

selections that we find in Japan, this one did not have a cultivar name. So we have named it 'Delilah', meaning "temptress" in Hebrew. I have seen several variegated forms of Mexican sage on the market, but they pale in significance beside this one. Well defined white margins with vivid bluish-purple flower spikes in the fall truly makes this selection a "temptress" in the garden. As with most other salvias, it roots in a matter of a few days. It needs full sun and good drainage for best performance in the garden. Since *S. leucantha* is not the most cold hardy of sages, it was feared that this variegated form would be even less so. However, it has overwintered here in Zone 8 in the ground with a -10 °C (14 °F) low temperature this past winter. Zones 8–10.

SUMMARY

In summary, to compete with the "big box" nurseries, smaller nurseries like us must use our advantage of being able to explore for new plant material for our respective markets. This seems to be the only way that we can survive in the global economy, where big is usually presumed to be better.

Growing Quality Trees for Southeastern Landscapes®

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INTRODUCTION

Florida tree nurseries have experienced significant changes in production demands during the last decade. Factors leading to these changes include publication of the 2nd edition of the *Florida Grades and Standards for Nursery Plants*, increased demand, and increased buyer sophistication. The publication of the 2nd edition of the *Florida Grades and Standards for Nursery Plants* has had a tremendous effect on the level of quality that buyers are requesting and expecting. Simultaneously, there has been a large increase in demand due to seemingly endless development. This demand, while helping the industry in some ways, has also led to a large number of nursery expansions, and new large nurseries are entering the market. Increased buyer sophistication has meant that many architects and developers are more aware and much more specific about species, cultivars, and the production method they prefer when specifying trees. All of these changes have forced nurseries to change their business strategies in order to compete successfully.

DEFINING QUALITY FIELD-GROWN TREES

Field growing of landscape trees was once the only method used to transplant large caliper trees into landscapes. Today, container and field production are both viable alternatives. Due to the increased popularity of container production of large trees during the last 20 years, field-grown tree nurseries have had to compete by marketing their product more effectively. Roots Plus Growers Association of Florida (RPG) was formed by a group of like-minded growers in the early 1990s to promote the importance of buying quality, hardened-off, field-grown trees. The association's mission is threefold: (1) to guarantee the consumer is buying a hardened-off, field-

grown tree, (2) to share new ideas to continually improve tree quality, and (3) to sponsor research and educational programs. Hardening-off is the process of holding trees (curing) for a period of time (minimum of 3 weeks) after harvesting until new roots begin to regenerate. This may sound like a simple idea, but research has proven that hardened-off field-grown trees are a superior performer in terms of establishment times and irrigation requirements in the landscape. Roots Plus Growers' trees display a tag telling consumers to look for new roots growing through the burlap to ensure they are receiving a hardened-off tree.

FLORIDA GRADES AND STANDARDS

Grades and standards for nursery plants were passed by the Florida Legislature in 1955. The 1st edition of *Florida Grades and Standards for Nursery Plants* (1965) was widely circulated but had minimal relevance or influence on the landscape tree market. The impetus for the 2nd edition was to improve the structural and aesthetic quality of trees. The 2nd edition had a tremendous impact on the landscape tree market and was immediately popular with architects, municipalities, and selected buyers. It has become, for all practical purposes, the universal tree specification throughout Florida. The *Florida Grades and Standards for Nursery Plants* provides a 10-step process that ends with all trees being graded in one of four grades: Florida Fancy, Florida #1, Florida #2, or a Cull. These grades are determined by looking at trunk structure, branch structure, canopy uniformity, root ball size, root quality, overall health, and many other factors.

GROWING QUALITY TREES

Production protocol for growing quality trees can be divided into three major categories: tree selection and planting, maintenance and pruning, and harvesting and hardening-off.

Tree Selection and Planting. Tree growers have a unique challenge in selecting which species and cultivars of trees to produce. Growers must use long-term planning strategies for selecting species and cultivars today that may not be sold for 4 to 10 years depending on final production size. Often these decisions are made without real data on what trees will be specified and in what quantities at the time of sale. There is greater emphasis in Florida over the last 10 years on cultivars and less on seedlings. The latest, and probably most anticipated species to be cultivated is *Quercus virginiana*. Many growers throughout the Southeastern U.S.A. are developing cultivars of live oak as well as many other oaks that have previously not been propagated from rooted cuttings. Growers and buyers are increasingly faced with new choices of tree cultivars. Tree selection is a complicated decision that includes growth and production estimates as well as sales and marketing plans.

Decisions also must be made as to what size and type of liner to grow or purchase. An 11.4-liter, (3-gal) liner planted into the field is a common size for Florida growers. The most important factor in acquiring quality liners is to ensure they are vigorously growing, appropriately sized for their container, and that the root system is healthy but without deformities. There are many new container types specifically designed to reduce root deformities in both liner and finished size containers. Even after buying liners grown in root-manipulated containers it is important to correct any deformities such as kinked or circling roots that can lead to culls or poor quality

plants. Another important issue at planting time is planting depth in the field, as well as planting depth in the liner root ball. There has been much discussion in the tree industry in the last 2 to 3 years about the importance of root depth in long-term health and survival of trees. Many growers are making the effort to plant trees with the top-most root emerging from the trees at or near soil level. In some cases this can mean removal of several inches of soil from liners prior to planting.

Maintenance and Pruning. Proper maintenance involves many aspects of production integrating together to produce a high quality product. Maintenance problems at any step of the way can be critical to the long-term quality and viability of trees. As with production of any horticultural crop, proper irrigation and fertilization are important to maximizing growth and quality. Irrigation management involves not only selecting the right irrigation system but also scheduling and managing that system.

Fertilization management strategies vary from grower to grower; however, all would agree that a scheduled and managed fertilization program is essential to producing quality trees.

Root pruning is an essential maintenance tool for producing a quality root system on certain species. Research has shown that root pruning produces a root system that is more fibrous with smaller diameter roots. This technique is especially helpful on species that are more coarsely rooted such as oaks and is used much less frequently on species that are naturally more fibrous. This technique has been shown to decrease water stress in trees after harvesting, thereby increasing survivability. Root pruning strategies differ from nursery to nursery, but most nurseries use some form of root pruning at least the season prior to harvesting, while others root prune multiple years prior to harvesting. These strategies differ due both to the experience of the nurseries with past crops as well as to the differences in soil and environmental conditions from nursery to nursery.

Pruning and staking of trees is a critical element in developing a high quality crop. Trees are normally staked from the time of planting until trees reach a caliper large enough to support themselves [2.5–5.1 cm (1–2 inches)]. Staking has sometimes been linked with slowing tree growth or weakening trees; however, on many species it has proven to be an essential tool for producing trees with straight trunks, which almost all buyers demand.

An important component of the 2nd edition of *Grades and Standards for Nursery Plants* is to produce large maturing shade trees with one dominant trunk. This component of the grades and standards is the first step in a 10-step process and for many buyers has become the most recognizable characteristic of a quality tree. Most growers have accepted this standard and have adjusted their pruning protocol accordingly.

Pruning for quality trees can be divided into two different types: (1) structural pruning in the canopy and (2) lower temporary branch pruning on the trunk. Structural pruning is used to guide the tree over the course of years to produce a tree with a dominant trunk and many well-attached branches that together create a well-shaped canopy that is both structurally and aesthetically appealing. This can be accomplished subtly over time by using arboricultural techniques such as branch subordination and occasionally branch removal. Lower temporary branch pruning refers to the pruning of branches from what will eventually be the tree's

cleared trunk. In the past many growers have simply removed all limbs from the trunk area as early as possible in production. This method has been shown to increase tree height without an increase in caliper, leading to frequent topping and long-term staking. Research has shown that leaving lower branches on the trunk as long as possible helps to build trunk caliper and possibly acts to regulate top growth. Lower branches need to be managed and pruned so as not to become excessively large or in the way during production. Both structural pruning in the canopy and lower temporary branch pruning are essential once or twice per year depending upon species, age of the crop, and climate.

Harvesting and Hardening-Off. Harvesting protocols for field-grown trees can vary from nursery to nursery based on environmental conditions. Many growers find it ideal to harvest some species only during the dormant season, while other species can be harvested almost year round. Harvesting techniques vary with different sizes of trees harvested. The most common sizes harvested in Florida would be a 71-cm (28-inch) root ball up to a 229-cm (90-inch) root ball. Some nurseries harvest trees and transport them to holding areas, while others harvest trees and leave the trees in the production fields until shipping. Quality field-grown trees should be hardened-off in the nursery prior to shipping and transplanting. Hardening-off requires holding trees after harvesting under optimum irrigation until roots have begun regenerating.

RESEARCH AND EDUCATION

Many techniques and management strategies used in nursery production have come from research and experiments at many nurseries over a period of years. As with much of horticultural production these techniques are learned and refined over many years of trial and error. We do however have an obligation to the industry to continue working at our farms and with research facilities to refine current practices as well as discover new time- and labor-saving techniques. The Florida Nursery, Grower and Landscape Association is working with the University of Florida to host the Great Southern Tree Conference (GSTC). This annual conference started in 2000 and has the support of the tree industry with partner businesses contributing approximately \$80,000 per year. Partner business contributions are used to develop and maintain a demonstration site with experiments that attendees can see and experience each year they attend. The GSTC attracted over 400 attendees in 2004 making this an excellent venue not just for research but also for education of the green industry.

Conferences such as IPPS and GSTC along with the commitment of individual nurseries to experiment and share their experiences are an obligation we all have to the green industry. As we continue to grow and select trees to meet the specifications and needs of tomorrow we must continue to be an active part of the research and education process that is helping to shape those needs. Gone are the days when tree farms simply grew trees and buyers came knocking on the door; today's tree market is much more sophisticated and competitive.