

Two Practices to Help Ensure Nursery Tree Quality

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Root pruning and care during the first transplantings of tree seedlings, as well as maintaining a central leader, are essential to ensure quality trees with strong branch structure. An open-ended polyester liner holds promise to minimize root problems and to enhance seedling growth.

INTRODUCTION

Two all-too-common nursery practices must change. Too many inferior quality trees have been and are being produced, sold, and planted in public and private landscapes. Landscape managers and maintenance people are realizing that quality planting stock is key to plant performance and ease of maintenance. Nurseries should realize that tighter and more objective nursery-tree specifications are being required by an increasing number of public and private buyers (Harris, 1992). *These two practices are: (1) maintain a central leader with branches smaller than the trunk to ensure strong structure of mature trees, and (2) root pruning and careful transplanting from seed flats and/or liners to minimize kinked and circling roots.*

Pruning. Many broadleaved trees, particularly those grown in containers, are headed to force several laterals close together to produce a young tree which appears dense and well proportioned. The branches, however, are too close together and near the same size. Trees so pruned seldom redevelop a new leader.

With no leader and branches near the same size, tree structure is weak. As large-growing trees mature their branches become large and more spreading. These trees are more subject to losing branches even in relatively calm weather. Few people ever realize these hazards started in the nursery. Few landscape maintenance people, even park and street tree workers, are aware of the problems of branches too low, too close together, and weakly attached until it is too late to correct without mutilating the tree. This has to stop.

Branches that could become permanent main scaffolds should be spaced vertically along the trunk. Potential scaffolds should be kept two-thirds (2/3) the trunk diameter or less. To ensure strong branch attachments, relative size is more important than angle of attachment. If the leader is headed, a new one should be developed.

Producing Quality Root Systems. The seedling liner and how it is handled is critical in producing vigorous trees free of kinked and circling roots. Seedling transfers from seed flats to liners and on to larger containers or from liners to larger containers are critical to the future well-being of a tree. All too often roots are kinked and circling which, if not prevented during these steps, can doom trees to poor growth or failure 5 to 15 years later.

MATERIAL AND METHODS

Nursery studies conducted more than twenty years ago are instructive. The common practice was to seed in flats, move the seedlings to peat pots, on into gallon cans, and finally into larger containers. Experiments compared root pruning versus no root pruning and times of transplanting from the seed flat and from liners (Harris et al., 1971). Species known to frequently have root defects in the landscape were used: *Eucalyptus sideroxylon* A. Cunn, ex Woolls (red ironbark), *Pinus radiata* D. Don (Monterey pine), *Pistacia chinensis* Bunge (Chinese pistache), and *Quercus ilex* L. (holly oak).

In one group of plants the seedlings and the liners were moved without the roots being pruned; in another the roots were pruned so that the seedlings could be placed into 2¼-in. peat pots without bending the main roots, and at the second move, the roots extending through the peat pots were removed before the plants were placed in gallon cans.

Table 1. Effects of root pruning on the structure of the root system and plant survival through the first growing season.

		Ironbark	Oak	Pine	Pistache
Number of trees per treatment ¹		416	180	288	128
Percentage of trees with good root systems:					
	Unpruned ²	40	4	48	22
	Pruned	86	91	94	80
Percentage of trees with root defects:					
Kinked	Unpruned ²	44	30	30	32
	Pruned	10	8	3	18
Kinked & circling	Unpruned ²	14	66	20	46
	Pruned	2	1	1	2
Cricling	Unpruned	1.7	0	2.3	0
	Pruned	1.9	0	2.4	0
Percentage of survival in the field:					
	Unpruned	96	98	99	90
	Pruned	96	97	98	96

¹ Trees for the root evaluations were those in gallon cans examined at the end of the growing season. Survival was determined then also.

² Results for unpruned and pruned significantly different at the 0.01 level.

Groups of seedlings were transplanted at different stages of root development. The seedlings were first moved when the roots had reached the bottom and had grown along the seed flat bottom 1 to 3 in. The first moves from the seed flat were 5 to 10 days earlier than normal practice.

All the plants were grown in a glasshouse through the liner stage, then moved to the field after they were transplanted to gallon cans. Roots penetrated the moist peat pots with little difficulty. At the end of the growing season, the plants were measured and their roots were washed clean and rated as to the amount of kinking and circling.

RESULTS

Root pruning and care in transplanting significantly increased the number of trees with good root systems (Table 1). Root pruning during the two moves reduced the percentage of plants with seriously kinked roots, as well as those with roots both seriously kinked and circling. Few plants had only circling roots regardless whether the roots were pruned or not. In other words, the kinking of roots led to their circling.

For the oak seedlings in peat pots, only at the latest time of transplanting did root pruning result in less caliper and height growth compared to unpruned oaks or those pruned when moved earlier. Survival was not affected by root pruning of any of the species.

DISCUSSION

The kinking and circling occurred close to the surface and close to the trunk or main roots. Neither of these conditions can be easily corrected later. On the other hand, these conditions could be greatly reduced by pinching the roots at the first move and essentially breaking the crisp roots from the outside of the peat pot by running a finger around and under the pot. Each action took only one or two seconds.

The common practice now is to use plastic liners with little or no attention to root condition when moved into the next size container. Attempting to correct root circling when taken out of a plastic liner is time consuming and disruptive of the root ball. Whether corrective measures are taken or not, the results are all too obvious.

My recommendation was going to be, "Return to using seed flats and peat pots, move early, root prune, and take care in transplanting." This is still a sound recommendation. However, there is a promising alternative.

PROMISING ALTERNATIVE

Ron Motz and Janet Bozzo of All-Seasons Wholesale Nursery near Elk Grove, California, have developed a simple, unique procedure to germinate, transplant, and grow seedlings with little or no root disturbance or slowing of growth. At the present time they are concentrating on oaks.

An oak acorn is seeded in an open-ended cylinder of transparent polyester film (which had not met quality standards for x-ray use) filled with nitrified fir bark. The cylinder is placed in an open-bottom tray with other seeded cylinders for seed germination and seedling growth. The open bottom of the cylinder allows for air pruning of the roots as they reach the bottom of the cylinder.

As the roots begin to reach the side of the cylinder but before the roots can hold

the soil-mix together, the cylinder, soil mix, and seedling are "planted" in a 5- or 15-gal container. After firming the soil and watering well, the cylinder is pulled up to leave the root system essentially undisturbed. The soil is firmed and rewatered.

Revval blue polyester film (polyethylene phthalate polymers) is formed into a cylinder and held by two staples. A variety of cylinder sizes have been tried from 2½- to 4-in. diameters and 8 to 14 in. tall. At present, the film for a 4-in. diameter by 8-in. tall cylinder costs about \$0.07 and the labor to staple it about \$0.03.

The growth of the seedlings in the cylinders and after transplanting to larger containers has been excellent if moved at the right time. Three- to five-foot seedlings in one growing season has been possible with many oak species.

Using a longer cylinder filled only half way with soil mix provides a tree shelter which can further increase early top growth. If the lower two inches of a cylinder is left in the soil when pulled up at transplanting into a larger container, an even taller shelter is available.

LITERATURE CITED

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