsown into a raised seedbed.

Most species grow two years before harvest. Many are undercut (root pruned) with a blade passing through the seedbed at a four-inch depth. Some species are dug, root pruned by hand, and transplanted into a second bed.

Seedlings are harvested during the dormant season and root pruned, topped, and stored in a humidified, refrigerated building or heeled into sawdust beds.

Own root plants are produced by softwood cuttings under intermittent mist, by hardwood cuttings in soil beds, or by micropropagation, with plantlets subsequently grown in a greenhouse.

Clonal rootstocks are usually produced by layering in beds of sawdust, although some rootstocks can be produced by hardwood cuttings.

The "primary grower" then takes these plants and lines them out in a row. Plants are lined out in spring, then most of the seedlings are budded (a form of grafting) in August. In budding, a single bud with an attached "shield" of bark of a desired cultivar is inserted into the base of the seedling, using a sharp knife and tied with a ribbon or plastic strip.

Budding is done with the T-bud (65 %) and the chip bud (35 %). Grafting during the dormant season is done only on a few plant varieties for which budding is difficult, as budding is a more economical method.

Own root and seedling plants are simply established and allowed to grow as they wish during this first season. Early the following spring, all growth on budded seedlings is pruned away 1/2" above the cultivar bud in late winter. This removes all growth down to two or three inches above the soil line. Similarly, own root plants and seedlings which have not been bud&d are also pruned down to within three inches of the ground. This forces vigorous growth of buds just above soil level, and this strong growth produces a straight stem.

Growth begins with warming spring weather. With ample fertilizer and irrigation, most varieties will produce 7 to 8 feet of growth by the end of the summer. Trees are irrigated by sprinkler and movable aluminum pipe every seven to ten days. Intensive labor is needed to produce quality plants. Trees are staked and taped to the stake with vinyl ties every ten days. Basal sprouts and shoots produced on the lower stem are plucked off by hand while they are very small on a regular basis. In some cultivars, lateral branches which develop are pinched to shape the tree.

Half of our trees are dug and sold as 1-year-olds. The remainder, which were planted on wider spacing, are intended to be grown to larger size, and are not harvested: They are dormant pruned during late winter to develop shape, then lightly summer pruned to maintain shape. Fertilization and irrigation continues, and additional staking may be needed. Lower

branches are pruned off to produce a branched head at the desired height. Straight leaders are maintained by staking and taping terminal growth.

In November, the harvest begins. Bare-root digging is accomplished using high clearance diggers on tracks. They drive over the top of rows, and a trailing "U" shaped blade cuts and lifts the roots. Shaking fingers attached to the blade shake the soil free from the roots. Trees are hauled by tractor and trailer to warehouses where grading crews check quality, discarding culls. Trees are graded into numerous categories based on size and branching, bundled and labelled, then sent to storage.

Two storage techniques are used. The majority of trees are heeled into three-foot-deep beds of moist sawdust, outdoors. Certain species which tend to begin growth very early in spring are held in cold storage. Here, temperatures are maintained at 33 to 34 degrees F., and fogging units maintain humidity at a constant 100% to prevent drying of roots.

Shipping of bare-root trees takes place from January through April, as dictated by the customers' climate. Shipping is done by refrigerated truck. Bare-root trees are heavily packed with moist cedar shavings and straw to prevent drying in transit.

METRIA members are rightfully concerned about diversity in plantings. Schmidt Nursery presently produces well over 250 cultivars of deciduous

trees in 82 species of 34 genera. These numbers are increasing each year. While many cities are heavily planted with certain dominant species, our sales show that there is reasonably good diversity in our market as a whole. The following table shows our production by genus. Acer has been broken down into its three major species. Over all, Acer would represent 30% of production including the three listed species and other minor Acer species.

Diversity is available in the nursery trade. In our nursery, 24 genera are sold in quantities which represent less than 1% of our total production. Some of these plants have strong limitations, but many should be much more widely used. I encourage all cities to plant trials in various situations to learn more about climatic and site adaptability, then make use of the diverse plant material available, based on each cultivars performance.

Deciduous Tree Production

14%	<u>Malus</u>
12%	<u>Acer platanoides</u>
12%	<u>Acer rubrum</u>
7 %	<u>Fraxinus</u>
7 %	<u>Prunus</u>
6 %	<u>Gleditsia</u>
6 %	<u>Quercus</u>
5 %	<u>Acer saccharum</u>
4 %	<u>Tilia</u>
4 %	<u>Pyrus</u>
2 %	<u>Crataegus</u>
2 %	<u>Platanus</u>
19%	Other