ALABAMA COOPERATIVE Extension SYSTEM

ANR-0053-K

ALABAMA A&M AND AUBURN UNIVERSITIES

Fruit Culture in Alabama

Training and Pruning Tree Fruits

For optimum performance and longevity, tree fruits must be initially trained to a desirable tree form. Annual pruning is a necessity for deciduous tree fruits although the level and type of pruning varies among species.

Training Fruit Trees

If fruit growers expect to maintain consistent yields and high-quality fruit, they should train trees during the first 2 to 6 years in the life of a planting, depending on the type of trees grown. Unfortunately, many growers simply plant fruit trees and wait for them to start producing. In the long run, this is a very costly and time-consuming philosophy. If the trees are properly trained initially, they will develop the necessary scaffold systems to produce high yields of quality fruit and will require less corrective pruning in later years.

The best time to start training newly set trees is in the spring after growth begins. The main goal in training young fruit trees is to develop the proper number of wide-angled scaffold branches in a desirable arrangement along the trunk. These branches must be strong to support heavy crop loads and prevent splitting and breaking.

Training Systems for Tree Fruits

There are numerous systems being used worldwide for training and pruning fruit plants, especially tree fruits. Some tree fruits such as citrus require almost no training except that used in the development of suitable young trees in the nursery. By contrast, the temperate, deciduous tree fruits, such as apples and peaches, require very exacting training and subsequent pruning for maximum longevity and profitability.

Training systems include:

• The older, conventional, low-density systems that have been used on freestanding, large trees planted at wide spacings. Examples are the central leader and modified leader used for apples and pears and the vase or open-center system used for peaches and nectarines.

• The somewhat more recently established high-density systems that have involved the dwarf and semi-dwarf apple trees (using English-developed dwarfing rootstocks) established along a rather simple 3- to 4-wire trellis. All of these training systems or some variation of them are still used today.

• The sharp trend during the last 20 years toward smaller, more closely spaced, high-density plantings in Europe, Australia, New Zealand, and other countries has resulted in several variations of the older training systems described above as well as several new ones. These may be referred to as the individual trunk-supported, ultra high-density systems.

Among the more popular of the new training systems are the French axe and slender spindle being widely used in Europe and now being tested in the United States. These systems are being used to train apples grown at very high densities (400 to 1,000 or more trees per acre) and require the use of dwarf to semi-dwarf trees with some type of trunk support. Both of these systems are modifications of the central leader form of training.

The tatura trellis is a more sophisticated version of the standard 3- to 4-wire tree trellis that has been used for years in countries such as Australia. There are a number of other new or modified trellis systems being used or tested around the world that cannot be properly addressed in this publication.

Some of the more popular training systems for tree fruits are described below.

Training Apple Trees: Central Leader Form

For freestanding or staked medium-density plantings of apples, the central leader tree (pyramidal or Christmas tree) form is preferred. This form helps maximize light penetration into the center of the tree and light distribution along and between trees (Figure 1). To develop the central leader tree, prune newly set trees immediately after planting, before growth begins, to a height of 28 inches. This will force the first scaffold branches to develop at the desired height.

As young shoots begin growth in the spring, usually one or two shoots in the uppermost position near the pruning cut will grow straight upward. When these shoots are 8 to 12 inches long, select the strongest and straightest to continue upward growth as the "leader," and remove the other competing shoots within 1 to 2 inches of the leader.

When the lower branches are 3 to 6 inches long, remove all branches lower than 20 inches from the soil line. Select three to five branches that are 4 to 8 inches apart, spiraling up and around the tree. These will form the first tier or whorl of branches. The first branch (or lowest branch) you select should be about 20 to 24 inches from the soil line.

Train the selected branches to form a wide crotch angle by using spring-type wooden clothespins, round toothpicks, or short wires sharpened at both ends. No. 9 clothesline wire works well. Place these braces when the branches are 3 to 6 inches long and still succulent. Set the

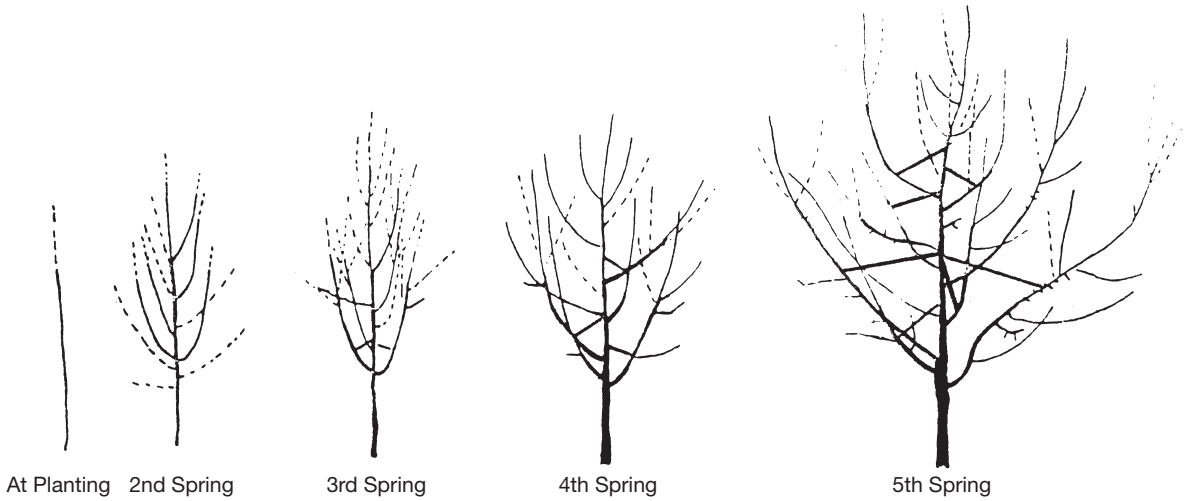


Figure 1. Central leader training system for apples and pears. Dotted lines represent branches that are removed. Source: Stebbins, R.L. 1980. Training and Pruning Apple and Pear Trees. PNW Cooperative Extension Service Bulletin 156

braces so that the branches form a 90-degree angle with the main axis of the tree (Figure 2).

Remove the clothespins to prevent girdling when shoot tissue lignifies or hardens, usually within 2 months. The toothpicks and wire braces may have to be removed after 2 months or at the end of the season. Clothespins or other small devices are initial training aids and not substitutes for longer limb spreaders to be used later. Remove all other branches that begin to grow in this area so that they do not compete with the selected scaffold branches. Removing these competing branches will help develop the first tier or whorl of branches.

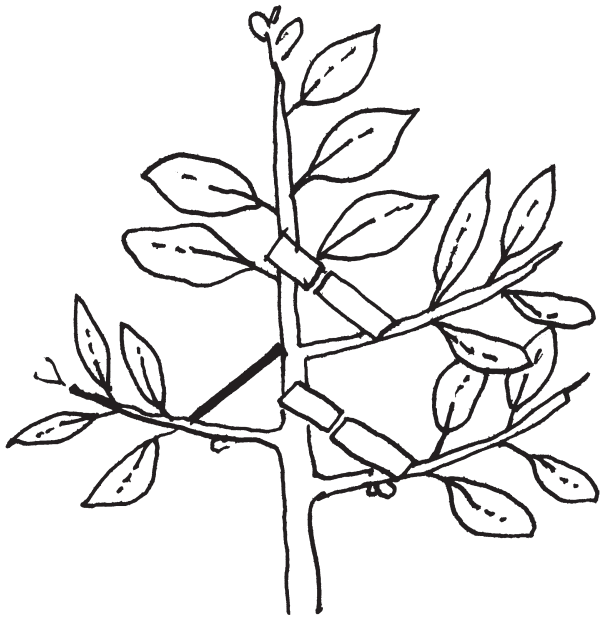


Figure 2. The small branches used to develop scaffolds must be trained while very small and rapidly growing—when they are 3 to 4 inches long and about 1/8 inch in diameter. After 6 to 8 weeks, at the end of the initial training period, the shoots may have reached 1/4 to 1/2 inch in diameter.

Three or four tiers will usually be needed to form the ideal tree. The three to four scaffold limbs comprising the first tier should be arranged equally distant around the trunk and separated vertically along the trunk by 4 to 8 inches. Additional tiers of scaffolds should be developed so that they are positioned in the openings not occupied by scaffolds in the tier below. No scaffold should be closer than 36 inches above one another. The second, third, and fourth tiers of branches should be at least 3 feet apart. Developing the third- or fourth-tier branches will take 3 to 4 years (Figure 3). Use the same procedure that was used to develop the first tier of branches to develop the second, third, and additional tiers of branches.

The branches that were forced to form a wide angle at their base will turn and grow upward as they elongate.

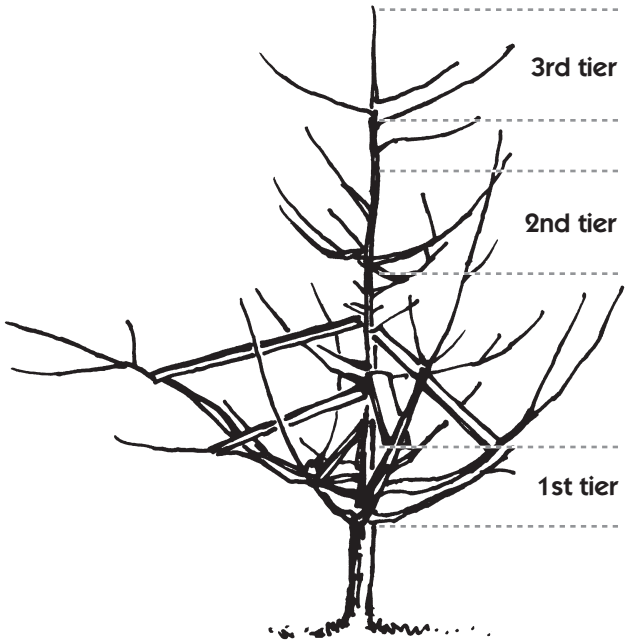


Figure 3. A bearing apple tree showing distribution of structural and fruiting branches in three developing tiers

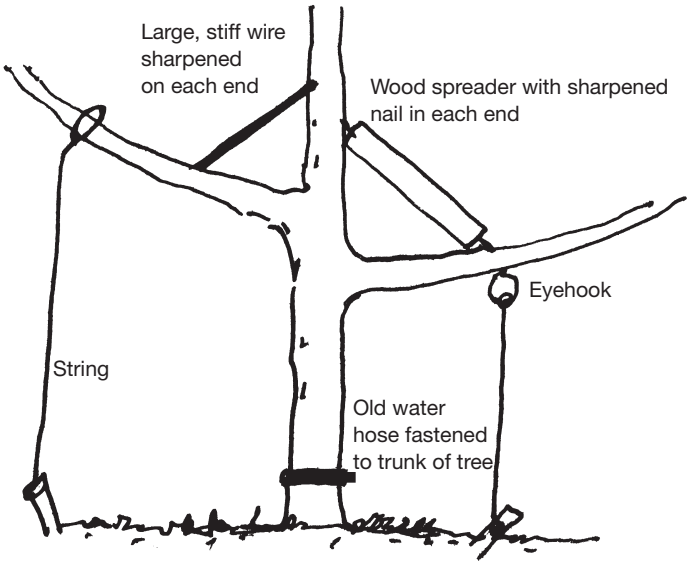


Figure 4. Several methods of spreading scaffold branches are shown above.

Thus, after removing clothespins from newly formed scaffolds in midsummer of the first year, continue spreading branches, using longer spreaders. If trees have grown sufficiently, place new spreaders on branches in late summer of the first growing season. Otherwise, position new spreaders on branches during the first winter or at the end of the second and possibly third growing seasons.

Tree development will dictate when you should add more spreaders. Initially, brace branches to form a 45-degree angle with the main axis of the tree. Spreading the limbs to a more horizontal position at this time encourages the development of undesirable, strong, vertical shoots on the tops of scaffold limbs. As branches become large enough to fill their allotted space, spread them to about a 60-degree angle from the central leader. Use wood spreaders, wire spreaders, or wires for one and possibly two or more seasons (Figures 3 and 4). Remove suckers arising from trunk and scaffold branches two or three times during the growing season by rubbing off the tender shoots.

In some instances, a side branch will not develop at the desired location on the trunk of a tree. If a scaffold branch is needed in a particular spot on the tree, you can force a dormant bud by making a 1-inch cut through the bark parallel to the ground ½ inch above a bud on young trees and 1 inch above a bud on older trees. This cut should only sever the bark tissue and not extend into the wood.

Trellising Apples

Whether you are a home orchardist or a commercial grower, you can use one of the newer innovations for training apples to improve yield and quality. When apples are grown on dwarfing rootstocks, they must be supported. Training them to a wire trellis permits high-density planting and early production of high-quality fruit.

The most widely used trellis is the conventional three- to four-wire fence 6 to 6½ feet high (Figure 5). Use 8- to 9-foot treated posts spaced 12 to 16 feet apart, depending upon tree spacing. Use No. 9 smooth wire or plastic continuous filament, and fasten the bottom wire to each post 20 inches aboveground. Some growers prefer to drill holes in the posts at the proper height and run the wire through these holes. This method works well also. Locate the top wire 74 inches above the ground. Fasten one of the other two wires 18 inches above the bottom wire and the other one 18 inches below the top wire. For a three-wire trellis, fasten the middle wire between the top and bottom wires, about 26 to 27 inches

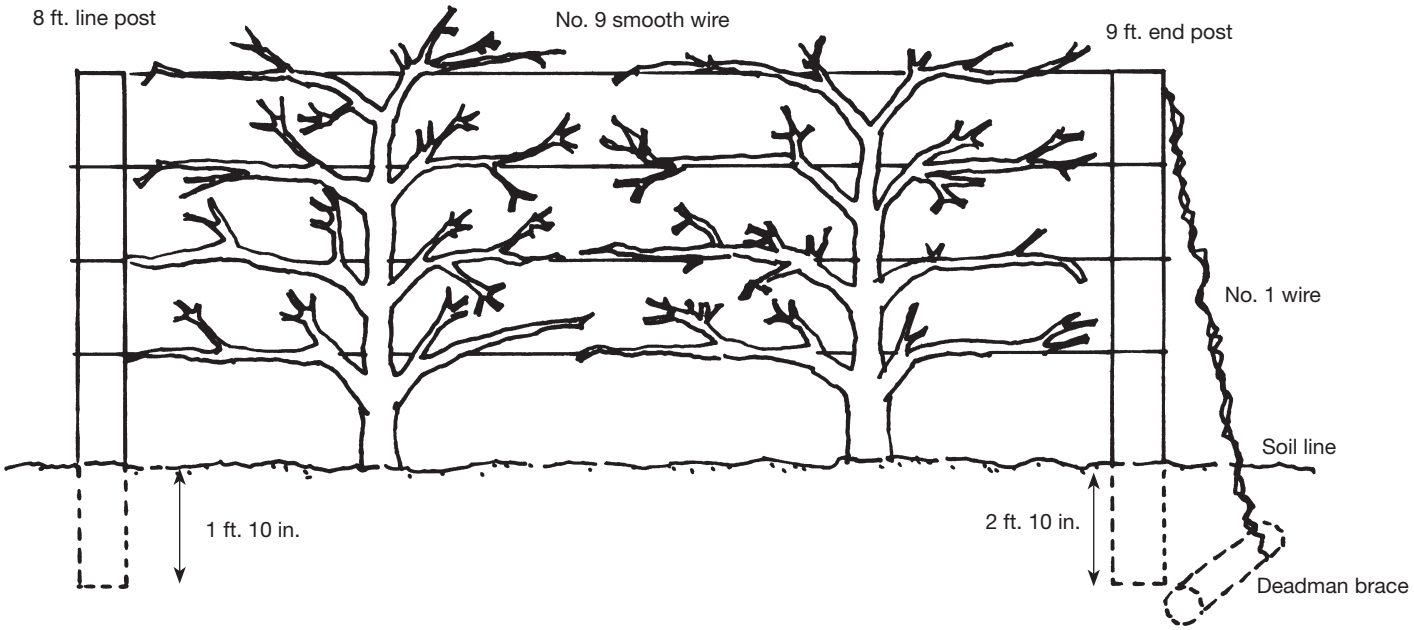


Figure 5. Four-wire apple trellis. End posts are usually 4 to 8 inches in diameter for short rows but may need to be 8 to 12 inches in diameter for very long rows. Line posts are usually 2 to 3 inches in diameter.

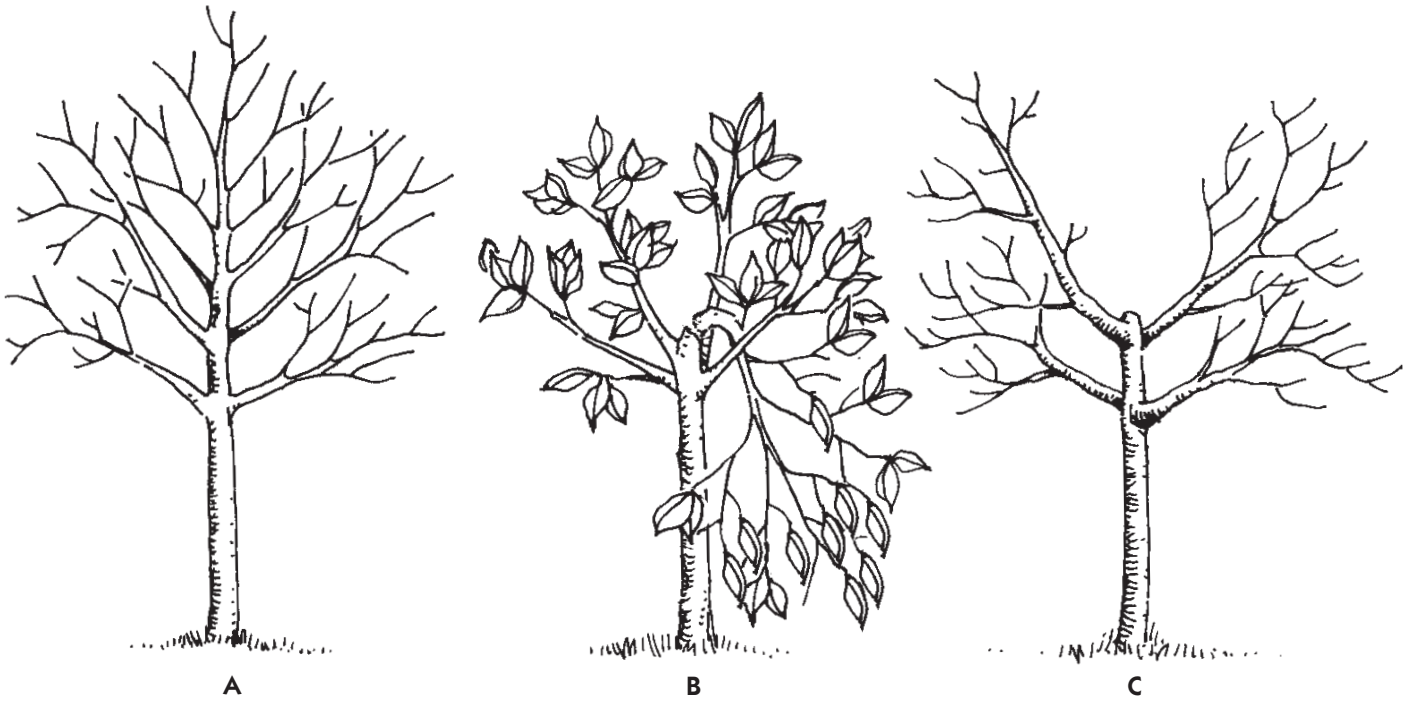


Figure 6. Peach training sequence for scaffold development first growing season for open-center or quad tree form. A- Young tree in early summer of first season just before breaking or cutting developing central leader; B- Same tree shown in A after breaking over central leader; C -Same tree in A at end of first season with 4 well-developed scaffold branches.

distant from each. Securely anchor end posts by bracing them or tying them with a strong wire fastened to a deadman brace buried in the ground. A deadman brace can be a post, concrete, or other heavy material.

Use recommended varieties of apples grafted onto M.9, M.26, or M.7A rootstocks. Although vigor is more difficult to contain with MM.106, it can be used with judicious pruning and wider spacing (9 feet in the row) and as a rootstock for slow-growing or spur-type varieties. The M.7A and M.26 are the preferred rootstocks among the dwarfing and semidwarfing types. Plant trees 8 feet apart (two between each post) with trellises 12 to 16 feet apart. This gives 340 to 454 trees per acre. Other suggested spacings are trees 6 feet apart with trellises 12 to 16 feet apart. This gives 518 to 605 trees per acre.

A wider spacing between rows of 16 feet allows for greater ease of machinery movement and general management of the orchard. This is especially true where the somewhat more vigorous rootstocks, such as M.7A and MM.106, are used. This wider between-row spacing is suggested for large commercial operations.

Develop a tree with eight major branches—four each way on the wires. Develop six branches in the same fashion for a three-wire trellis. Tie each branch to a wire. Train the branches on the wires at a 90-degree angle or at a 65-degree angle from the trunk. Training at a 65-degree angle from the trunk is the best approach. To do this, cut the center leader about 4 inches below each wire as it grows upward. Select the two branches needed, and tie them to each wire. Remove other competing shoots along the trunk, leaving only the leader and the two branches needed for the wires.

Use summer pruning to develop the spur-fruiting system on the trellis framework during the first 3 to 4 years. Remove current growth not needed for branch development along scaffolds (if upright), or cut back current growth to two or three buds between July 15 and August 1 to promote formation of fruiting spurs and to permit full light exposure for optimum fruit color. Keep small branches about every 12 to 15 inches on each side of the scaffolds. As trees become older, thin out some of the fruiting branches where they are crowded. Depending upon scion variety and rootstock combination, you can expect 50 to 200 pounds of apples per plant during the sixth growing season.

Training Pear Trees: Modified Leader Form

Pear trees can be trained using the central leader system described above for apples. The central leader system is especially useful for trees purchased on rootstocks, such as Quince A, Quince A plus Old Home pear interstem, or certain Old Home hybrids, which tend to produce a semidwarf tree. However, many of these stocks are susceptible to fire blight or other problems when grown in the Southeast and have not been used extensively. The most popular and blight-resistant stock used for pears in the southeastern area is Calleryana pear, *Pyrus calleryana*. This is a vigorous stock which results in the development of a large, normal-sized pear tree capable of producing 10 to 20 bushels or more.

Because of the large size tree generally grown in the Southeast, the central leader form of training may require some modification to compensate for the vigor and the greater problems with fire blight. Fire blight may more easily destroy a central leader tree by attacking the trunk than it will a multibranched modified leader tree form.

The other alternative to the system described for apples involves using a modified central leader form.

Develop this form by pruning the young tree to a height of 28 inches at the time of planting. Select four to six wide-angled branches during or at the end of the first year for use as the primary scaffolds, and remove all other growth. These branches should be situated 4 to 12 inches apart, beginning with lowest branch 20 inches from the ground and spiraling upward around the trunk. You may have to wait to select all the branches until the second year.

Using clothespins and spreaders is not strictly necessary in training hard pear varieties such as Orient and Baldwin. However, early spreading and later branch spreading will result in better structured trees. To properly train trees, head back primary scaffold branches and vigorous shoots each year for the first several years. Use the same methods as described for apples. Head back the primary scaffolds to a point where the next whorl of branches is desired. Thin out other shoots along these scaffolds and leave them unheaded. You may have to head back very vigorous side shoots.

Asian pears are reportedly smaller-growing trees than standard pears but may have equal or worse fire blight problems, depending on the variety and management. Therefore, a modified leader form is best for this more recently introduced type of pear. Some growers also advocate open-center training as used for peach trees. Because branches of most Asian pears tend to grow straight upward, early spreading with clothespins and later branch spreading should prove beneficial. For more information on Asian pears, see Extension publication ANR 1131, "Asian Pear Culture in Alabama."

Training Peach and Nectarine Trees: Open-Center and Quad Forms

Peach and nectarine trees should be trained to a three- or four-limb open-center or quad form system. The quad is a modified form of the open-center system in which four scaffolds are selected for the framework and only fruiting wood is retained on these scaffolds. Select three to four shoots that are equally spaced around the trunk to be used as the major scaffold branches. Ideally, these shoots should be positioned at or near the same height on the trunk, with no more than 3 to 4 inches separating the uppermost and lowermost shoots. Most commonly these shoots are selected anytime during the first growing season after the shoots are 12 to 18 inches long and you have removed excess shoots. This approach does not always result in the desirable wide-angled scaffolds.

One of the best methods for early training involves allowing newly planted trees to grow unpruned for some 2 to 3 months or until shoots reach 24 to 36 inches in length (Figure 6). Usually, one or two leaders grow straight up and several lower branches develop with wide angles. At this time, remove the upper one-half to two-thirds of the leader(s). Select three to four of the most desirable lower wide-angled branches for the permanent scaffolds, and remove all excess shoots. Recut the leader and some of its branches every 4 to 8 weeks to allow the lower selected branches to develop properly. During late winter to early spring of the next year, remove the pruned leader about ½ to 1 inch above the uppermost scaffold branch.

Training Plum Trees

Plum trees can be trained using a modified leader or open-center system. The open-center system as described for peaches is preferred in the Southeast.

Training Figs

Because fig plants are periodically frozen severely, often to the soil line, a tree form of training using a single trunk is not recommended. Maintaining a bush form is generally best.

Develop a plant with 6 to 8 dominant branches arising close to the ground. Control height at 7 to 8 feet for harvest without a ladder, or allow trees to grow to 10 to 15 feet for harvest with a ladder. Keep the center of the plant open.

Pruning Bearing Fruit Plants

Annual pruning of fruit trees and vines stimulates growth of desirable fruit-bearing wood throughout the plant. A balance between fertilizer applications and pruning to maintain moderate growth will result in more fruit bud formation. When heavy pruning is necessary to control growth, reduce applications of nitrogen fertilizer somewhat below the recommended rates for certain types of fruits, especially apples and pears. The primary purposes of pruning bearing fruit plants are:

- To thin overcrowded growth to permit more efficient spraying and to allow better light and air circulation through the plant
- To remove dead, diseased, weak-growing, or unproductive wood
- To limit height and spread of the plant
- To stimulate growth of new fruit-bearing wood for next year's crop
- To properly direct the growth of new shoots throughout the plant and to maintain good balance in tree structure
- To perform some fruit thinning by thinning out of fruiting wood, as is normally practiced with peaches

Bearing Habits of Fruits

Understanding the bearing habits of fruits is important for proper pruning. Without this knowledge, a grower may destroy a major portion of the fruit buds and potential crop when pruning. Fruit plants grown in Alabama produce their flowers from a simple bud (flowers only) or a mixed bud (containing flower parts and vegetative growth). Position of fruit buds on the plant also varies and influences pruning.

Peaches produce their fruits from simple buds positioned laterally along 1-year-old shoots. Peach buds for the current crop were produced on wood that grew during the summer of the previous year. The same is true for plums and cherries, but an even larger part of the crop is produced from mixed buds formed on spurs 2 years old and older. Therefore, when you prune, thin out a portion of the 1-year-old fruiting wood, but leave as much of this wood as desired for this year's crop. Some renewal pruning of spurs on plums and cherries is necessary as trees become older.

Apples and pears produce from mixed buds. Normally, these buds are located terminally on 1-year-old shoots and fruiting spurs, but occasionally fruit buds develop in lateral positions on 1-year-old shoots. Gala and certain of the more recently introduced varieties seem to have a strong affinity for developing fruit buds in lateral positions on 1-year-old wood.

Fruit buds of persimmons and figs are mixed buds and are located laterally on 1-year-old growth. Most of these plants produce their fruits on current spring growth developing only from 1-year-old wood. Thus, it is very important that the cultural program used results in an abundance of healthy 1-year-old shoot growth.

Citrus plants, such as satsuma, produce simple (flower) and mixed buds on the previous season's growth. Mixed buds produce new shoots that have fruit buds in the axils of new leaves. This is commonly referred to as leafy bloom. (Bouquet bloom is formed from simple flower buds.) Annual pruning is not needed until plants begin crowding, except for removal of dead or diseased wood. Removal of water sprout growth on the insides of trees will become necessary in older trees.

Time of Pruning

Time of pruning varies with the type of plant and its fruiting habits. Although apples, pears, and figs can be pruned during the winter months, waiting until February and March is preferable. Peaches, nectarines, and plums should not be pruned from October through January. Prune these during February and March, preferably before early bloom. However, pruning may extend through the flowering season with no detrimental effects. Water sprouts (upright, sucker-type growth) can be removed during spring and summer. Removal of additional excess growth inside peach and nectarine trees from 3 to 6 weeks ahead of harvest of mid- and late-season varieties can be very helpful. This reduces rot problems and enhances development of desirable fruiting wood.

Apples should be pruned in late winter prior to bloom development. However, dwarf trees on a trellis and larger semidwarf trees may also be summer-pruned during July and August.

In trellised and other high-density plantings of apple, summer pruning of current-season shoots 2½ to 5 weeks ahead of harvest is very beneficial. Current-season growth, especially in the upper portions of trees, is headed back to 2 to 8 inches depending upon need for branches or new spur wood. If growth is very excessive, some shoots are totally removed. This removal of current-season growth opens up trees for easier pest management, greatly enhances fruit color, and makes harvest easier. This practice is especially valuable in older, mature plantings. Fruiting spurs will be found growing from wood that is 2 years old and older. When you prune, leave the short and medium length shoots that grew last year and keep the healthy, vigorous fruiting spurs. This is particularly important with spur-type apples.

Pruning Apples and Pears

- Remove dead, diseased, weak, and unproductive wood.
- Keep center of tree along the trunk open to permit spray materials and light to better penetrate the tree (Figure 7).
- When necessary, cut large limbs back to a side branch to control height and diameter of limb spread.
- Thin out thick growth to encourage good, vigorous leaf development early in the season, with only moderate growth during June and July for fruit bud development.
- Between July 15 and August 1, cut back new growth not needed for branches to two or three buds if apple trees are on dwarf rootstock and trellised. Cutting back new growth will promote formation of fruiting spurs and allow full light exposure for better fruit color.
- Remove stubs when pruning unless cuts are being made for spur development. However, never cut into the collar of a branch near its point of attachment with the

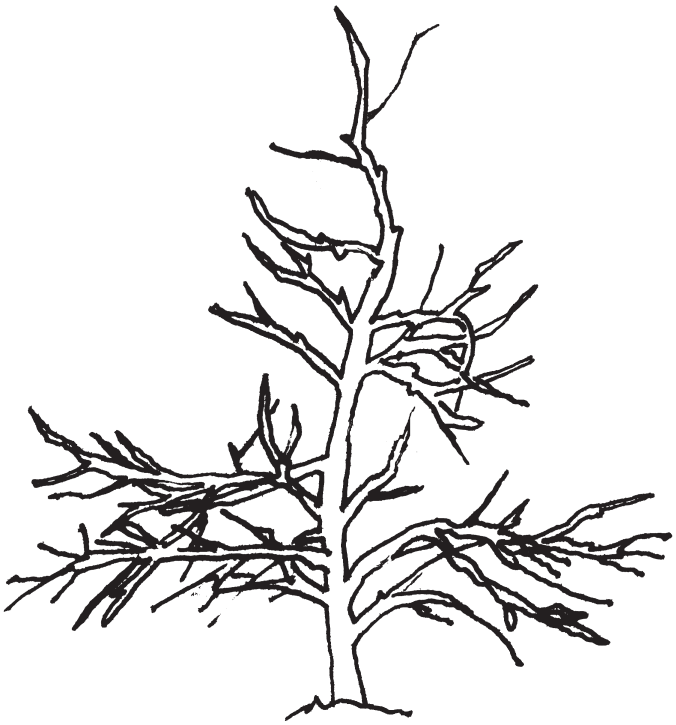


Figure 7. A well-trained bearing apple tree showing wide-angle, correctly spaced scaffold branches

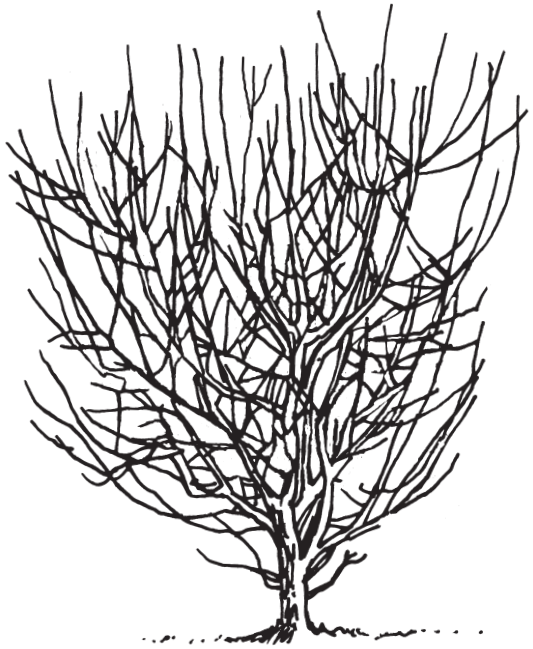


Figure 8. Bearing peach tree before pruning

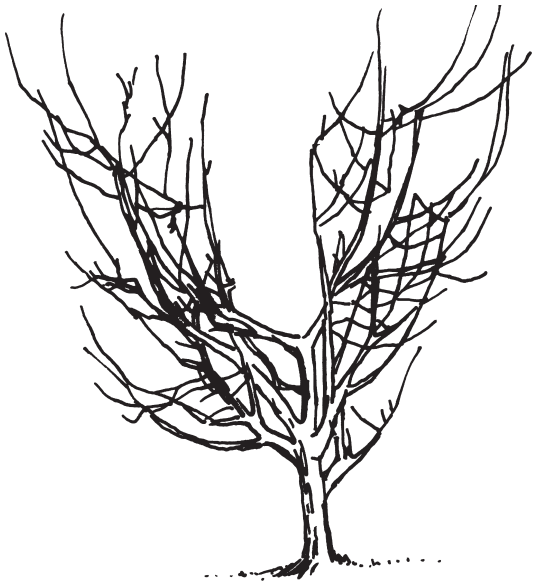


Figure 9. Same tree (Figure 8) pruned. Note open center, heading back of branches, and plenty of fruiting wood.

trunk. This will involve leaving a very short stub when a branch is removed. Cut back to a lateral branch going in the direction you want the plant to grow.

• Prune hard pears just enough to control growth and to remove interfering wood. This will help prevent fire blight.

• Asian pears require annual pruning similar to apples and pears, depending on which training system (leader, modified leader, or open center) is used. To reduce fire blight, avoid excessive pruning. Do not allow fruiting spurs to develop on trunk, and keep height down by annually cutting main leader and/or scaffold leaders to a secondary branch.

Pruning Peaches, Nectarines, and Plums

• Remove dead, diseased, and weak wood, interfering branches, and trunk sprouts.

• Keep center of tree open by cutting back to a branch growing outward. Remove upright growth unless needed to fill in a blank space (Figures 8 and 9). During the spring, remove or rub off sprouts arising on top sides of major scaffolds on interior part of tree near trunk.

• Keep trees within bounds by cutting main scaffold branches back to a lateral growing in the same general direction as the scaffold branches. Maintain tree height at 7 to 8 feet by topping upper branches to an outward-growing branch where possible. If you want taller trees that must be worked with ladders, top branches at a height of about 10 feet.

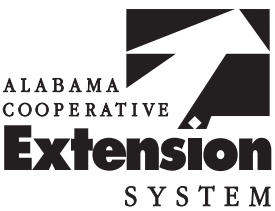
• Balance pruning and fertility to maintain a good supply of annual growth 18 to 24 inches long for the next year's crop.

• Remove at least half the fruiting wood throughout the tree so that each fruiting branch occupies its own space without being crowded. This should involve removing some 2-year-old as well as 1-year-old wood. Examine fruit buds for damage before pruning. If freezing weather reduces crop potential, do not remove as much fruiting wood so that a maximum crop is possible. Immediately after harvest, complete a thorough pruning.

Pruning Figs

• Thin out weak, dead, and diseased growth by cutting back to laterals. Keep center of plant open, and reduce height of laterals to 7 to 8 feet by pruning to secondary branches. A larger plant can be developed if you want to use ladders.

• Maintain a good supply of current growth, which produces the main crop of figs.



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