

What's Pruning Got to Do with Quality ?

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Everyone talks about producing quality nursery plants; but what is quality? This presentation provides insight into characteristics of quality nursery stock.

What is Quality in Ornamental Plants??

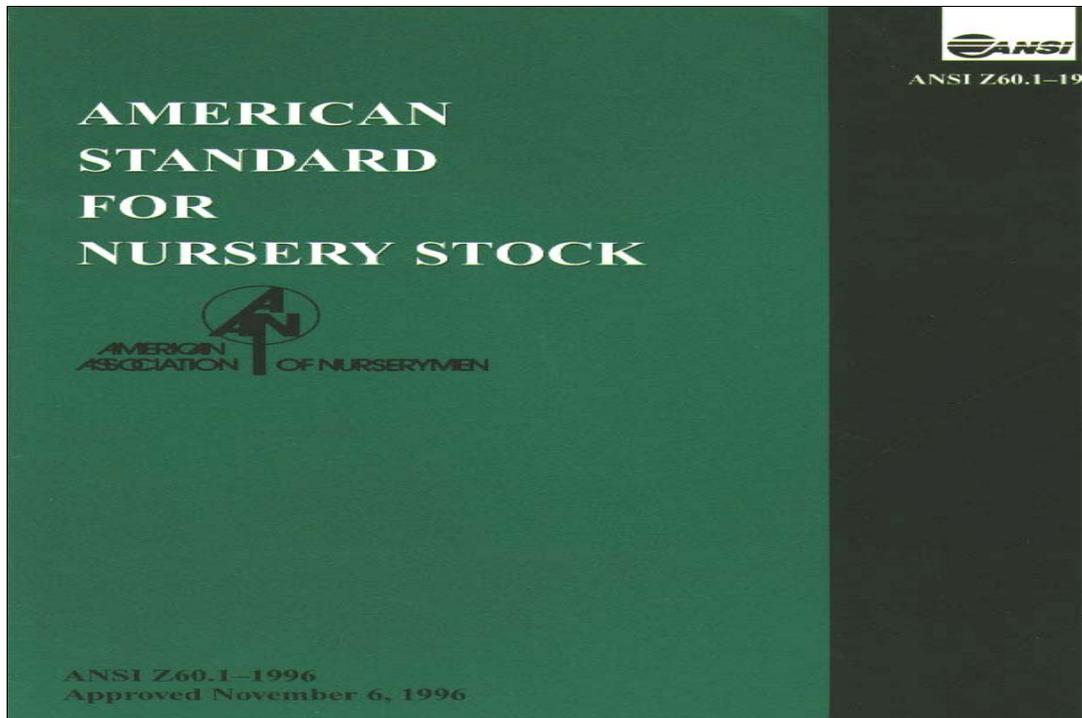
- ◆ Close Correlation between customer and industry perceptions of plant quality
- ◆ *Customer Perceptions of Plant Quality-*
Dr. Tom Glasgow 1999

Dr. Tom Glasgow (Craven County Extension Director) conducted surveys as a part of his Ph.D. graduate studies on quality perceptions of nursery grown plants. His research indicated that consumers' perceptions of characteristics of quality were closely correlated to characteristics listed and discussed by nursery industry professionals.

What is Quality in Ornamental Plants??

- ◆ Quality = fullness; healthy foliage and stems; vivid or striking foliage color; symmetry; absence of circling roots; absence of roots from drain holes; information tags
- ◆ *Customer Perceptions of Plant Quality*- Dr. Tom Glasgow 1999

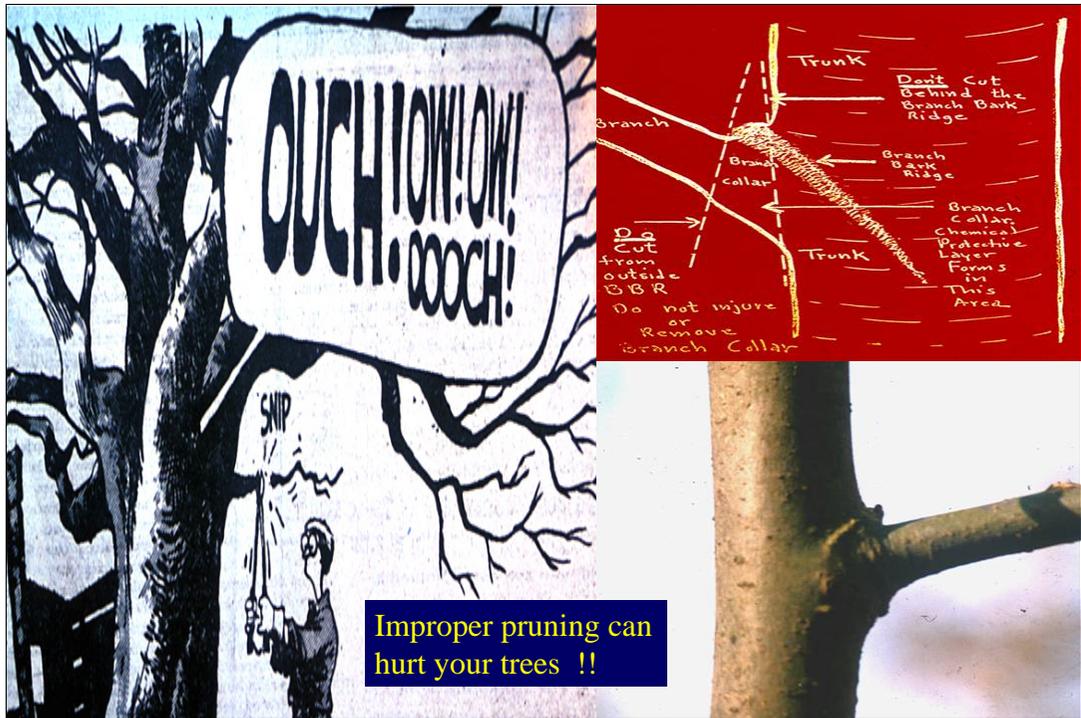
Quality characteristics identified in focus groups and surveys indicated that Quality factors included aesthetic characteristics of plant canopies and branch structure, including foliage color, healthy foliage free of spots and imperfections, symmetry and root characteristics including no circling roots and information tags were important to consumers.



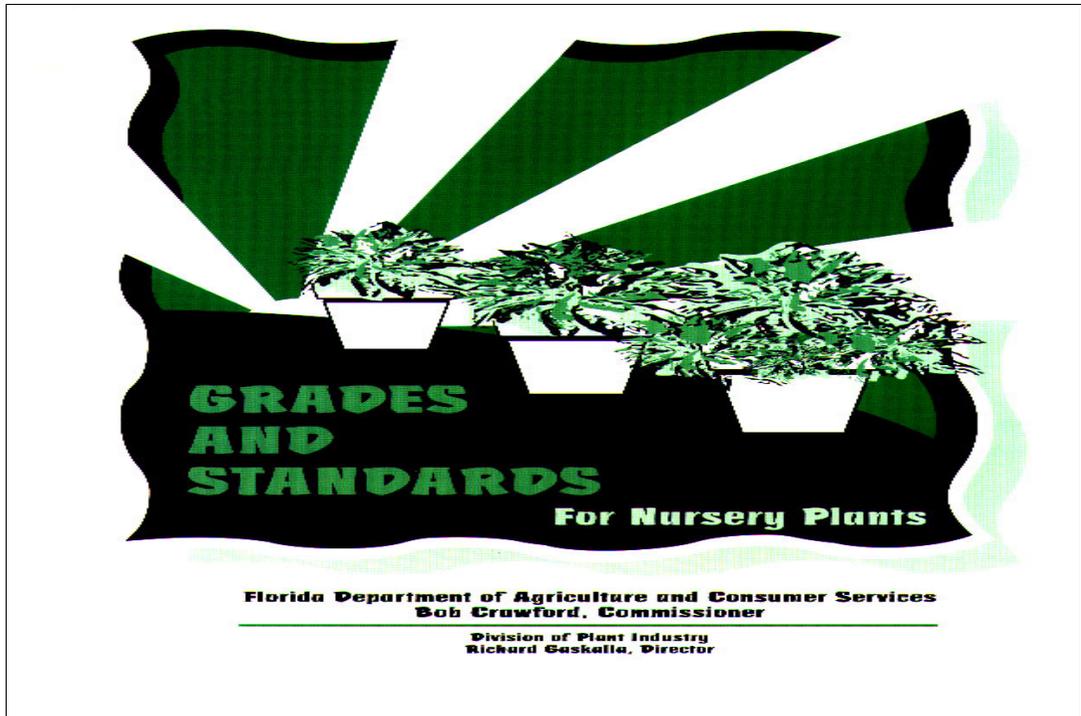
For years, the American Standards for Nursery Stock (ANSI Z 60.1) standards provided the only documented characteristics of quality for nursery stock. The American Standards provide guidelines for size of root ball to caliper size of shade trees and height and width standards for shrubbery. The standards also provided guidelines for number of branches for shade trees and standards for container size of plant material related to height and width characteristics. (See:<https://www.anla.org/publications/index.cfm?>)



Pruning practices for centuries recommended flush cut pruning. It was not until approximately 1982 when Dr. Al Shigo proved that flush cut pruning was harmful to plants and interrupted natural wood closure physiology of plants.



Dr. Alex Shigo changed pruning practices. Today, proper pruning removes branches at the branch collar as shown in the insert in the top right corner of the picture above. Flush cut pruning would have created much larger pruning wounds made at the origin of the branch and main stem. The diagonal line in the right corner picture shows that a branch collar pruning cut is made at the point where the branch narrows before it becomes wider at the stem. The pruning cut forms an equilateral triangle with the bark ridge formed between the branch and main stem.



The Florida Grades and Standards brought a new set of quality criteria to production of nursery stock. The grading standard created 4 categories of plant quality. The Florida Fancy category requires single stems with no competing or co-leaders throughout the height of single stem shade trees. Other quality characteristics require good symmetry of branches, closed or nearly closed pruning wounds and disease and pest free plants. Florida #1 plants allows some defects including co-dominant leaders above $\frac{1}{2}$ the height of the tree. Shrubbery must meet height, width and symmetry standards. As the Florida Grades and Standards have been enacted, landscape architects and municipalities require all plants to meet Florida Fancy or Florida # 1 standards. (See:<http://www.doacs.state.fl.us/pi/pubs.html>)

What is Quality in Ornamental Plants??

- ◆ Florida Fancy Characteristics-Shade Trees
- ◆ One trunk through center to top
- ◆ Branch diameters $< 2/3$ of trunk
- ◆ No flush cuts, or evident injuries; no chlorosis
- ◆ No disease or insects evident
- ◆ Full crown, appropriate root ball size
- ◆ No Circling Roots

Florida Grades and Standards for shade trees emphasize single straight leaders and elimination of co-dominant branches.

TYPE TWO MATRIX — PYRAMIDAL SHAPES								
CALIPER	MINIMUM TREE HEIGHT	MAXIMUM TREE HEIGHT	MAXIMUM CROWN SPREAD DIAMETER			MINIMUM B&B ROOT-BALL DIAMETER	MINIMUM GROW BAG ROOT-BALL DIAMETER	MINIMUM CONTAINER VOLUME
			FL. FAN.	#1	#2			
1/4"	18"	36"	10"	8"	6"	6"	—	4" Sleeve
1/2"	18"	4'	14"	10"	8"	8"	—	1 Gal.
3/4"	3'	5'	15"	12"	10"	14"	—	3 Gal.
1"	4'	7'	20"	16"	12"	16"	12"	5 Gal.
1 1/4"	5'	9'	24"	20"	16"	18"	14"	7 Gal.
1 1/2"	6'	11'	30"	24"	20"	20"	16"	15 Gal.
2"	6'	14'	42"	36"	30"	24"	18"	15 Gal.
2 1/2"	8'	16'	48"	42"	36"	28"	18"	25 Gal.
3"	9'	18'	58"	48"	40"	32"	20"	45 Gal.
3 1/2"	10'	18'	65"	54"	44"	36"	24"	65 Gal.
4"	10'	22'	6'	5'	4'	40"	30"	95 Gal.
4 1/2"	12'	24'	7'	6'	5'	44"	36"	95 Gal.
5"	14'	26'	8'	7'	6'	48"	36"	95 Gal.
5 1/2"	15'	28'	9'	8'	7'	50"	—	200 Gal.
Notes:								

The Florida Grades and Standards has a matrix for all forms of plants in production. The specifications may change related to the form of any particular nursery crop.

Using these standards, growers can 'grow crops to order', taking guess work out of how tall, what caliper or width a tree should be to meet specifications for sale.

[<http://www.doacs.state.fl.us/pi/pubs.html>].

Step 9 - Determining If Pruning Cuts Were Made Correctly

Instructions: Locate the photograph, drawing, caption and associated text below which most closely represents the condition of the pruning scars on the tree you are grading. Check the 'true' column in Step 9-b if incorrect pruning cuts were made. Check the 'false' column if correct pruning cuts were made, and if there are no trunk injuries.

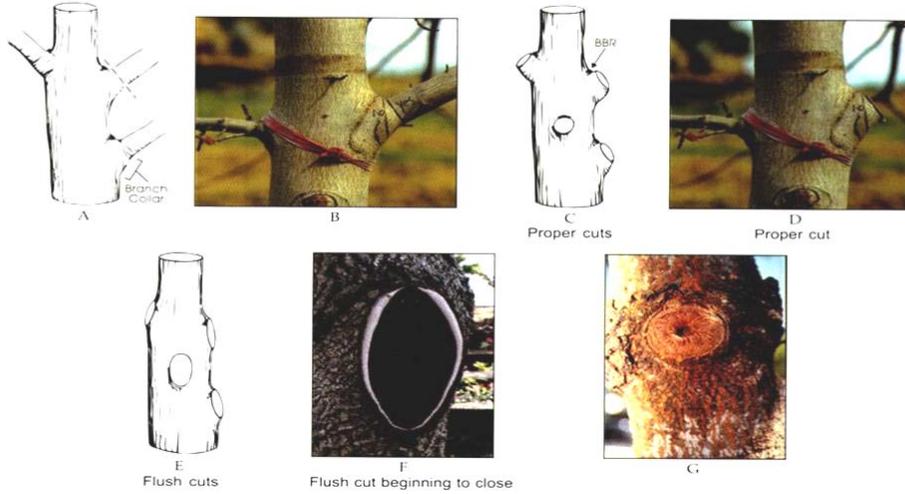


Figure 4.

The Florida Grades and Standards provides a score sheet for grading pruning cuts and wounds. Flush cuts as illustrated in caption E and a flush cut would in caption D down grade trees based upon pruning technique.

What is Quality in Ornamental Plants??

- ◆ Florida Fancy Grade Characteristics- Azaleas
 - ◆ Branching- plentiful and uniformly distributed close to ground level
 - ◆ Dense-healthy, vigorous normal size leaves, shape, color
 - ◆ No holes, broken limbs, chlorosis
 - ◆ Pest damage barely perceptible

General standards for shrubbery include density of canopy, leaf and foliage appearance, and open spaces or holes in canopy.

What's Quality?

Making Quality!

Pruning

Sheared Shrubbery and Screening Plants



Nurseries have reputations for quality based upon the effort and skills they utilize to grow aesthetically pleasing plants and how well their plants become established and live in the landscape. The total package includes every thing they do to grow healthy tops and roots.

Shearing is done frequently in nurseries - 3 to 6 times during the growing season by manual labor or mechanical equipment.

Each time a shoot tip is removed, many new shoots develop creating a dense compact plant canopy.



Most shrubbery is sheared to create a densely branched and compact canopy. Open spaces in a canopy of a sheared crop usually results from poor timing or too infrequent pruning cycles where terminal shoots are allowed to grow too tall and do not fill in with lateral branches below vigorous shoots. The rule for pruning shrub type plants is frequent pruning and removal of only short tips less than 3 inches in length.

Shearing
Shrubs
creates
compact
dense
foliage by
removing
terminals
from every
growing
tip.



Shearing is used to create compact growth of liners as seen in the upper left picture of azalea liners and to develop pyramidal form in field and container grown crops such as 'Nellie R. Stevens' holly. Shearing is also used to create topiary and other creative forms of specimen plants.



Shearing is the most frequently used pruning practice for growing shrubbery. The goal is to produce a very compact, dense symmetrical canopy. Best results are experienced with crops are sheared 3 to 5 times during the growing season with just a 1 inch or less tip removed. Each pruning cut should result in multiple new shoots from the terminal and near by nodes. Therefore, each pruning cycle produces many new shoots and greater density of the canopy.

TYPE TWO MATRIX

Scientific Name: **X *Cupressocyparis leylandii* (Dallim. & A. B. Jackson) Dallim.**
Common Name: **Leyland cypress**

Florida Fancy—Branches are well-distributed along the single trunk, and the crown is uniform.

Florida #1—The crown is not uniform because the lower left side is missing.

Florida #2—The trunk divides into three trunks in the upper half of the tree, and the canopy is very one-sided.



Florida Fancy



Florida No. 1



Florida No. 2

Symmetry and balance are the most important characteristics for grading screening type plant material. Plants with good symmetry are graded high while asymmetrical form is down graded. Attention to pruning and shearing practices can result in higher grade plant material.

Shearing is done frequently in nurseries -

3 to 6 times during the growing season by manual labor or mechanical equipment.

Each time a shoot tip is removed, many new shoots develop creating a dense compact plant canopy.



Screening plants must be sheared frequently to develop dense compact form. All tips are pruned. One single terminal shoot is allowed to grow 10 inches to 12 inches in height and then the terminal is pruned. Pruning the terminal allows lateral branches to elongate and fill in the terminal shoot. Several new laterals will develop, one is selected as a new terminal and others are cut back to approximately $\frac{1}{2}$ their length. Additional lateral shoots will then develop on the terminal and along nodes on pruned laterals. This procedure is continued 3 to 6 times during the growing season to develop dense canopies. Most pruning during the growing season will include pruning soft shoot growth rather than waiting for shoots to lignify.



Pruning cycles must be frequent or terminal shoots grow too vigorously and do not fill in open spaces. Plants in this slide are reduced in quality due to the open spaces seen in the canopy. The only options to fill in open space are to cut the tops back to the open positions in the canopy or to allow lateral shoots below the open space to grow upward and then they are sheared to develop multiple shoots to fill in the open space. This practice requires extra production time and is essentially a remedial practice to correct defects which could have been avoided if pruning cycles had not been omitted.



Conifer screening plants are pruned in the same manner as broadleaved screening plants. Many nursery professionals are reluctant to prune the top of conifers, however, if they are not pruned, the canopies will not be as dense as desirable. Some screening plants like leyland cypress develop co-dominant leaders. The best choice for the best structure is to cut one co-dominant leader out. However, the plant will have a wider, denser base if both leaders are left. Therefore some growers allow both leaders to grow thorough a height of approximately 4 ft at which time the cut the top out of one and allow the other leader to form a dominant leader. Such plants maybe sold at 6 feet or taller but have a wider base and are usually chosen by landscapers and sold first in landscape nurseries. Failure to remove one of the leaders results in splitting and damage in high wind storms or ice storms.



The leyland cypress on the left is a single stemmed plant. Frequent pruning is required to increase the density of single stemmed leylands. Multiple leader leylands have a more compact and dense form. Unfortunately, multiple leader leylands in landscapes tend to be easily damaged by snow, ice and high wind. Multiple leaders tend to split (peel like a banana). Some growers allow multiple leaders at the base of the plant to increase density of lower canopies, but in the season before sales, growers top or cut the top of all but one main leader. The top of the canopy develops as a single leader plant. The lower multiple leaders are very stiff shoots and do not have a heavy weight load at the top. Therefore snow, ice and wind do not cause these shoots to break or split.

What's Quality?

Tops

Single leader

No Co-Dominate Leaders

Scaffold Branch Distribution

Symmetry/Balance

No Holes

Good Branch angles

Canopy Height- Market Strategy

Planting Depth Correct

No Girdling Roots



So with all the new innovations for growing trees in BIG containers, What's Quality? Are there grades and standards for QUALITY ?

The answer is YES !

STEP 1—Determining the Quality of Trunk Structure

Instructions: Locate the drawing, caption and associated text below that most closely represents the trunk structure of the tree you are grading. Circle the appropriate tree grade at the end of Step 1 on page 2. (For photographic examples see Shade Tree Appendix pages 49-56.)

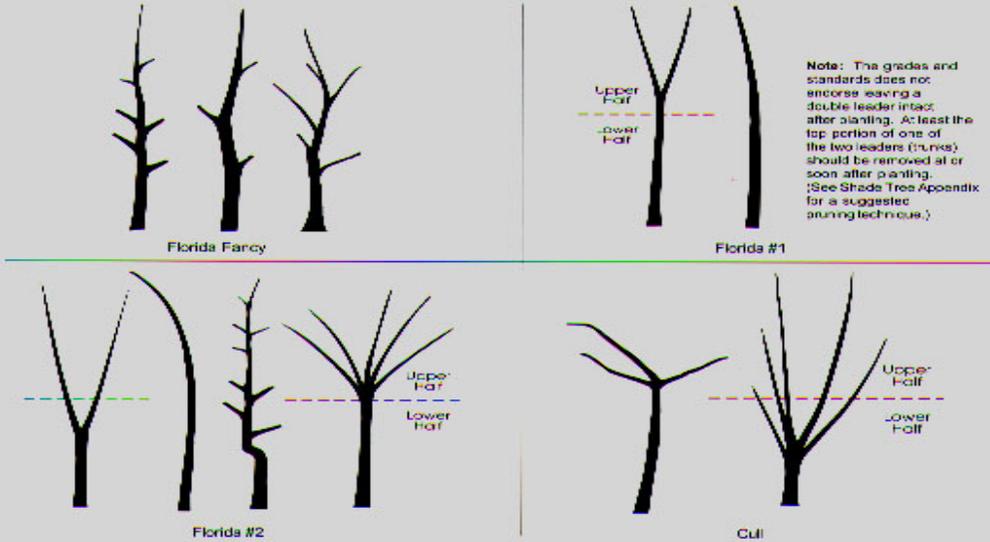


Figure 1.

The diagram above provides a visual description of Florida Grades and Standards quality categories for main stems and leaders .

A Florida Fancy Grade requires a central leader throughout the entire height of the tree. The leader may not be straight in some tree crops, however, a central leader is maintained throughout the height of the canopy. A Florida # 1 has a co-dominant leader in the top 1/2 of the canopy. Florida #2 trees have co-dominant leaders below 1/2 the height of the tree. Florida # 2 trees are essentially “Park Grade” trees. Co-dominant leaders in large shade trees frequently split during storms with high winds or under snow and ice loads during winter storms. A cull is a tree not fit for any landscape use.

STEP 2—Determining the Quality of Branch Arrangement

Instructions: Locate the drawing, caption and associated text below that most closely represents the branch structure of the tree you are grading. Circle the appropriate tree grade at the end of Step 2 on page 4. **Note:** All conifers, magnolias, hollies, loblolly bay and other narrow, upright trees are exempt from Step 2. Major branches on trees less than 5 feet tall do not have to be 4" or 6" apart to meet Florida #1 or Florida Fancy standards, respectively.

(For photographic examples see Shade Tree Appendix pages 49-56.)

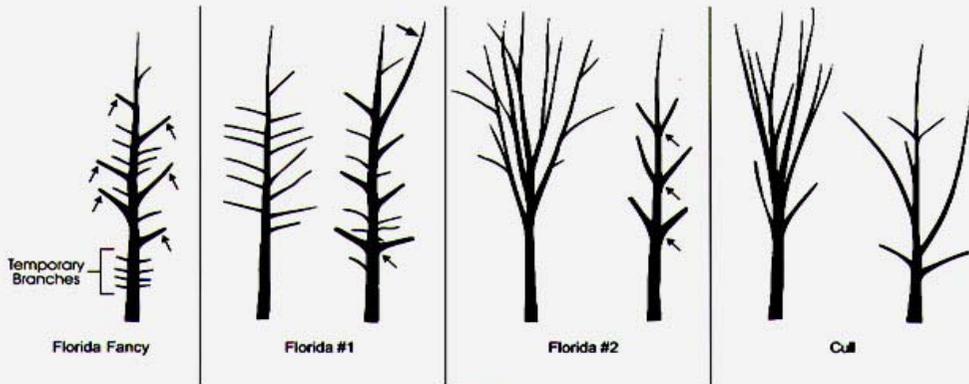


Figure 2.

Branch structure arrangement and spacing are considered in the Florida Grades and Standards. Good scaffold branch distribution and wide crotch angles are required for the Florida Fancy Grade. Lateral branches that will compete with the leader require a down grade in the standards. Weak or multiple parallel branches growing in the same area of the canopy also result in a down grade in the Florida Standards.

STEP 6 - Determining the Structural Uniformity of the Crown

Instructions: Identify the drawing, caption and associated text below that most closely represents the structural uniformity of the tree you are grading. Circle the appropriate tree grade at the end of Step 6 on page 4.

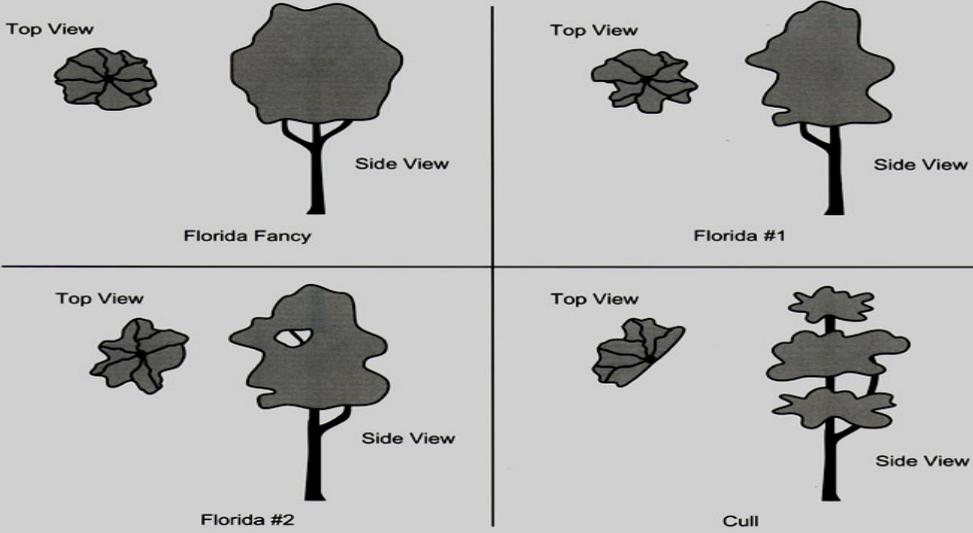


Figure 3.

Canopy symmetry and uniformity are also considered in the Florida Grades and Standards.

TYPE FOUR MATRIX



Florida Fancy

Scientific Name: *Ulmus parvifolia* Jacq. & cvs.
Common Name: Chinese elm

Florida Fancy—Branches are well-distributed along a single trunk, and the crown is uniform.

Florida #1—The crown is uniform, but two major branches in the crown are opposite each other.

Florida #2—The trunk divides into two nearly equal-sized trunks in the lower half of the tree.



Florida No. 1



Florida No. 2

A Florida Fancy Grade tree has characteristics of a straight single leader with no co-dominant branches, good branch arrangement and spacing and uniform growth on all sides of the canopy.

TYPE FIVE MATRIX

Scientific Name: *Acer rubrum* L. & cvs.
Common Name: **red maple**

Florida Fancy—There is one straight trunk, and the crown is uniform.

Florida #1—The crown is uniform, but the trunk divides into two nearly equal-sized trunks in the top half of the tree.

Florida #2—The crown is uniform, but the trunk divides into two nearly equal-sized trunks in the lower half of the tree.



Florida Fancy



Florida No. 1



Florida No. 2

A tree receiving a Florida Fancy grade is not necessarily a perfect specimen, but a Florida Fancy tree is structurally sound and has a aesthetic form.

Failure to
Prune
Or
Lack of
Skill
Affects
Quality of
Nursery
Stock



Unfortunately, most states have not developed a system of grades and standards as Florida has. Consequently, many very poor quality trees are planted in landscapes. What's wrong (or right) with trees in this slide?

What's Quality?



Pruning

Single Leader

Eliminate Co-dominant Leaders

Select & Space Scaffold Branches

Determine Canopy Height

Sparse stem twig retention

General guidelines for pruning single leader trees include maintaining 1 leader, pruning in the first and each year of production so that scaffold branches (permanent branches) can be selected and developed with good spacing between parallel branches and wide angled branches can be selected to spiral upward around the canopy. Determining canopy height is market dependent.

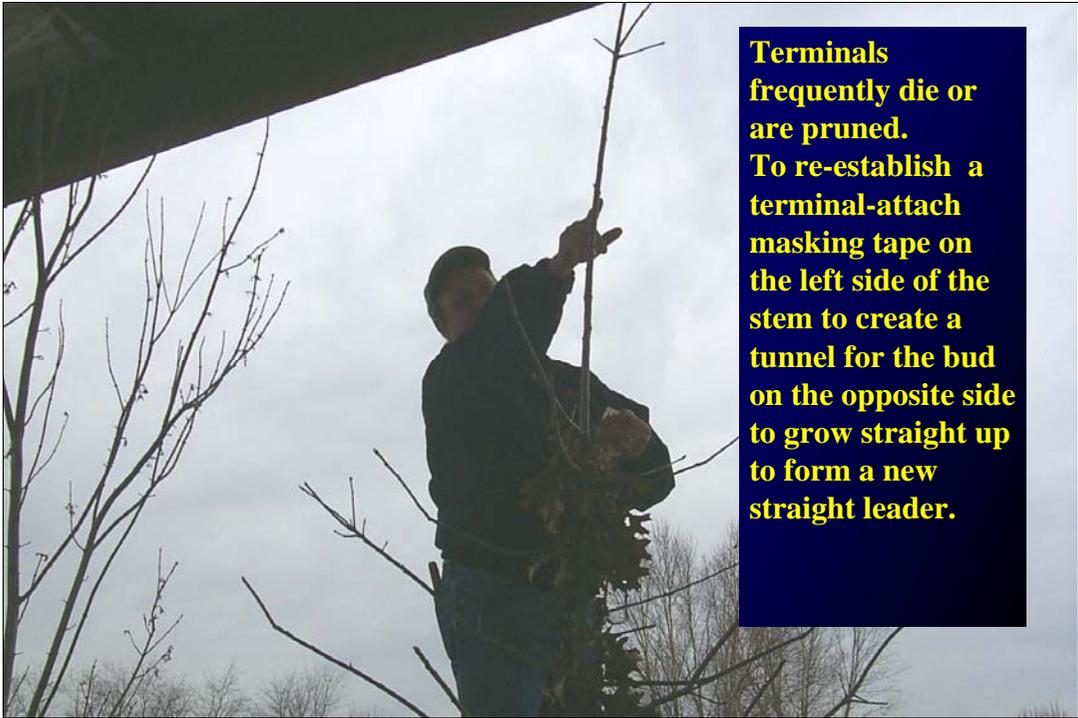
Co-dominate leaders reduce quality of trees



The tree on the left can be pruned to 1 leader. Since several laterals originate at approximately the same location on the stem, several should be completely removed to avoid swollen nodes. The most acute angled lateral shoots should be completely removed. Wider lateral shoots should be cut back to a bud on the lower side of the stem to force growth laterally not upward. The co-dominant leaders in the center may be too large to cut. The outside co-dominant leader in the right side picture can still be removed and new growth should fill the upper canopy within the next growing season.



Winter pruning- When trees are dormant, co-dominant and competing leaders are easily identified. Competing leaders could have been eliminated during summer pruning but still can be corrected while plants are dormant. Co-dominant leaders need to be cut back to the point they originate or cut back to at least $\frac{1}{2}$ their length to an outside or bottom bud to direct new growth outward rather than upward. The center picture is easily corrected by selecting the center most leader and removal or cutting back competing leaders to at least $\frac{1}{2}$ their length. The improper pruning conducted on the right side picture will be the most difficult to re-establish a new leader. Summer pruning will be required to complete good form. Pruning will require selecting a new leader from several new shoot that will develop on the leader closest to the stake.



Terminals frequently die or are pruned. To re-establish a terminal-attach masking tape on the left side of the stem to create a tunnel for the bud on the opposite side to grow straight up to form a new straight leader.

The leader on this tree was too vigorous and developed without any lateral branch development. To correct the problem, cut the leader back and establish new leader from bud. Lower lateral branches will require pruning back to an outside or bottom bud. Summer pruning will require suppression of new shoots to keep them from out growing the new leader formed from the bud selected.



A new leader is being developed on this red maple. Lateral shoots were pruned back to reduce competition. The top bud on the lateral shoot left of the leader should be removed, otherwise a competing shoot will develop with the next flush.



A new leader is being established in these red maples by bending a flexible lateral up and securing it in an upright position using masking tape. The leader will become lignified (become stiff) and the masking tape will deteriorate and will not require removal.



Masking was used to pull a flexible lateral shoot to the previous leader. The previous leader was stripped of all buds. The picture shows the stub from the previous leader which was cut back after the new leader formed. Results could have been better if the leader would have been cut back sooner. Also, 3 shoots are attached to the node above. No more than two lateral shoots at any node is preferred. Never the less, the leader will be straight as the stem grows in diameter.



Pruning to improve quality :Failure to prune 'Bradford' Pear has resulted in rejection of this flowering tree for landscape use. 'Bradford' was a very popular landscape choice until consumers realized this tree would split apart after 15 to 20 years in landscapes. 'Bradford' pear is now essentially out of the nursery industry. The tree requires pruning early in the production cycle to maintain a leader. In the upper right picture, laterals are out-growing the leader and will over take the leader creating multiple leaders. The laterals require pruning to approximately $\frac{1}{2}$ their length to outside or downward facing branches to reduce competition with the leader. Selection of lateral branches with wide branch angles is also necessary to prevent large scaffold branches from growing into the main leader as seen in the lower left picture in the slide. When large lateral branches grow in diameter into the main stem, tension is created that after 15 to 20 years causes branches to split away from the leader, causing large holes in the canopy and disfiguring the entire form of the tree. The picture on the right side of the slide shows a properly pruned 'Bradford' Pear. The tree has been pruned to maintain natural form. The scaffold branches selected have wide crotch angles and will not develop tight crotches that split out as trees grow in the landscape.



Correct pruning practices in the nursery can avoid situations such as the development of multiple scaffold branches at the same node. The maple in the top left picture has the largest scaffold branches in the tree originating at the same location in the canopy. Preferably, scaffold branches are selected to spiral up the stem with only 1 major branch at any node. The tree in the lower left has many branches low in the canopy and co-dominant leaders above the multiple nodes. This tree will be weak in structure as it grows to full size in the landscape. In contrast, the Ginkgo trees in the right hand of the slide have been pruned to create scaffold branches in particular planes. Such trees could be pruned to an espalier form which might be placed against a wall and grown in a single plane.

What to
Cut???

Where do you
Start??

Prune early
and often??

Only take
what you
need!!



Some trees present a total puzzle in regard to where to begin pruning regardless of if they are in the landscape or nursery. This redbud has very sprawling lateral branches and a leader that is not erect. The first step would be to cut the laterals back to $\frac{1}{2}$ their length and remove some branches entirely if multiple branches are located at the same node. The leader should be cut back to an upright bud and staked vertical so that a single leader will be maintained. Some low branches might also be removed if they are too low on the stem.

Canopy height depends on market preference



Canopy height for shade trees is a marketing driven decision. In this picture, these trees will be harvested and sold to other nurseries as liners for field and large container production.

Canopy height depends on market preference



For nurseries, canopy height is a marketing decision. If small 1 to 1 ½ inch caliper trees are sold to consumers or retail nurseries, the canopy height may be set at 24 to 36 inches. Larger trees sold to landscapers or municipalities may produce 2 to 3 inch caliper trees and set canopy heights at 60 or 72 inch heights. Tables in the Florida Grades and Standard provide guidelines for appropriate caliper, spread and heights for each size of containers.

Pruning

TO DO LIST

Protect
Leader

Lift Canopy

Leave some
Feather Shoots

Select Scaffold
Branches

Keep Wide
Branch Angles

Maintain
Space between
Scaffolds



**Eliminate
competing
dominate
leaders early
in production**

**Choose a
leader!**



Nursery production of shade trees requires detailed attention to pruning. Maintaining a single leader is the most important pruning requirement. Pruning is required during dormant seasons as well as during the growing season. Competing laterals need to be removed or cut back to $\frac{1}{2}$ their length to reduce competition with the leader. Multiple laterals at the same node need to be pruned to reduce laterals to 1 leader per node. Nodes below the leader should be pruned to create branches that spiral in each direction of the compass to create a symmetrical outline in the canopy.

**Quality of Trees and Market are determined by Pruning
Canopy Height
& Scaffold Branches**

Summer pruning may require 2 to 3 visits to direct growth of new liners.

For red maples- it is very important is to maintain a straight single leader by pruning competing shoots back several nodes to a top and bottom node, then pinch out the top bud.

Cut back lower lateral shoots to direct growth up - not out.

Shorten lower shoots but do not completely remove all low shoots.

Leaving some lower growth will enhance caliper development during the Fall



Young vigorous trees such as red maple cultivars require frequent pruning to maintain leaders and reduce growth of laterals. The key is to reduce growth of branches that do not contribute to the form and structural development of the tree. In small liners such as these trees, there are no permanent branches present at this stage of production, therefore keeping symmetrical growth is important to push vertical growth. Low feather growth on stems can be cut back to 1 to 2 nodes to enhance caliper growth of the stem during fall translocation of nutrients.



Red maples are very vigorous. Pruning in this picture removed considerable growth-as seen in the final slide on the right!

However, the results of this pruning are correct. The leader was established, laterals have been shortened and

lower shoot growth has been left to enhance caliper development.



Nurseries growing large trees require equipment that allows them to prune at canopy height. This nursery uses a wagon to allow the pruning crew access to the top of the canopy.

What's Quality?

Staking/Support

Stem Support - Stand straight
Anchorage -Root establishment
Blow Over

Attachments

Allow Movement- Build taper
Reduce girdling

Remove Stakes & Attachments

1 Season Max



Although most nurseries would prefer not installing staking and anchorage systems, tree production demands installation and maintenance of support systems.

Stems of tree liners are generally too weak to stand erect without staking.

Stakes in this slide are used to hold the stem erect in the container.

Stakes shorter than the leader can be used to hold the tree erect without affecting the growth of the leader.



Staking of tree liners is a necessary evil of tree production. Attachments to the stem must be checked frequently to avoid compression and damage of stems. The goal is to keep trees vertical until the stem develops enough strength to stand alone. Unfortunately, new terminal growth may also be too weak to stand, requiring taller stakes.

Every tree in the field
exhibits results of good
pruning practices



Straight stem growth is accomplished by pruning and staking in this field nursery. These field grown trees will be sold as liners for container producers.



Close spaced trees require staking to stand upright and develop straight leaders. Stakes should be removed after 1 season but best removed when the leader out grows the height of the stake to prevent bending of the leader



This tree is supported by a stake shorter than the height of the tree. When leaders out grow stakes, they usually bend over the top of the stake.

If the leader is strong enough to maintain vertical, then short stakes can be used to keep the tree upright. Wind resistance of the canopy usually requires use of stakes to keep trees from bending over.

What's Quality?

Pruning

Sheared Screening Plants

Single Leader

Multiple Leader from Base

Modified Leader/Scaffolds



In the Florida Grades and Standards, pruning practices dictate the grade of finished nursery stock. Standards have been developed for screening plants, single leader shade trees, multiple leader shade trees and trees with modified leaders.

What's Quality?



Pruning

Multiple Stem Leader

Select 3 to 5 Spaced matched Stems

Remove suckers and lower branches

Prune crossing branches

Modified Leader/Scaffolds

Straight Stem with Vase shaped canopy at selected height

In the Florida Grades and Standards, pruning practices dictate the grade of finished nursery stock. Standards have been developed for screening plants, single leader shade trees, multiple leader shade trees and trees with modified leaders. Multiple leader trees generally require much less pruning and maintenance during nursery production. Flowering cherries are frequently pruned into a modified leader form where the a leader has been grown straight to a height of 72 or 84 inches and then cut. Scaffold branches are selected to form a vase shaped canopy.

TYPE FOUR MATRIX



Florida Fancy

Scientific Name: *Lagerstroemia indica* L. & tree cvs.
Common Name: crape-myrtle

Florida Fancy—Trunks and major branches are not touching, and the crown is uniform and full.

Florida #1—The crown is full, but branches and trunks are touching.

Florida #2—The crown is thin and slightly one-sided. Flush cuts were made when removing branches, and bark is included in the crotches of main branches. This cannot be seen in the photograph (see Fig. 7a, page 46).



Florida No. 1



Florida No. 2

The Florida Grades and Standards focuses on equal sized stems and symmetry as quality standards for the Florida Fancy Grade.



Multiple leader trees such as river birch or crapemyrtle should have straight stems and symmetrical canopies. Pruning is limited to removing sucker shoots at the base of the stems and crossing or rubbing branches in the upper canopy.



Kwanzan cherries are usually grown as a modified leader tree. To produce a modified leader tree, a straight leader is maintained until the tree reaches an appropriate height which for 2 ½ caliper trees may be 90 inches to the height the terminal is cut. As the tree grew from 72 inches to 90 inches, lateral scaffold branches were selected to form the vase-like canopy. A canopy height of 72 inches is required for many municipal tree planting projects.

Tree
pruning
requires
selective
techniques

Not all
trees are
pruned
alike.



Rules for single leader trees are not always appropriate for many types of nursery grown trees. Japanese maples are often prized for asymmetrical form and are not necessarily pruned for straight leaders.

What's Quality?



Roots

Distribution throughout rootball

Not Root Bound

Roots to bottom of container

Not Rooted out of container

Healthy

Not planted too deeply

White root tip observed at edge of rootball

Is QUALITY only judged by the top of the plant? Although roots are not as readily seen as top growth, root health is actually more important than the appearance of the top of nursery and landscape plants.

Are there any grades and standards for roots? See: Florida Grades and Standards- Step 10

[http://www.marshalltrees.com/upload/file_mgr/7_25file.pdf]

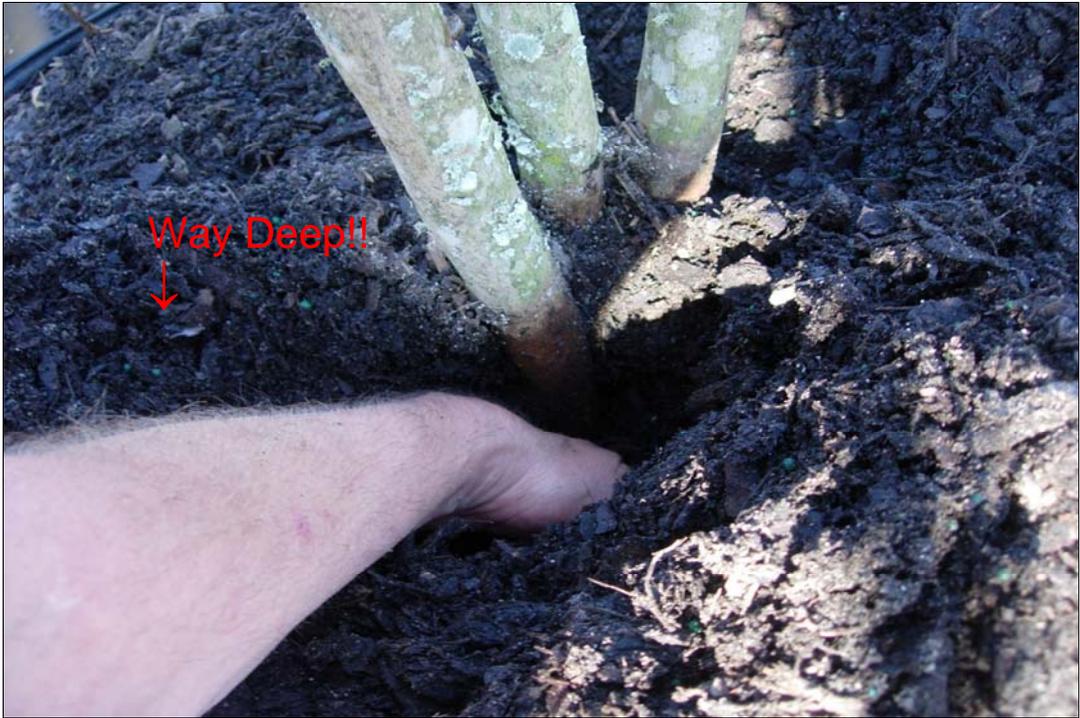
What's Quality?



Planting Depth

- One of the biggest complaints from landscape professionals and arborists is that nursery trees are planted too deep and result in mortality of landscape trees.

Planting depth and condition of root systems is a hidden quality factor of field grown and container grown crops.



Planting too deep is an epidemic in the nursery and landscape industries and results in poor survival of plants in the landscape.

Planting too deep reduces vigor and establishment of trees grown in large containers

Alternatives include thinning the canopy to reduce wind resistance, staking or anchorage support



Planting too deep is a problem in container production and in field production. Planting too deep can be fatal in the nursery or when plants are transplanted into the landscape and planted too deep because the tree from the nursery was too deep.



In the nursery, some crops such as leyland cypress die when they are planted too deep or too much potting mix is placed over the original root ball surface.



The pictures above are from a 'Green Giant' Arborvitae. The plant died. It appeared to have been planted too deep.



This field grown tree died in the landscape after being harvested from a field nursery. The tree was excavated and found to have approximately 3 inches of field soil over the top of the root ball. The tree was planted in the landscape at grade and mulched heavily with bark. Ultimately, the tree ended up approximately 6 inches below the top of the original root system. The problem began in the nursery. The tree either submerged after being planted by an auger hole planting technique or the auger hole may have been deeper than the original root ball of the liner. The other possibility is that soil was thrown over the top of the root system by cultivation practices used for weed management.



The soil line can be seen on stem several inches above where stem has a natural flare. This tree was planted too deep. Some roots vertical roots can be observed, which indicates the tree tried to grow roots up through the soil covering the root ball to where adequate aeration was available for survival.



This field grown willow oak tree liner was transplanted from a 3 gallon liner. The 3 gallon liner was very root bound and had circling roots. The root system could not support the demand of the tree canopy causing death of the tree. A physiological canker (crack) developed in the stem due to water stress.



The root ball of this willow oak was dug out of a field nursery. Trees in this planting had pits in the stem and were slime fluxing (pushing sap out of the stem) developed due to an imbalance of root mass to top mass of the tree. The tree liner was a root bound 3 gallon container tree. A girdling root or roots developed as the diameter of the primary roots grew. The root system was inadequate for the demands of the canopy. A flat side on the stem developed at the base of the stem at the soil line. Flat sided trunks develop when they are restricted in growing on one side by a girdling root.



Stem anomalies such as cracks or warty bark are frequently due to inadequate root systems.



This landscape tree was excavated and found to have very few fine adsorbing roots. The tree was likely grown in a field nursery without irrigation, large primary roots explored surround field soil for moisture. Only stubs of primary roots were harvested when the tree was dug from the field nursery.



*Drip irrigation
increases roots
harvested in the
rootball*

More roots are harvested when field grown trees are drip irrigated. The tree pit above shows clean walls with little evidence of large roots being severed at harvest. More roots are harvested when trees are drip irrigated in field nurseries.