

# Canopy Management of Citrus Trees<sup>1</sup>

Tripti Vashisth, Mongi Zekri, and Fernando Alferez<sup>2</sup>

Tree canopy and bearing volume are two important factors in fruit production and fruit quality. Generally, trees with larger canopy volumes produce more fruit than smaller-canopy trees. Canopy management is an important aspect of citrus production in Florida to avoid problems associated with overcrowding and excessively tall trees, to improve light interception and pesticide distribution into the canopy, and to facilitate equipment operation within the grove. Proper control of vegetative growth is essential for the maintenance of healthy, productive citrus trees. The effect of insufficient light is frequently observed in mature citrus groves that are not pruned regularly. Shading reduces yield and foliage on the lower parts of the trees. Sunlight not only influences flowering and fruit set but also enhances fruit quality and color development. Increased sunlight penetration within the tree canopy might also allow foliage to dry more quickly after a rain shower and could help reduce establishment of fungal pathogens. Therefore, adjustments must be made to the tree canopy to maximize sunlight interception.

Pruning is one of the oldest horticultural practices. It changes the form and growth of a tree. The pruning process 1) adjusts tree shape and the canopy's ratio of framework to fruit-bearing shell, 2) alters the shoot/root ratio, and 3) changes the carbohydrate (food-storage) status of the tree. Pruning healthy, mature citrus trees can reduce yields in proportion to the amount of foliage removed and can delay fruiting of young, nonbearing trees. Pruning should therefore be limited to that required for future canopy bearing

surface development and to conduct efficient cultural and harvesting operations (Figure 1). Under Florida weather conditions, citrus trees often produce vigorous vegetative growth that can result in overcrowding and shading. Therefore, canopy management is very important.

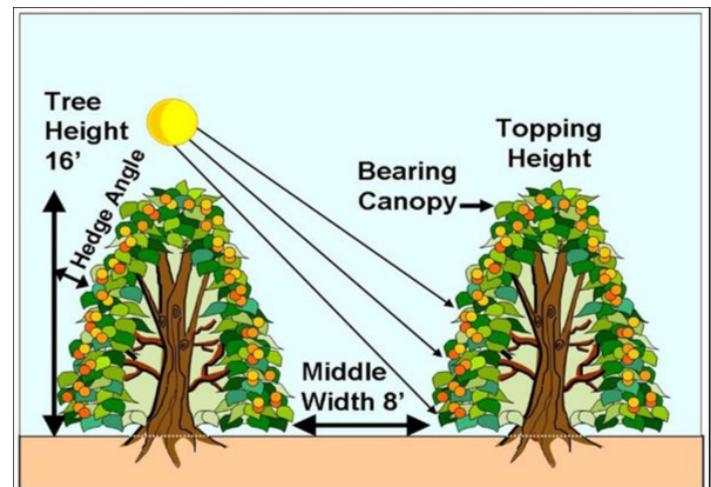


Figure 1. Topping height, middle width, and solar angle influence the amount of sunlight that gets to the lower canopy.  
Credits: UF/IFAS (adapted from EDIS HS1026)

In general, tree response to pruning depends on several factors including variety, rootstock, tree age, growing conditions, time of pruning, and production practices. There is no fixed set of rules. Analyze each situation critically before making any canopy-management decisions that would involve severe pruning. Growers are encouraged to gain a clear understanding of the basic principles of pruning, to take advantage of research results, and to consult

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2. Tripti Vashisth, assistant professor, Horticultural Sciences Department, UF/IFAS Citrus Research and Education Center; Mongi Zekri, Extension agent IV, UF/IFAS Extension Hendry County; Fernando M. Alferez, assistant professor, Horticultural Sciences Department, UF/IFAS Southwest Florida REC; UF/IFAS Extension, Gainesville, FL 32611.

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knowledgeable colleagues and custom operators for their observations and recommendations.

## Basic Pruning Cuts

Thinning out and heading back are the main types of pruning cuts (Figure 2). Thinning out is a selective pruning method that involves the removal of complete branches down to the main trunk. It is often done with hand-held equipment. Thinning out encourages longer growth of the remaining terminals and can result in a more open tree, which allows more sunlight to penetrate more deeply into the tree canopy. Thinning out is commonly seen in peaches and plums to maximize light penetration into the inner canopy for better fruit set and growth. This type of pruning is generally thought to be labor intensive and costly and is not commonly practiced in the Florida citrus industry. Heading back removes the terminal portion of a shoot or branch, removing apical dominance and stimulating lateral bud breaks (Figure 2). Heading back encourages a desirable branched and compact growth pattern. Mechanical hedging and topping are the main forms of mass heading back used in Florida for mature trees.

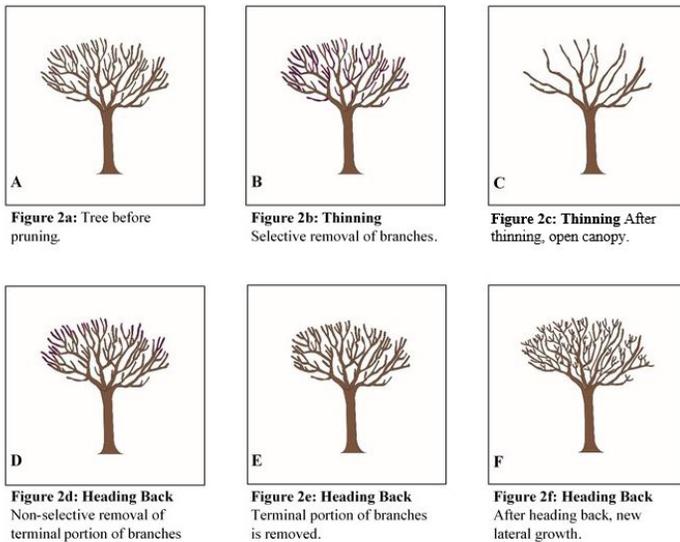


Figure 2. The two types of pruning cuts, b–c: Thinning, selective removal of branches to open up the canopy; d–e: Heading back, non-selective removal of terminal portion of branches resulting in more lateral branching.

Credits: Tracy Bryant, UF/IFAS

## Canopy Management for Young Trees

Severe pruning and training of young, nonbearing trees tends to delay fruit production and should be avoided. Most trees usually need no pruning for the first few years in the grove except for removal of sprouts on the trunk. Larger sprouts should be cut off flush with the trunk to avoid

dominance over a weaker tree. Sprouting on the trunks of young, nonbearing trees can be greatly reduced by using a commercial sprout inhibitor containing naphthaleneacetic acid (NAA; refer to plant growth regulator chapter of Citrus Production Guide). Protective wraps around the trunk will reduce sprouting, but they must be carefully monitored and observed because insect and disease problems sometimes develop under the wraps.

## Canopy Management for Mature Trees

When mature trees begin to overcrowd, grow tall, and intrude into the alleys, canopy management becomes essential to maintain tree size and improve light penetration. Hedging and topping are very common cultural grove management practices in Florida.

### Hedging and Topping

Hedging is cutting back the sides of trees to prevent or alleviate crowding. Hedging produces numerous cut wood surfaces along the side of the tree canopy from which new sprouts arise and eventually develop into a wall of new foliage. Middles (alleys) between tree rows should be sufficiently wide to accommodate grove equipment and provide adequate light access to the sides of the trees. Middles are usually hedged to a width of 7 to 8 ft but will vary depending on original grove design, scion variety, rootstock, and equipment used in all production practices.

Hedge *before* canopy crowding becomes a problem, and develop a proactive pruning program to ensure that only the right-sized branches are removed. As a general rule, avoid pruning of branches greater than 0.13–0.25 inch (1/8–1/4 inch) in diameter, and avoid severe pruning. Removal of a significant portion of the tree will result in excessive vegetative growth and a drastic reduction in subsequent yield. Hedging is usually done at an angle, with the boom tilted inward toward the treetops so that the hedged row middles are wider at the top than at the bottom. This angled hedging allows more light to reach the lower skirts of the tree. Hedging angles being commonly used vary from 10 to 15 degrees from vertical.

Topping should be done before trees have become excessively tall and should be an integral part of a tree-size maintenance program. Long intervals between topplings increase the cost of the operation due to heavy cutting and more brush disposal. Furthermore, excessively tall trees are more difficult and expensive to harvest and spray. Topping trees will improve fruit quality and increase fruit size while

reducing management and harvesting costs. Some common topping heights are 10 to 12 feet at the shoulder and 13 to 14 feet at the peak. As a general rule, topping heights should be two times the width of the row middle.

Lower heights are sometimes used for training trees, increasing fruit size, or rejuvenating declining trees, and sometimes after flooding events that have damaged the trees' root systems. Taller trees are sometimes maintained when they are vigorous and widely spaced. Trees in the flatwoods areas are generally topped lower than those on the ridge because the more limited root systems will usually not support as much top growth. Topping should be started before extensive cutting is required. If heavy cutting is required, the initial cuts should be low enough to avoid cutting excess wood in subsequent topping operations. Re-topping is generally done just above the old cut.

After severe hedging or topping, heavy nitrogen applications will produce vigorous vegetative regrowth at the expense of fruit production. Therefore, nitrogen applications should be adjusted to the severity of hedging and/or topping. Reducing or omitting a nitrogen application before and possibly after heavy hedging will reduce both costs and excessive vegetative regrowth. Light maintenance hedging should not affect fertilizer requirements or application.

Large crops tend to deplete carbohydrates and result in a reduced fruit yield and increased vegetative growth the following year. Pruning after a heavy crop additionally stimulates vegetative growth and reduces fruit yield the following year. Pruning after a light crop and before an expected heavy crop is recommended because it can help reduce alternate bearing, which can be a significant problem in Valencia and Murcott production.

Severe hedging may create problems of brush disposal. It also stimulates vigorous new vegetative growth, especially when done before a major growth flush. This happens because an undisturbed root system is providing water and nutrients to a reduced canopy area. The larger the wood that is cut, the larger is the subsequent shoot growth. Severe pruning reduces fruiting and increases fruit size.

### Skirt Pruning

Skirting is a pruning practice to raise tree skirts. Without skirting, the movement of herbicide booms, fertilization (in wetted zone), and mechanical harvesting equipment is impeded. Fruit and limbs near the ground are often damaged by the passage of such equipment and by herbicide spray and fertilizer contact. Skirting allows uniform distribution

of granular fertilizers and improved water coverage of microsprinkler irrigation systems under tree canopies. Skirting facilitates the inspection of microirrigation systems and reduces the incidence of *Phytophthora* foot rot and brown rot because it allows good air circulation.

## Creating a Canopy Management Program

The best time of year to hedge and/or top depends on scion variety, grove location, severity of pruning, and availability of equipment. Since pruning is usually done after removal of the crop, early-maturing varieties are generally hedged before late-maturing varieties. Most growers prefer to hedge before bloom, but trees will get more vegetative regrowth, which may not be desirable. Pruning could begin as early as November before harvesting in warmer areas. During this period, pruning operations should only cut minimal foliage and fruit from the trees.

Valencia trees may be hedged in late fall with only minimal crop reduction when the hedging process removes only a small amount of vegetative growth. In cases where excessive growth is to be removed, the trees are usually harvested before hedging is conducted. Light maintenance pruning can be done throughout the summer and until early fall with little or no loss in fruit yield. Moderate to severe pruning should not continue into the winter in freeze-prone areas, as trees with tender regrowth are susceptible to cold injury.

## Canopy Management and Huanglongbing

Since Florida groves have become heavily affected with Huanglongbing (HLB) and the psyllid population has been on continuous increase, selecting the best time for hedging, and topping is becoming more complicated. New growth flushes promoted by hedging and topping in late spring, during the summer, and in the early fall can increase the population of leafminers and psyllids and aggravate the spread of HLB. Huanglongbing-affected trees often undergo severe root loss. These trees can be hedged and topped to help balance the shoot-to-root ratio to improve tree performance and extend tree longevity. However, buckhorn (severe pruning) pruning of HLB-affected trees is not economically viable and causes a significant reduction in yield the year after pruning.