



# Training and Pruning Newly Planted Deciduous Fruit Trees

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## Introduction

Training and pruning newly-planted deciduous fruit trees is one of the most important steps in developing trees with a strong framework (scaffold branches). Trees with a good framework of branches can support heavy crops without limb breakage and will help to bring the young tree into production at an early age. Selection and arrangement of these branches determines the type of development and growth in later years. The goal of pruning and training is to balance vegetative and fruiting wood growth.

Fruit production is dependent upon many factors such as a frost free period once the fruit buds have opened, sufficient water, and proper nutrients. One of the factors most often overlooked is adequate sunlight. Unpruned trees tend to grow upright with sunlight only reaching the leaves on the outside of the tree. If a tree is trained and pruned properly then more sunlight will penetrate to the interior of the tree where much of the fruit production occurs.

This publication will explain how to train and prune trees into the two most common forms - the "open center" or "vase shape" and the "central leader". Trees that are pruned to an open center are those that put on high amounts of vegetative growth, so the open center allows more light to penetrate into the center of the trees. Whereas, trees pruned to a central leader are inherently less vigorous.

Most orchardists and home gardeners should purchase fruit trees with side branches (feathered trees). This permits selection of the main framework branches (scaffold limbs) after planting rather than waiting one growing season for them to develop on those without side branches (whip trees). If trees are planted as whips use the following instructions "PRUNING AND TRAINING NEWLY PLANTED TREES WITH SIDE BRANCHES" after the trees have been in the ground for one year.

Rules that apply to all trees:

1. Branched or "feathered" trees from the nursery are preferred.
2. Selected branches to remain on the tree should be about the same diameter. If branches are not similar in diameter the larger branch(es) will grow larger and cause an unbalanced tree in the future.

3. Pruning and training of the young tree is critical because waiting until the tree is more mature will result in trees that have improper form. Attempting to repair a three to five year old tree that was left on its own to develop naturally is difficult and often not possible even with large cuts. The larger the pruning cuts are the less likely that the tree will heal properly which can lead to disease organisms entering the tree and premature death.

The most common types of pruning cuts are thinning, heading back and reduction. A thinning cut is made at the point at which the branch arises. A typical thinning cut is the removal of the smaller of the two branches. A heading cut is also referred to as topping, it is used to reduce the height of the tree. This type of cut is done in-between the nodes of the branch. A better alternative to this type of cut is the reduction cut which is similar to the thinning cut but the larger of the two branches is removed. For more information on proper pruning techniques refer to publication AZ 1139 Pruning Deciduous Shade Trees.

## PRUNING AND TRAINING NEWLY PLANTED TREES WITH SIDE BRANCHES

### Peach, nectarine and Japanese plum (Open Center)

After planting the tree measure from ground level to a height of 24 to 30 inches on the main trunk and cut it at this point (see Figure 1). Where the cut is made depends on the desired height of primary branches and the presence of branches or buds below the cut. If sufficient branches or buds are not available to form the framework then a higher cut may be desirable. Next, select the framework branches below the pruning cut. The framework branches should be selected with care; they will support the weight of growth that forms in the future. Select at least three and not more than five branches, four being ideal, that are alternately spaced (spiral-like arrangement) and remove all others. The selected framework branches should be about the same diameter and cut back to short stubs measuring 4 to 6 inches in length. This type of pruning will produce a tree with a vase-shape or open center arrangement of limbs, allowing good sunlight penetration (see Figure 1).

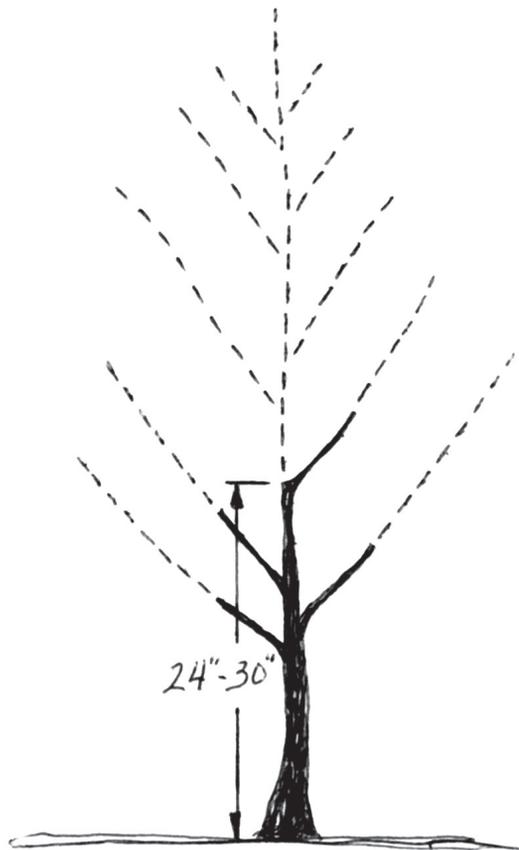


Figure 1. Peach, nectarine and Japanese plum are pruned to a vase shape. To form this shape measure 24 to 30 inches above ground level on main trunk. Within this distance cut just above where the top scaffold branch will be. Ensure that there are 3 to 5 branches or buds below the cut to serve as the trees scaffold system. Cut these remaining branches to short stubs measuring 4 to 6 inches in length. (Dotted lines indicate removed growth.)

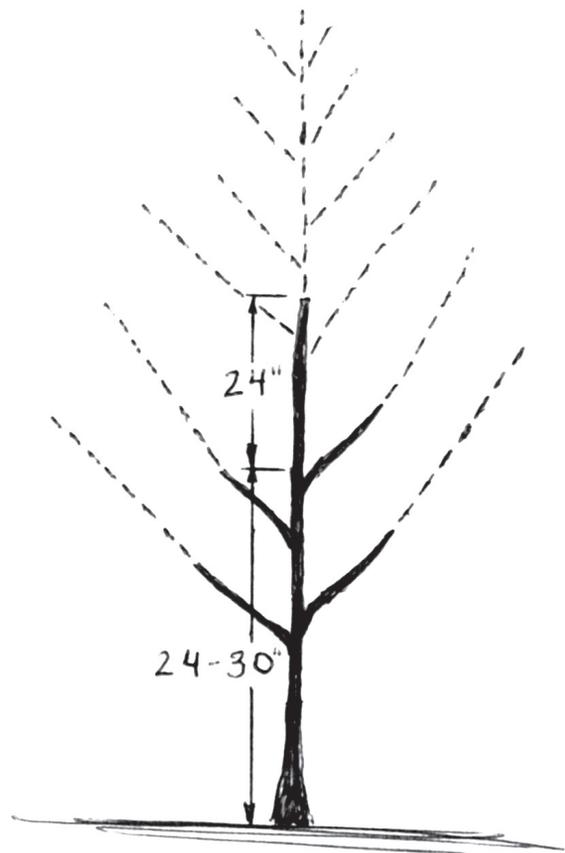


Figure 2. Apple, pear and cherry are pruned to a central leader shape. To form this shape measure 48 to 54 inches above ground level on main trunk make the cut here. Within the first 24 to 30 inches leave 3 to 5 branches or buds. Cut these remaining branches to short stubs measuring 4 to 6 inches in length. Any additional branches above the 3 to 5 lower branches should be cut back to the main trunk. (Dotted lines indicate removed growth.)

### Apple, apricot, cherry, European plum, pear and quince (Central Leader)

These trees are pruned differently than vase-shaped trees. They will be trained to a central or modified central leader type of growth. Selection of framework branches (scaffold limbs) is done on the same basis as vase-shaped trees. Select four to six, with five being ideal, alternately spaced limbs forming a spiral. The selected branches should be about the same diameter. Before doing any pruning, observe the following recommendations: (1) measure from ground level to a height of 24 to 30 inches on the main trunk; (2) mark this area with a piece of string and select the four to six framework branches below this marking; (3) after selecting the framework branches, remove all other side branches above and below the string; (4) next, measure approximately 2 feet above the topmost framework branch and cut the main trunk at this point; and (5) after this is done, cut the selected framework branches to a length of 4 to 6 inches (see Figures 2.)

For closer spaced trees two opposing framework branches can be chosen to form a "Y," (see Figure 3). With the "Y" system only two main branches are kept and these branches are tied to a wire trellis system to train the branches and help support the fruit. This system can also be used with open center type trees.

## PRUNING DURING AND AFTER THE FIRST GROWING SEASON

### Peach, nectarine and Japanese plum (Open Center)

At the beginning of the first growing season after planting, buds on the framework branches will sprout and start developing. Any growth developing below the main framework branches should be rubbed off when it first appears. Most of this undesirable growth will be evident below the main framework and possibly from below ground level. By mid-summer it may be necessary to thin out some new branches that are parallel to each other and too close, thus casting shade on each other. Also, those that are crossing and rubbing against each other or those that may be growing downward.

Winter pruning, when trees are devoid of foliage, consists of shortening side branches and removing of objectionable growth. A rule of thumb for pruning peach, nectarine, and Japanese plum involves a reduction of the previous season's growth by one third. When reducing the length of side growth, cut back to a lateral branch. This will decrease development of new branches at the pruning cut site (see Figure 4).

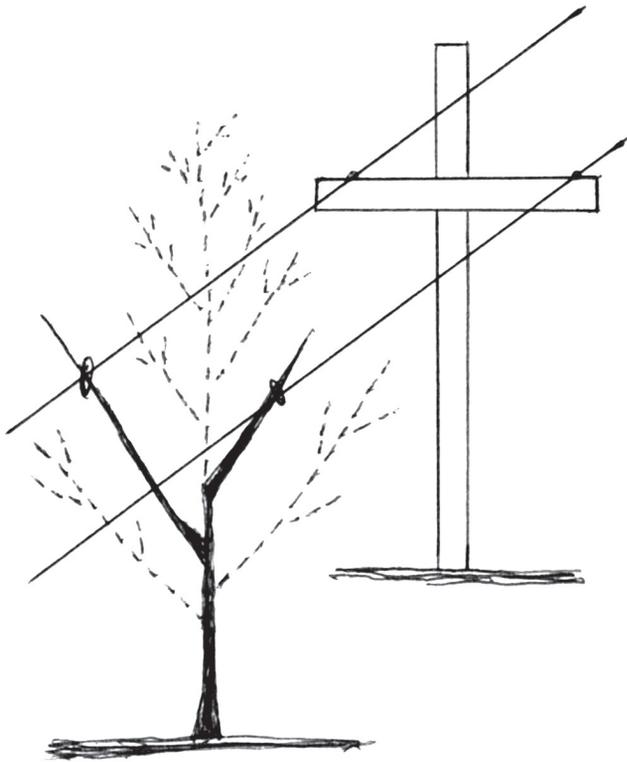


Figure 3. "Y" system pruning method with 2 main scaffold branches tied to support wires. (Dotted lines indicate removed growth.)

Japanese plums are pruned slightly different. Shortening top and side branches should be done with extreme care to prevent development of excessive new growth at the pruning cuts. To reduce the length of branches be sure to make cuts next to a lateral branch. If no lateral branches are present, it is best to wait until next season for them to develop before reducing length. If long branches are cut back where no lateral branches are present, numerous new shoots will develop resembling a "witch's broom".

### Apple, apricot, cherry, European plum, pears and quince (Central Leader)

These trees are trained to a central or modified central-leader type of growth rather than vase-shaped. The main trunk growing above the framework branches will produce additional side branches. These should be checked carefully to prevent them from competing with the main leader. They should be allowed to grow approximately one foot in length before pinching out the growing tips. Pinching or rubbing off undesirable side branches will stimulate the central leader to increase in height.

Winter pruning consists of removing branches that are dead, diseased, closely paralleling each other, those casting shade, growing downward (pendulant), crossed or those rubbing against each other (see Figure 5). These species of trees have a bad habit of producing extremely long branches during the first growing season. This can be prevented by pinching out the growing points on growth developing from the framework branches during the summer months. If growth is not pinched during the summer, it is best not to head back the long branches

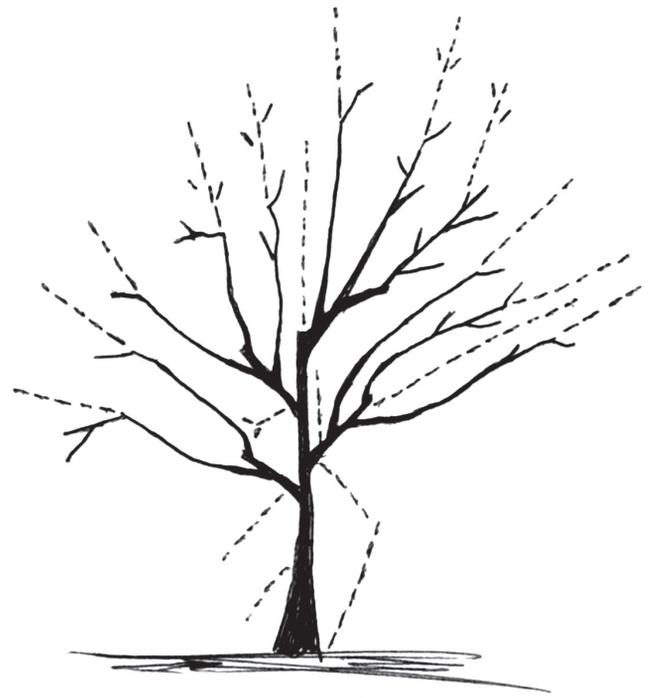


Figure 4. Pruning vase shaped trees after first growing season. (Dotted lines indicate removed growth.)

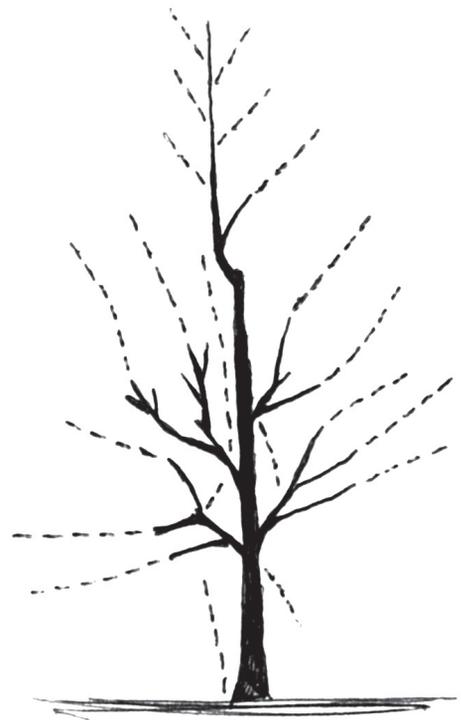


Figure 5. Pruning central leader type trees after the first growing season. (Dotted lines indicate removed growth.)

during the winter. This will often result in the production of numerous new shoots below the pruning cuts. Rather, cut back the long branches during late summer.

The upright development of new growth on these trees, in particular apple, cherry and pear, requires the use of wooden spreaders, clothespins (during the first and second years),



Figure 6. Arrows indicate cutting back to a lateral branch and the removal of unwanted branches growing into the center of the tree. (Dotted lines indicate removed growth.)

weights, twine and stakes, or water filled plastic gallon jugs to weigh down and spread out branches before they become too woody. Early spreading to 60 to 70° is not difficult and it will lessen the chance of crowded, upright growth in later years. Spreading is done the second or third year after planting, during the spring when leaves are present. Spreading also promotes earlier fruit production, and creates good limb crotch angles to better support crop weight.

## PRUNING AFTER THE SECOND GROWING SEASON

### Peach, nectarine and Japanese plum (Open Center)

After trees have completed their second season of growth, reduction of top and side growth can be initiated during winter pruning. With the exception of Japanese plums, all growth that developed during the growing season can be reduced by one third. Always cut back to a lateral branch to prevent excessive development of new shoots (see Figure 6). Remove objectionable growth, keeping the center portion of the trees free of large limbs that will create excessive shading. Remember to maintain a vase-shaped tree (see Figure 6). The center portion of Japanese plum trees should be kept open in a similar manner as described for peach and nectarine. A general reduction of side branches is needed for Japanese plum, but extreme care should be exercised to make cuts at lateral branches (see Figure 4). Japanese plum produce numerous new branches if cuts are not made next to lateral branches.

### Apple, apricot, cherries, European plum, pears and quince (Central Leader)

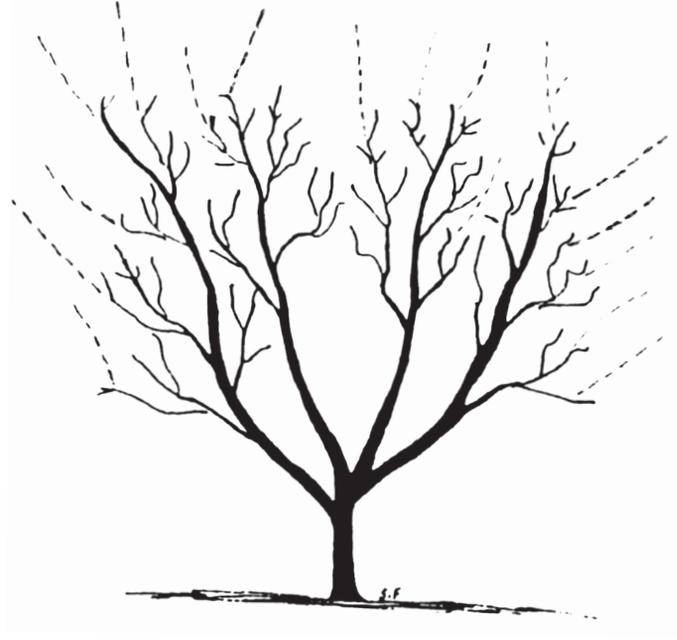


Figure 7a. This is a vase shaped tree. It lacks a central leader limb in the center portion. Last year's most vigorous shoots are cut back to a lateral. (Dotted lines indicate removed growth.)

When pruning these trees, keep in mind that the central-leader type of growth should continue to predominate. Removal of objectionable limbs can be done in winter and reduction of top and side branches should be done in the same manner as the Japanese plum trees mentioned above. Always cut back to a lateral to prevent development of excessive new growth.

Reduction of top and side growth on all fruit varieties is essential to stimulate fruit production on the lower portions of trees. Removal of excess growth also allows for coloring of fruit and reduction of the fruit crop for better size fruit.

## PRUNING TREES AFTER THE THIRD GROWING SEASON

Pruning deciduous fruit trees after the third growing season involves the reduction of tops and sides, removal of objectionable growth and thinning of growth to permit sunlight to color the fruit. Observe the practice of cutting back to lateral branches especially for apples, cherries, pears and European plums. This will permit production of high quality fruit crops. (See figure 7a.)

## MODIFIED CENTRAL LEADER

Annual dormant pruning of apricot, cherry and European plum involves annual pruning of the central leader tipped back to a strong lateral shoot. The strong lateral will then become the new apical stem. This will decrease tree vigor (see Figure 8).

## FULLY DWARF FRUIT TREES

If apple, pear or cherry trees are planted, on a dwarfing rootstock then a post, pipe or trellis must be installed to support these trees. Even some semi-dwarf trees will require support.

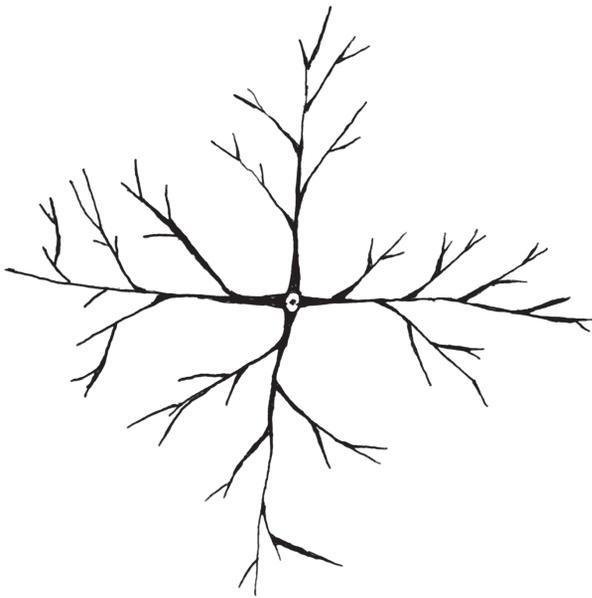


Figure 7b. Top view of the vase shaped tree.

They do not produce a large enough root system to support themselves. There are several advantages of dwarf fruit trees: 1) smaller trees, thus taking less space; 2) better sunlight penetration; 3) fruit production begins the third year; 4) dwarf trees are easier to care for in terms of pruning, fruit thinning and pest control; and 5) ladders are not needed to harvest fruit.

Trellising is used to increase shoot growth and making trees more precocious, meaning they fruit earlier in their lives. Supporting trees in this manner will decrease trunk movement caused by wind, resulting in less trunk growth. That energy will be redirected to shoot and fruit growth.

Placing a wooden post, a 1" rigid electrical conduit pipe or steel pipe next to a dwarf tree for training will suffice (see Figure 9). In Figure 10 the same training principles presented above in this publication are employed, except the central leader is supported with a post or trellis with the trunk and limbs tied to the post or wires for support.

Espalier training of dwarf fruits is done for a "horticultural effect." Several systems have been developed like, "Candelabra," "Horizontal Palmette," "Ypsilon", and "Horizontal Cordon," (see Figure 11). Similar training and pruning principles described above are employed when developing espalier fruit trees.

Several trellising systems have been developed for high tree density commercial orchard production. Some of these for apples and pears include the "Ebro espalier," the "Lincoln canopy," the "Dutch slender spindle," the "French vertical axis system," the "Palmette system," the "Tatura trellis" and "HYTEC system." For cherry and other fruit trees the "V trellis" has been developed. These are not intended for use in a small homeowner orchard. Further information on these commercial training and trellising systems can be found online.

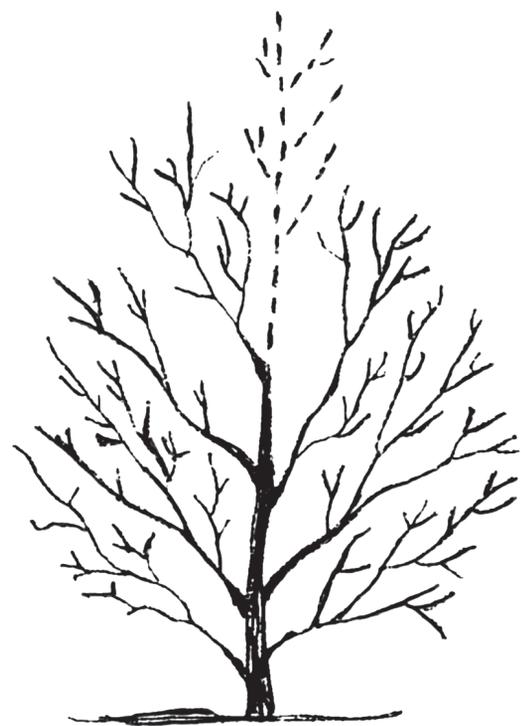


Figure 8. Central leader tipped back to a strong lateral shoot. (Dotted lines indicate removed growth.)



Figure 9. Wooden post or 1 inch electrical conduit pipe used to support a dwarf tree.

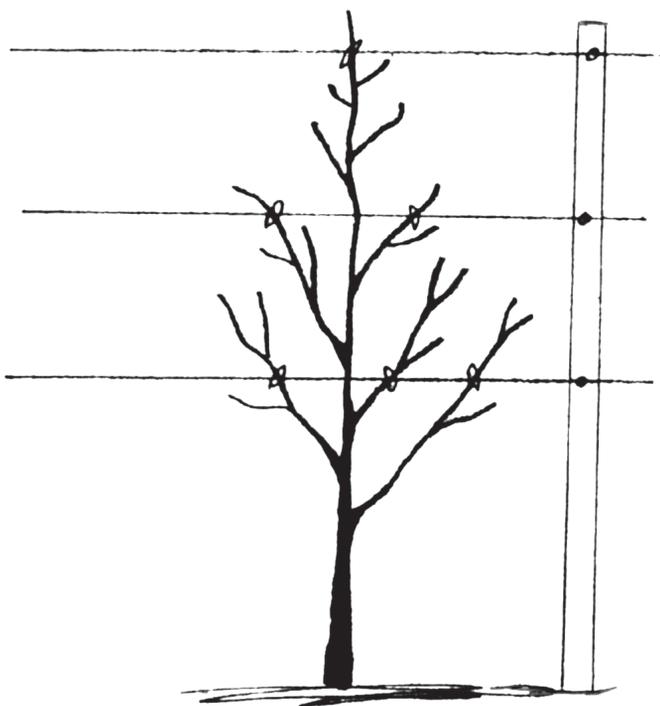


Figure 10. The dwarf tree is supported by a post and wire trellis system.

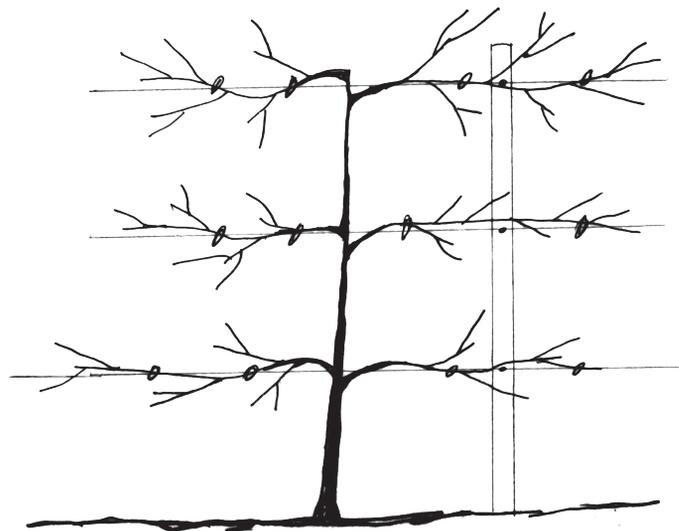


Figure 11. Espalier training system. Shoots are tied to a wire, fence or building for support.

## Adapted from and replaces:

Fazio, S. 1984. Pruning Newly Planted Deciduous Fruit Trees. University of Arizona Cooperative Extension Bulletin Q377. Tucson, AZ.

## Additional Reading

Davison, E. 1999. Pruning Deciduous Shade Trees. University of Arizona, College of Agriculture & Life Sci. Bull., AZ1139. Tucson, AZ. <http://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1139.pdf>

Ingels, C., P.M. Geisel, and C.L. Unruh. 2002. Fruit Trees: Training and Pruning Deciduous Trees. University of California, Division of Agriculture and Natural Resources. Pub. No. 8057. Davis, CA. <http://anrcatalog.ucdavis.edu>

Olsen, J. 2011. Training and Pruning Your Home Orchard. PNW 400. Pacific Northwest Extension Publication, Corvallis, Oregon. <http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/22166/pnw400.pdf>

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