



MASTER GARDENER

COLORADO STATE UNIVERSITY
EXTENSION



Tree Fruit

Reference / Supplemental Reading

CSU Extension Publications available online at www.cmg.colostate.edu

- *Apple and Pear Insects* - Fact Sheet #5.519
- *Apples* - Planttalk #1201
- *Apricots* - Planttalk #1209
- *Backyard Orchard: Apples and Pears* [pest management] - Fact Sheet #2.800
- *Backyard Orchard: Stone Fruits* [pest management] - Fact Sheet #2.804
- *Cherries* - Planttalk #1202
- *Coryneum Blight* - Fact Sheet #2.914
- *Coryneum Blight* - Planttalk #1444
- *Fertilizing Fruit Trees* - Fact Sheet #7.612
- *Fertilizing Fruit Trees* - Planttalk #1216
- *Fire Blight* - Fact Sheet #2.907
- *Fire Blight* - Planttalk #1411
- *Growing Tree Fruits in Colorado Gardens*, CMG GardenNotes #771
- *Insect Control: Horticultural Oils* - Fact Sheet #5.569
- *IPM: Plant Health Care* - GardenNotes #101
- *Oystershell Scale* - Planttalk #1414
- *Peach Tree Borer* - Fact Sheet #5.566
- *Peaches* - Planttalk #1204
- *Pear Slug* - Fact Sheet #5.560
- *Pears* - Planttalk #1205
- *Plums* - Planttalk #1206
- *Pollination of Tree Fruits* - Fact Sheet #7.002
- *Pruning - Training and Pruning Fruit Trees* - Fact Sheet #7.003
- *Pruning - Training Young Fruit Trees* - Planttalk #1211
- *Pruning Mature Fruit Trees* - Planttalk #1210
- *References and Review Questions: Tree Fruits*, CMG GardenNotes #770
- *Spider Mites* - Fact Sheet #5.507
- *Tent Caterpillar* - Planttalk #1484
- *Training and Pruning Fruit Trees* - Fact Sheet #7.003
- *Training Young Fruit Trees* - Planttalk #1211

Curriculum developed by David Whiting, Extension Consumer Horticulture Specialist (retired), Department of Horticulture & LA, Colorado State University

- Colorado Master Gardener Training is made possible, in part, by a grant from the **Colorado Garden Show, Inc.**
- Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating.
- Extension programs are available to all without discrimination.
- No endorsement of products named is intended, nor is criticism implied of products not mentioned.
- Copyright Colorado Master Gardener Program, Colorado State University Extension. All Rights Reserved.

Revised October 2014

Tree Fruits

Learning Objectives

At the end of this unit, the student will be able to:

- Discuss considerations in planting fruit trees in the home landscape.
- Describe structural training and annual pruning of dwarf, semi-dwarf and standard size apples.
- Describe structural training and annual pruning of peaches.

Review Questions

1. Describe consideration in planting fruit trees in the home landscape.
2. What fruits are generally self-fruitful? What fruits generally require cross pollination by another compatible cultivar?
3. Describe the structural training of standard apples, semi-dwarf apples, and dwarf apples.
4. Describe the annual pruning of apples.
6. Describe the structural training of peaches.
7. Describe the annual pruning of peaches.



CMG GardenNotes #771

Growing Tree Fruit in Colorado Gardens

- Outline:
- Planting Considerations, page 1
 - Size and suggested spacing, page 1
 - Pollination, page 2
 - Spring frost, page 3
 - Soils, page 3
 - Fertilization, page 3
 - Insects and diseases, page 4
 - Training and annual pruning, page 4
 - Pruning basics, page 3
 - Apples, page 5
 - Training, page 5
 - Annual pruning, page 7
 - Peaches and nectarines, page 7
 - Training, page 7
 - Annual pruning, page 8
 - Sweet cherries, page 9
 - Sour cherries, page 9
-

Tree fruits are less suited to the home garden than small fruits. They require more space than can be allocated in the small home yard. Space can be saved by growing dwarf cultivars and by training trees into an espalier form. [Figure 1]

Figure 1. Espalier apple tree

To be productive they require specific training and annual pruning. In most areas, they require routine sprays to manage insect and disease problems. In regions with late spring frosts, crops are often lost to frost.



Planting Considerations

Size and Suggested Spacing

Fruit trees can be large, particularly if not carefully trained and pruned. The typical size of fruit trees is given in Table 1.

Table 1. Typical Size of Fruit Trees				
		Typical Spread (Pruned)	Typical Height (Pruned)	Unpruned Spread and Height with No Competition
Apple¹	Standard Semi-dwarf Dwarf ²	20 feet 10 feet 6 feet	20+ feet 12-15 feet 5-10	40 feet by 40 feet
Pear	Standard Dwarf ³	18 feet 12 feet	15 feet 12 feet	40 feet by 25 feet 25 feet by 15 feet
Peach and Nectarine	Standard Dwarf ⁴	20 feet 8-10 feet	15 feet 5-10 feet	25 feet by 25 feet 8 feet by 4-6 feet
Apricot	Standard Dwarf ⁴	20+ feet 8feet	15 feet 6-8 feet	30 feet by 30 feet 6-8 feet by 6-12 feet
Sweet Cherry	Standard Dwarf ⁵	30 feet 4 feet	25 feet 6-8 feet	30 feet by 40 feet 4-8 feet by 6-12 feet
Sour Cherry	Standard Dwarf	18-24 feet 8-10 feet	15 feet 6-8 feet	30 feet by 20 feet 8-10 feet by 20 feet
European Plums and Prunes	Standard	20 feet	15 feet	25 feet by 30 feet
Japanese Plums	Standard	18 feet	15 feet	25 feet by 30 feet
<p>1 Size of apples is controlled by the rootstock and pruning techniques. Depending on rootstock, size may run from standard size down to 40% of standard size trees.</p> <p>2 Dwarf apples are recommended for home gardeners. However, they require careful training to be highly productive and staking.</p> <p>3 Dwarf pears have not proven overly successful and are not recommended.</p> <p>4 Dwarf peach and apricot require careful training to be highly productive. Dwarf apricots are not recommended. Some dwarf peach trees are very small.</p> <p>5 Dwarf cherries require careful training to be highly productive.</p>				

Pollination

Pollination is a common problem for many gardeners growing tree fruits. Bees do not fly in cool, rainy weather, common in many springs.

Apricots, sour cherries, peaches, nectarines, and European plums and prunes are generally self-pollinated. That is, pollen from most cultivars will pollinate itself.

Apples, sweet cherries, pears, and Japanese plums are generally cross-pollinated. That is, two compatible cultivars must be planted within 100 feet for good pollination.

Please see this CSU Extension fact sheet, "Pollination of Tree Fruits" for more details: <http://extension.colostate.edu/topic-areas/yard-garden/pollination-of-tree-fruits-7-002/>

Spring Frost

Frost damage is a common problem in climates with late spring frost, like Colorado. Commercial orchards are typically located on side hills, where cold air drains to the valley floors, giving some frost protection. Gardens located down in a valley floor typically have a shorter growing season than surrounding areas, and the tendency for late spring frosts makes the location unsuitable for tree fruits. Table 2 gives critical temperatures at various stages of bud development.

Fruit	Swollen Buds	Buds Showing Color	Full Bloom	Green Fruit
Apples	20-21°F	24-28°F	27-29°F	29°F
Apricots	23°F	25°F	28°F	31°F
Cherries	25°F	28°F	28°F	30°F
Peaches	23°F	25°F	27°F	30°F
Pears	23°F	27°F	29°F	30°F

Soils

Being prone to root rots, fruit trees are intolerant of soils with poor drainage or heavy irrigation. Fruit trees are not compatible with the frequent irrigation of a typical home lawn and should be located outside of the influence of the lawn area. Commercial orchards are often located on gravelly soils with good drainage.

Fertilization

Fruit trees must have adequate nutrient levels to grow and produce fruit. Which nutrients and the amount needed can be determined through a soil test. The nitrogen requirement can also be based on the amount of growth produced the previous year and it is applied in the spring just prior to or at bud break. Fertilizer products should be broadcast evenly underneath the tree and watered in. For more detailed information about fertilizing fruit trees, see this CSU Extension fact sheet, Fertilizing Fruit Trees, <http://extension.colostate.edu/topic-areas/yard-garden/fertilizing-fruit-trees-7-612/>

Insects and Diseases

Each region has their local list of insect and diseases associated with growing fruit. In most areas, routine sprays are typically necessary for pest free fruit. In Colorado, refer the following CSU Extension fact sheets for details:

- Backyard Orchard: Apples and Pears <http://extension.colostate.edu/topic-areas/yard-garden/backyard-orchard-apples-and-pears-2-800/>
- Backyard Orchard: Stone Fruits, <http://extension.colostate.edu/topic-areas/yard-garden/backyard-orchard-stone-fruits-2-804/>
- Fire Blight, <http://extension.colostate.edu/topic-areas/yard-garden/fire-blight-2-907/>
- Peach Tree Borer, <http://extension.colostate.edu/topic-areas/insects/peach-tree-borer-5-566/>
- Cytospora Canker in Tree Fruit Crops, <http://extension.colostate.edu/topic-areas/agriculture/cytospora-canker-in-tree-fruit-crops-2-953/>

Training and Pruning

For productivity and quality produce, fruit trees require both specific training and annual pruning. *Training* refers the general structural shape of the tree, achieved by pruning when the tree is young. *Annual pruning* refers to the pruning each year to grow quality fruit.

Pruning Basics

Detailed information about fruit tree pruning can be found in this CSU Extension Fact Sheet:

<http://extension.colostate.edu/topic-areas/yard-garden/training-and-pruning-fruit-trees-7-003/>

Details of specific pruning terms, techniques and styles mentioned here can be found in the CMG GardenNotes series:

- Pruning Cuts: <http://cmg.colostate.edu/Gardennotes/612.pdf>
- Structural Training of Young Shade Trees: <http://cmg.colostate.edu/Gardennotes/613.pdf>

Pruning of fruit trees is similar to the pruning of shade trees. The objective in annual pruning of fruit trees is to balance growing of fruit and growing of new fruiting wood. The percentage of wood removed is different in shade trees than in fruit trees. In shade trees, the amount of live wood removed is generally limited to 10-15% per season. In fruit trees, much higher percentages are removed to encourage the growth of new fruiting wood. To achieve this balance, fruit trees require 1) better general vigor with special attention to watering and fertilization, and 2) heavy pruning to promote fruiting wood. General pruning of fruit trees occurs in late winter, after the high potential for extreme cold (temperatures below zero) has passed but before bud swell and flowering.

Apples

Structural Training of Young Apple Trees

Dwarf apples are trained to a central leader Christmas tree shape with branches in whorls. Spread lower branches to near horizontal and upper branch to 45°. With proper training, dwarf apple trees can be kept to an eight to ten foot height. Due to increased sunlight through the tree, dwarf apples produce the best quality fruit on small trees. [Figure 2]

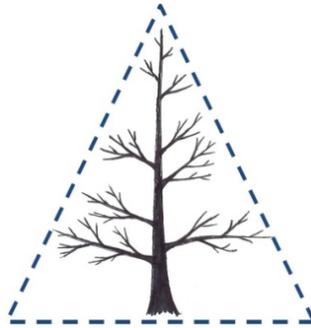


Figure 2. Train dwarf apples to a Christmas tree shape, spreading lower branches to near horizontal and upper branches at a 45° angle.

Semi-dwarf apples are trained to a modified central leader system. When trained, semi-dwarf trees may be kept to a 15-18 foot height. In selecting scaffold branches, develop openings for ladders.

Modified Central Leader Training – In this pruning style, a dominant central leader is maintained with three to five *scaffold branches* (vertically spaced at least six inches apart) which become the primary structure of secondary trunks. By definition, the diameter of a “scaffold branch” must be less than one-half the diameter of the adjacent trunk. Being structurally strong, this pruning style is preferred for larger trees. However, fruit production and quality will be low in the center canopy due to shading. [Figure 3]

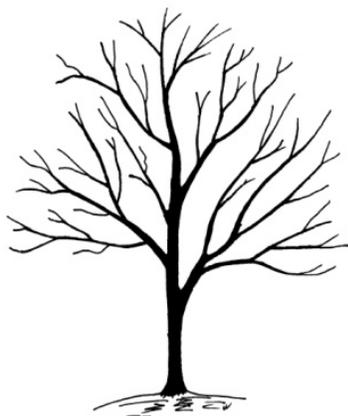


Figure 3. *Modified Central Leader Training* develops trees with a dominant trunk into the upper region of the trees and “scaffold branches” becoming secondary trunks. For structural strength, the scaffold branches must be space at least six inches apart and the diameter of the scaffold branches must be less than one-half of the adjacent trunk.

Standard size apples are generally trained to a modified central leader system. The majority of fruit on standard sized apple trees is of inferior quality due to shading of the majority of the tree’s canopy. Standard size apples are rather large for home landscapes.

Annual Pruning of Fruiting Apples

Apples fruit on two or three year-old twigs and spurs that are no thicker than a pencil. Avoid cleaning out of the small twigs and spurs along the branches.

The primary purpose in annual pruning is to increase sunlight penetration and to remove less productive wood. Apples need light annual thinning of the canopy, opening the tree to light. Start at the top working down into the canopy using reduction cuts and thinning cuts. Avoid any heading cuts as this leads to a thicker canopy that shades out fruit production.

If left un-pruned, the quantity of fruit produced may temporarily be greater, but the quality will be much lower.

Remove any water sprouts back to the parent branch/trunk.

Pruning old neglected apple trees – Over a period of years, thin the canopy, thereby opening the tree to light. Over time, remove old wood and reduce tree height with reduction cuts.

Fruit thinning – For quality fruit, thin apples to six to eight inches between fruit, by mid-June.

Peaches and Nectarines

Structural Training for Young Peach Trees

Peaches and nectarines fruit in the top four to five feet of the tree. With careful pruning, height of a peach tree can be maintained at seven to ten feet. Untrained, it is common to find peach trees that fruit in the top four feet of a 12 to 16 foot tall tree.

Train young peach trees to an open center vase shape. Space four to five scaffold branches at least six inches apart. To keep the tree height low, branching typically starts 18 to 24 inches above the ground. [Figure 4]

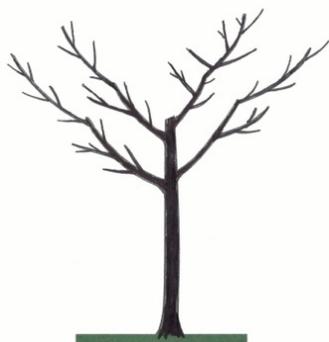


Figure 4. To open the tree to light, train peaches and nectarines to an open vase system.

Select scaffold branches with wide angle of attachment and evenly spaced around the tree. It is best to develop scaffold branches all at one time and from the same diameter twigs. Otherwise, older/larger ones will dominate the tree.

In early training, allow small twiggy growth along the scaffold branches.

Do not remove all the fruiting shoots in the center of the tree. The most productive trees have fruiting wood throughout the tree canopy.

Annual Pruning of Fruiting Peaches

The objective in annual pruning of fruiting peach trees is to balance fruit production with growth of new wood. Peaches fruit only on one-year-old wood. To promote growth of the fruiting wood, removed one-half to two-thirds of the growth each spring with a combination of thinning cuts and reduction cuts.

- Thin fruiting shoots to a spacing of four to six inches
- Long branches produce more fruit than short ones. Generally avoid heading cuts on the primary branches.
- The ideal fruiting shoots are 12 to 24 inches long and 3/16 to 1/4 inch diameter at the base. Longer shoots may be headed back by one-fourth.
- Remove three to six inch long shoots that are mixed with the more desirable 12 to 18 inch shoots.
- Leave small twigs that are not vigorous enough to offer competition in the tree's interior.
- Stimulate growth of one-year-old fruiting wood in the tree center by thinning-out and heading-back inside branches.
- Remove any water sprouts back to the parent branch with thinning cuts.
- Avoid cleaning out the small twiggy in the tree's interior. This eliminates the center of the tree from being fruitful.

Fruit Thinning – For quality fruit, thin peaches to six to ten inches between fruit, by the time the fruit reaches one-inch in diameter.

Figure 5. Peaches fruit only on one-year-old wood. Trees are heavily pruned to balance the growth between the fruit crop and production of new wood for next year's crop.



Sweet Cherries

Structurally Training – Sweet cherries are trained to a modified central leader system. Select scaffold branches that are outward growing rather than upward growing.

Annual Pruning – Cherries are borne on long-lived spurs that produce fruit for 10 to 12 years. Little annual pruning is needed on fruiting sweet cherries. Focus pruning on thinning the tree canopy, removing older wood with thinning and reduction cuts. Avoid making heading cuts in the top of the tree, as this leads to shading out of the interior.

Fruit Thinning – Cherry fruit is not generally thinned.

Figure 6. Sweet cherry trees are large and occupy a lot of space in the home landscapes. Most cultivars require a second cultivar for cross pollination.



Sour Cherries

Structural Training – Sour or pie cherries are generally much smaller trees or shrubs. Train sour cherries to a modified central leader system or delayed open center system.

Annual Pruning – Little pruning is needed on fruiting sour cherries. With routine thinning and removal of older wood, sour cherries may be kept less than 12 feet tall.

Author: David Whiting, Extension Consumer Horticulture Specialist (retired), Dept. of Horticulture and LA, Colorado State University. Artwork by David Whiting; used by permission. Revised by Mary Small, CSU Extension.

- Colorado Master Gardener *GardenNotes* are available online at www.cmg.colostate.edu.
- Colorado Master Gardener training is made possible, in part, by a grant from the *Colorado Garden Show, Inc.*
- Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating.
- CSU Extension programs are available to all without discrimination.
- No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.
- Copyright, Colorado State University Extension. All Rights Reserved. CMG GardenNotes may be reproduced without changes or additions, for nonprofit educational use *with attribution*.