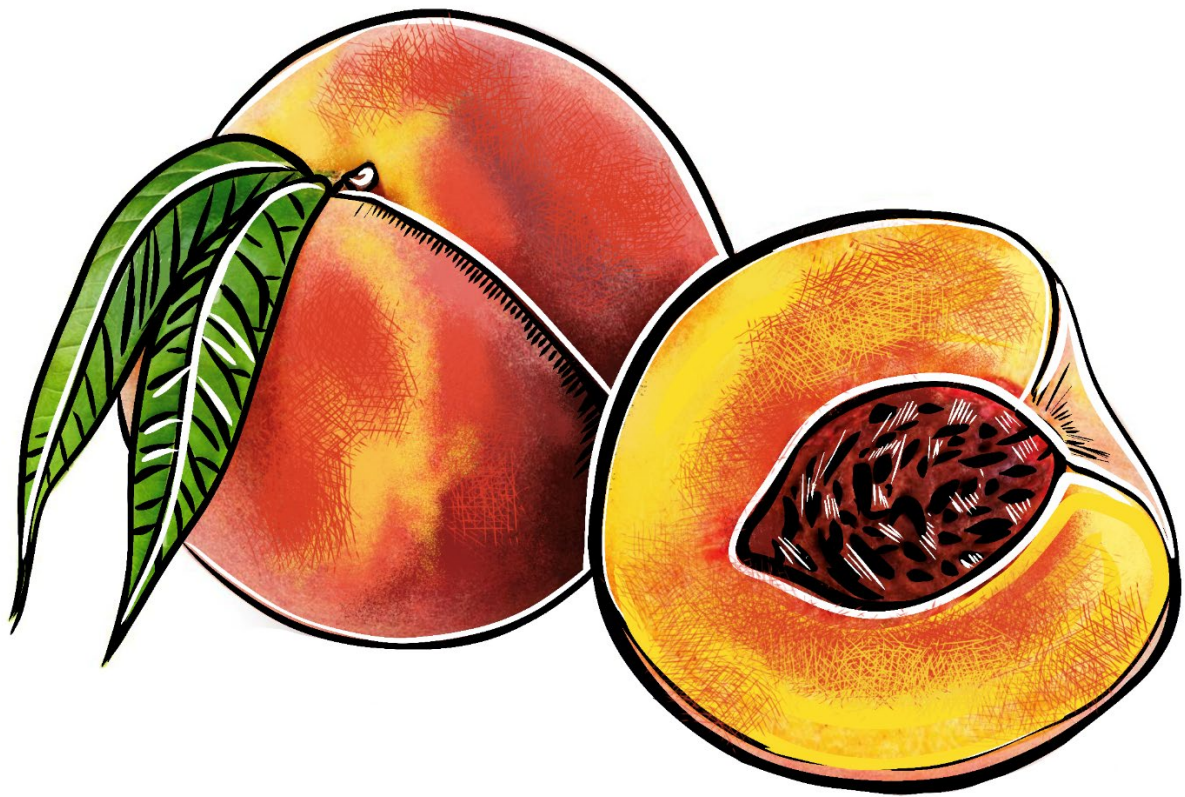




MASTER GARDENER
COLORADO STATE UNIVERSITY
EXTENSION

CMG GardenNotes #770-771

Tree Fruits



Prunus persica, Palisade Peaches
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CMG GardenNotes #770

Tree Fruit

References and Review Material

Reading/Reference Materials

CSU GardenNotes

- <https://cmg.extension.colostate.edu/volunteer-information/cmg-gardennotes-class-handouts/>.
- #101, *IPM: Plant Health Care*.
- #771, *Growing Tree Fruit in Colorado Gardens*.

CSU Extension Fact Sheets

- <https://extension.colostate.edu/topic-areas/yard-garden/>.
- #2.800, *Backyard Orchard: Apples and Pears* [Pest Management].
- #2.804, *Backyard Orchard: Stone Fruits* [Pest Management].
- #2.907, *Fire Blight in Fruit Trees*.
- #2.914, *Coryneum Blight*.
- #2.954, *Preventative Control for Cytospora Canker on Peach*.
- #5.507, *Spider Mites*.
- #5.560, *Pear Slugs*.
- #5.566, *Peachtree Borer*.
- #5.569, *Insect Control: Horticultural Oils*.
- #5.583, *Tent-Making Caterpillars*.
- #5.613, *Codling Moth: Control in Home Plantings*.
- #7.002, *Pollination of Tree Fruits*.
- #7.003, *Training and Pruning Fruit Trees*.
- #7.612, *Fertilizing Fruit Trees*.

Planttalk Colorado™

- <https://planttalk.colostate.edu/>.
- #1201, *Apples*.
- #1202, *Cherries*.
- #1204, *Peaches*.
- #1205, *Pears*.
- #1206, *Plums*.
- #1209, *Apricots*.
- #1210, *Pruning Mature Fruit Trees*.
- #1211, *Training Young Fruit Trees*.
- #1216, *Fertilizing Fruit Trees*.
- #1217, *Fruit trees for Colorado*.

- #1411, *Fire Blight*.
- #1444, *Coryneum Blight*.
- #1484, *Tent Caterpillars*.
- #1498, *Horticultural Oils*.

Other

- For a deeper dive into fruit trees, see <https://intermountainfruit.org/>.

Learning Objectives

At the end of this training, 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 considerations in planting fruit trees in the home landscape.
2. What fruits are generally self-fruitful? What fruits require cross pollination by another compatible cultivar?
3. Describe the difference between structural pruning of semi-dwarf apples and annual pruning?
4. Describe the annual pruning of peaches.
5. Explain why thinning of fruit is important.



CMG GardenNotes #771

Growing Tree Fruit in Colorado Gardens

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Tree fruits are less suited to the home garden than small fruits. They require more space than can be allocated in a small home yard. Space can be saved by growing hardy semi-dwarf fruit trees and performing tree training and annual pruning maintenance. [Figure 1]

To be productive fruit trees require specific training and annual pruning. Fruit trees require routine sprays to manage insect and disease problems. In regions with late spring frosts, crops are often lost to frost. Avoid cold sinks to prevent cold damage. Use microclimates to your advantage.

For other information specific to growing fruit trees, view these CSU Extension Fact Sheets:

- #2.800, *Backyard Orchard: Apples and Pears.*
- #2.804, *Backyard Orchard: Stone Fruits.*
- #2.907-1, *Fire Blight in Fruit Trees.*
- #2.954, *Preventative Control for Cytospora Canker on Peach.*
- #5.566, *Peachtree Borer.*
- #5.569, *Insect Control: Horticultural Oils.*



Figure 1. Semi-dwarf apple tree, image from Stark Bros.

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**. Specific rootstocks control the growth and many other growing factors and qualities of fruit trees. In general, dwarf trees tend to be less hardy and take longer to establish than semi-dwarf trees.

Table 1. Typical Average 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 8 feet	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 and are not as hardy as semi-dwarfs.</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. Semi-dwarf selections are better.</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 one hundred feet for good pollination.

See CSU Extension Fact Sheet #7.002, *Pollination of Tree Fruits* for more details.

Spring Frost

Frost damage is a common problem in climates with late spring frosts, like Colorado. Commercial orchards are typically located on sides of 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. For more information see: <https://intermountainfruit.org/cold-effects/index>.

Table 2. Critical Springtime Temperatures – 90% kill / 10% kill				
Fruit	Swollen Buds	Buds Showing Color	Full Bloom	Green Fruit
Apples	10/18°F	24/28°F	25/28°F	25/28°F
Apricots	0/20°F	14/24°F	22/27°F	25/28°F
Sour Cherries	5/17°F	24/27°F	25/28°F	25/28°F
Peaches/ Nectarines	1/18°F	15/25°F	24/27°F	25/28°F
Pears	0/15°F	19/25°F	24/28°F	24/28°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 information about fertilizing fruit trees, see CSU Extension Fact Sheet, #7.612, *Fertilizing Fruit Trees*.

Training and Pruning

For productivity and quality produce, fruit trees require both specific training and annual pruning. **Training** refers to 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 CSU Extension Fact Sheet #7.003, *Training and Pruning Fruit Trees*.

Details of specific pruning terms, techniques and styles mentioned here can be found in CMG GardenNotes #612, *Pruning Cuts*, and #613 *Structural Pruning of Young Shade Trees*.

Pruning of fruit trees is similar to the pruning of shade trees in the structural sense. However fruit trees are pruned much heavier and a few of the cuts and tools are different from pruning ornamental and shade trees. The objective in annual pruning of fruit trees is to balance quality and yield of fruit by improving access to sunlight, thinning fruit, and promoting growth of new fruiting wood. The percentage of wood removed is different in shade trees than in fruit trees. In fruit trees, much higher percentages are removed to encourage the growth of new fruiting wood. For example, orchards

remove as much as 50% of peaches. 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, so there is time to apply dormant oil also known as horticulture oil as a preventative spray.

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 branches 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]

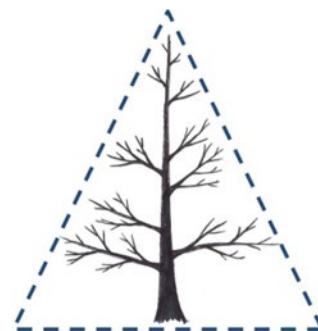


Figure 2. Train dwarf apples to a Christmas tree shape.

Semi-dwarf apples are trained to a modified central leader system. When trained, semi-dwarf trees may be kept to a fifteen to eighteen foot height. In selecting scaffold branches, develop openings for ladders. Another option would be to use the open vase method of training.

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]

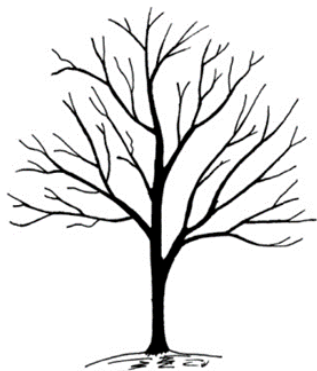


Figure 3. For structural strength, the scaffold branches must be spaced at least six inches apart and the diameter of the scaffold branches

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

Avoid cleaning out the small twigs and spurs along the branches. Apples fruit on two to five year old twigs. Some cultivars like ‘Gala’ fruit even longer, on spurs that are no thicker than a pencil.

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 sunlight. 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. Apples tend to fruit heavier every other year; pruning, thinning, and proper fertilization will help balance this out.

Remove any **water sprouts** (upright vigorous shoots) 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, not removing more than 20% of live wood. Dead wood does not count. 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, and to one per cluster by mid-June or when fruit is nickel to quarter sized.

Peaches and Nectarines

Structural Training for Young Peach Trees

Peaches and nectarines fruit in the top four to five feet of the tree due to fruiting on one year old growth. With careful pruning, the height of a peach tree can be maintained at seven to ten feet. It is common to find untrained peach trees that fruit in the top four feet of a twelve to sixteen 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 eighteen to twenty-four inches above the ground. [Figure 4]

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. The majority of side branches should be horizontal to the ground, think of a feather as the branch and its side branches. Leave a few small inward and upward stems to prevent sunscald.

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, one year old wood, to a spacing of four to six inches.
- Long branches produce more fruit than short ones. Heading cuts can keep branches lower and outward growing.



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

- Ideal fruiting shoots are twelve to twenty-four inches long and 3/16 to 1/4 inch diameter at the base. Longer shoots may be headed back by 1/4.
- Remove three to six inch long shoots that are mixed in with the more desirable twelve to eighteen 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 twigs 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 prior to the fruit reaching one inch in diameter. If you wait too long to thin, the fruit will be small and not juicy. Thinning also helps control codling moth in apples, as the female moth likes to lay eggs between touching apples. **[Figure 5]**



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

Structural 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 ten to twelve years. Little annual pruning is needed on fruiting sweet cherries. Focus pruning on thinning the tree canopy, by removing older wood with thinning and reduction cuts. If making heading cuts to reduce height, make sure to prune to an outward branch to avoid shading other limbs. **[Figure 6]**

Fruit Thinning

Cherry fruit is not generally thinned since the fruit is small and thinning would not improve quality.



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 (vase-shaped).

Annual Pruning

Little pruning is needed on fruiting sour cherries. Sour cherries fruit on new wood and spurs and are **self-fruiting** (self-pollinating). With routine thinning and removal of older wood, sour cherries may be kept less than twelve feet tall.

Authors: David Whiting, CSU Extension, retired. Artwork by David Whiting. Used with permission. Revised June 2018 by Mary Small, CSU Extension, retired. Reviewed May 2023 by Susan Carter, CSU Extension.

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