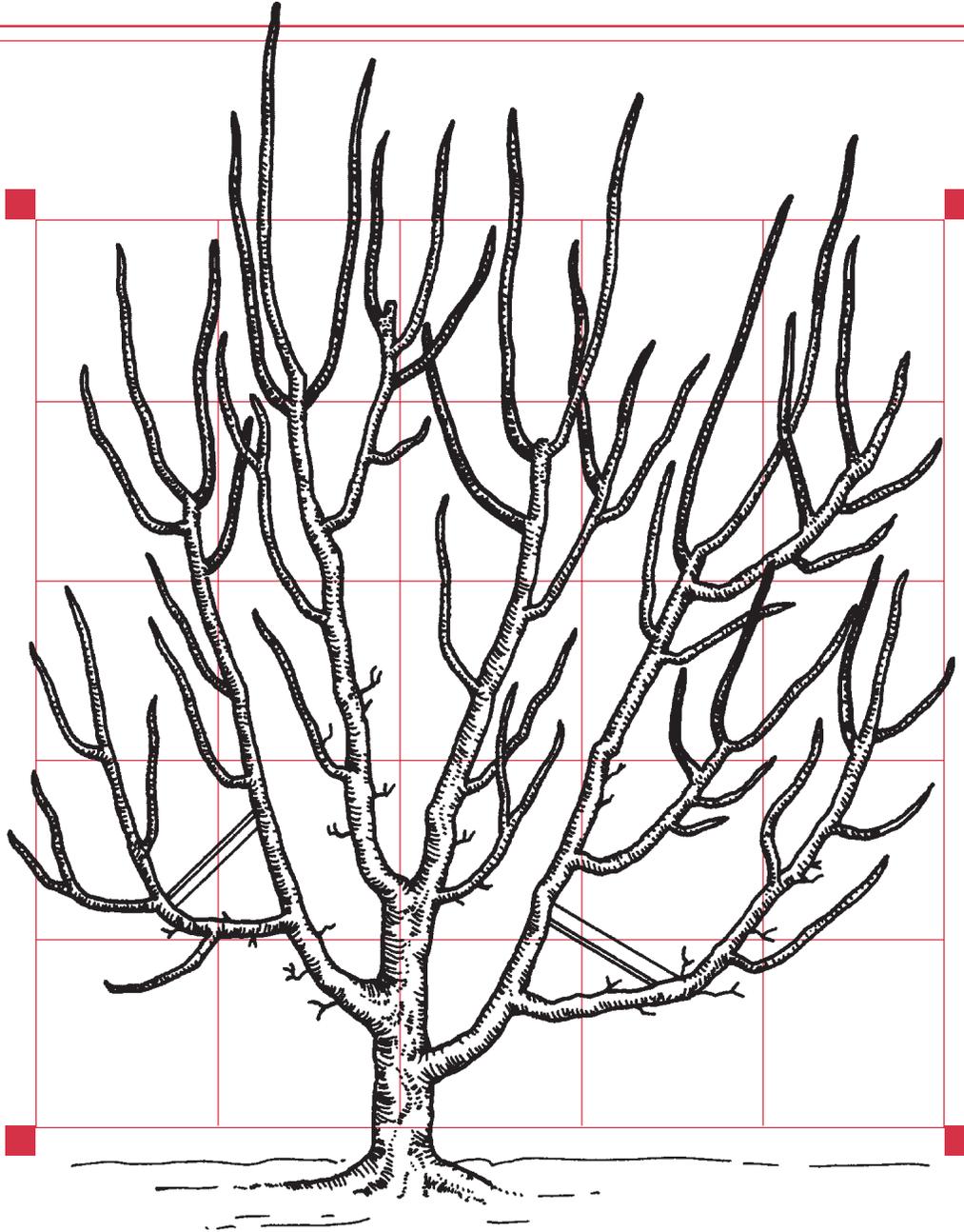


# TRAINING & PRUNING Your Home Orchard



A Pacific Northwest Extension Publication

Oregon • Washington • Idaho

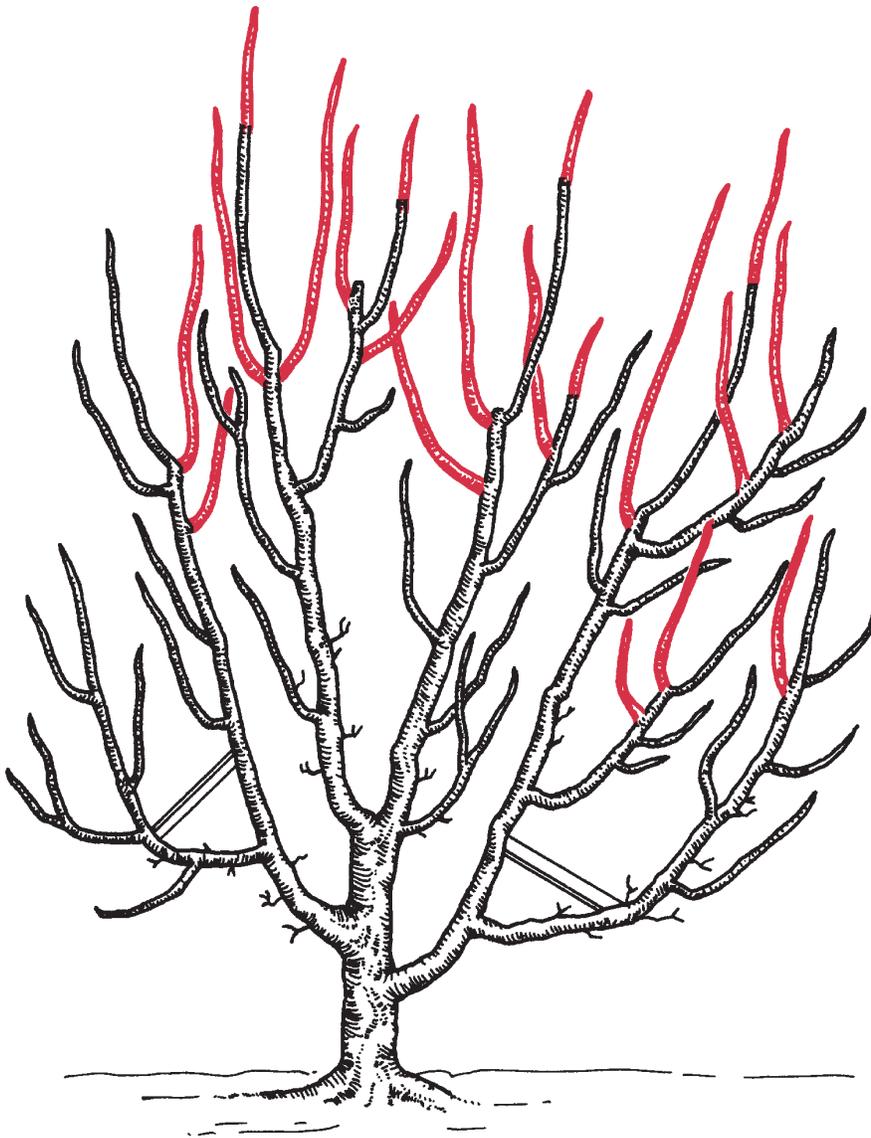
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PNW 400



# Training and Pruning Your Home Orchard

R.L. Stebbins



In its fourth winter, this tree has four well-developed leaders (see “Open-center training,” page 6).

## Basic principles

### Why train fruit trees?

- Training develops a strong tree structure that can support heavy crops without breakage.
- Training helps to bring a young tree into production at an early age.

### Why prune fruit and nut trees?

- Pruning reduces overall tree size.
- Pruning makes trees easier to spray and harvest.
- Pruning young trees can improve structural strength and induce branching.
- Pruning mature trees can increase their production and improve the fruit quality.
- Pruning reduces the need to prop up the fruit-laden branches.

### Don't use wound dressings!

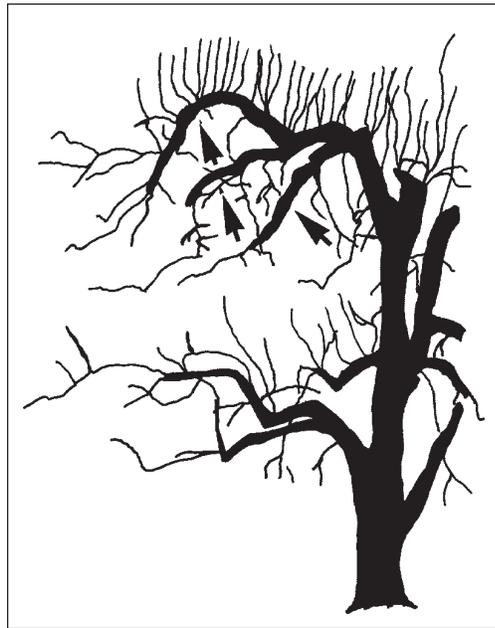
They're not necessary—there's no clear evidence that they reduce wood rots associated with pruning wounds. Trees protect themselves from wood-rotting fungi by producing a chemical barrier near a properly made pruning wound.

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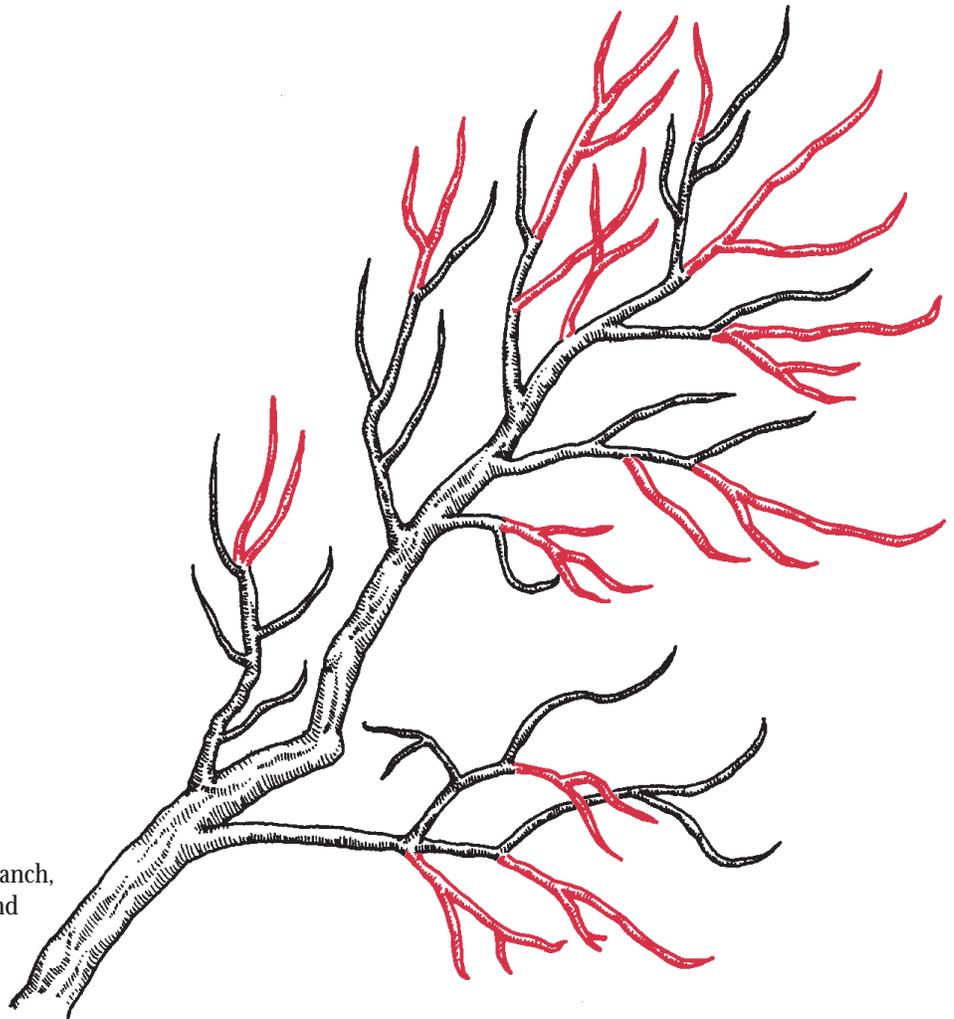
Robert L. Stebbins, Extension horticulture specialist emeritus, tree fruit and nut crops, Oregon State University. This replaces an Oregon State University Extension publication by the same title.



**Figure 1.**—When you prune, don't leave a stub—and don't make a wound larger than necessary, which happens with a "flush cut." Cut just outside the tapering portion of the branch, where it's inserted in a larger branch or the trunk.



**Figure 2.**—In a poorly pruned tree, upper limbs shade out lower limbs, and a dense thicket of "suckers" appears in the top. Cut the drooping terminal portion to a more upright branch. Remove some of the "suckers," cutting close to the limb; thin out side shoots on others so that they'll bend over with the weight of the fruit.



**Figure 3.**—On this well-pruned branch, thin out more shoots toward the end (those colored red).

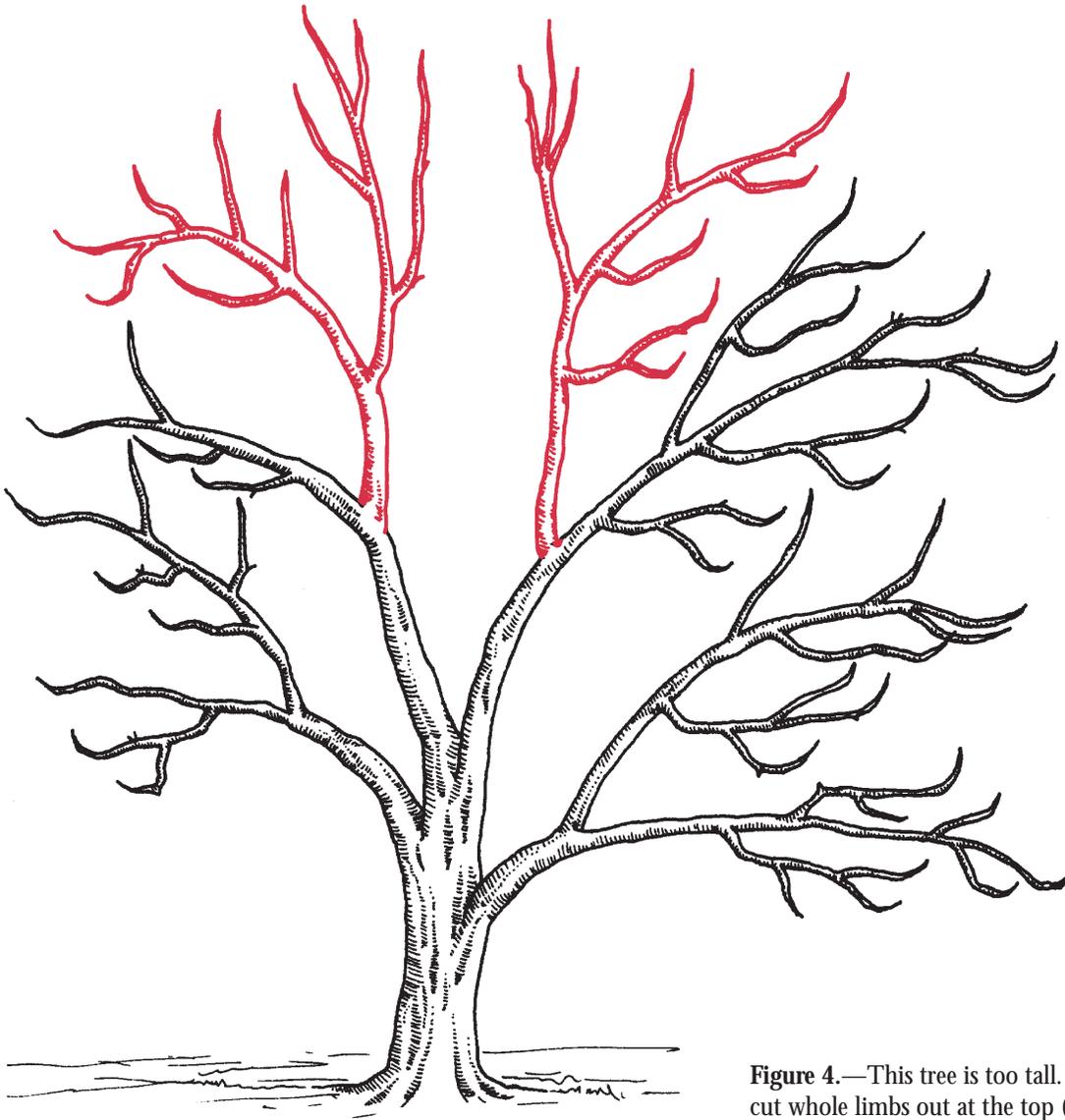


Figure 4.—This tree is too tall. To reduce its height, cut whole limbs out at the top (those colored red).

Prune so that you don't leave a stub (Figure 1), but also so that you don't make a wound larger than necessary, as occurs with a "flush cut." Cut just outside the tapering portion of the branch where it's inserted into a larger branch or the trunk.

Early tree training helps you avoid large pruning wounds low in the tree, which might become infected.

## General rules for training

- Start following a training system at planting time.
- Remove unwanted shoots in summer when they're small.
- Train more by limb positioning than by pruning.

- Follow the training program consistently, as frequently as necessary, so that you complete training properly as soon as possible.

## General rules for pruning

- Prune all fruit and nut trees at planting time to balance the tops with the roots. You'll need much less pruning at planting if you plan to irrigate the young tree frequently during its establishment.
- Prune young trees very lightly.
- Prune mature trees more heavily, especially if they've shown little growth.
- Prune the top portion of the tree more heavily than the lower portion (Figure 2).
- Prune when all danger from fall or early winter freeze has passed, but before full bloom in spring. Sweet cherry trees may be pruned in August when there's less danger of bacterial infection.
- Thin out more shoots toward the end of a well-pruned branch in a mature tree. This will increase fruit size and quality on the remaining shoots (Figure 3).
- To reduce the height of an excessively tall tree, cut whole limbs out of the top, making cuts flush with the bark of a lower limb. Stubs left in the top of a tree won't heal (Figure 4).

## Limb bending

Bending nearly vertical limbs to an aspect 45 to 60 degrees from vertical usually stimulates fruit production earlier in the life of the tree. The thicker and more upright a limb is, the more benefit it will receive from bending. Early production stimulated by bending helps to keep a tree small and manageable.

### Open-center training (Figure 5).

To train trees to an open center, choose three or four shoots to form main scaffold branches the first winter. Remove other shoots that might form competing limbs. Head them, removing a fourth to a third of their length, if they're long and unbranched.

- When you remove large limbs, first cut part way on the underside. Don't leave stubs.
- To keep a tree small, prune moderately every year and don't apply fertilizer, manure, or compost. (This doesn't apply to "dwarf" trees.)

### Central-leader training (Figure 6).

If a nursery tree has few or no branches at planting, head it at 24 to 30 inches above ground. To train trees to a central leader, choose a vigorous shoot high on the tree after planting.

During spring or early summer, remove other shoots near it that, because of their upright aspect and vigor, will compete with the lead shoot (Figure 7). Head this shoot by a third each dormant season, and tie down or remove competing shoots.

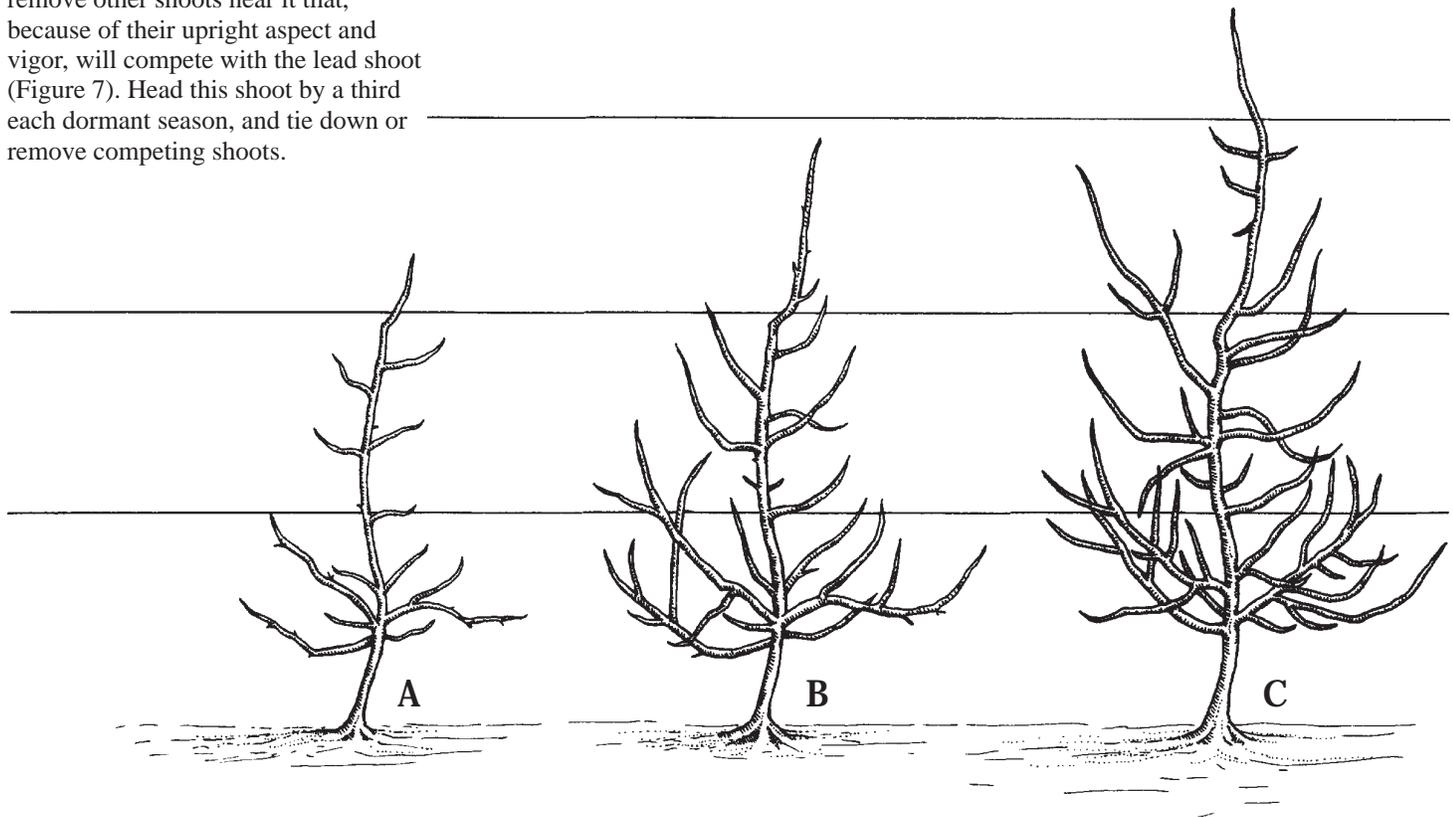
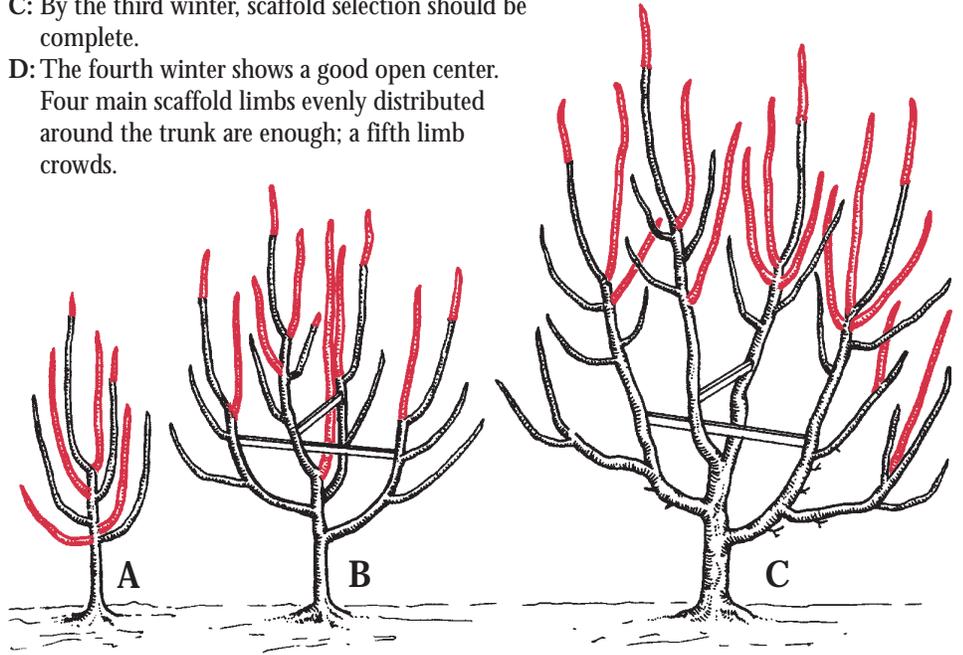
**Figure 5.**—To train trees to an open center, you'll need four seasons (red indicates removed or headed shoots).

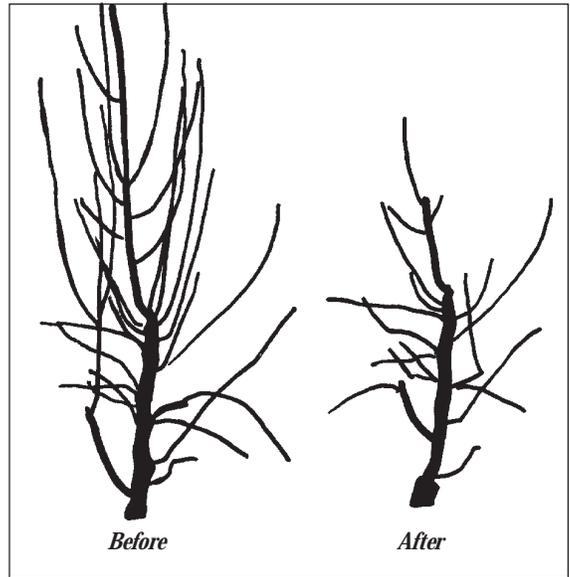
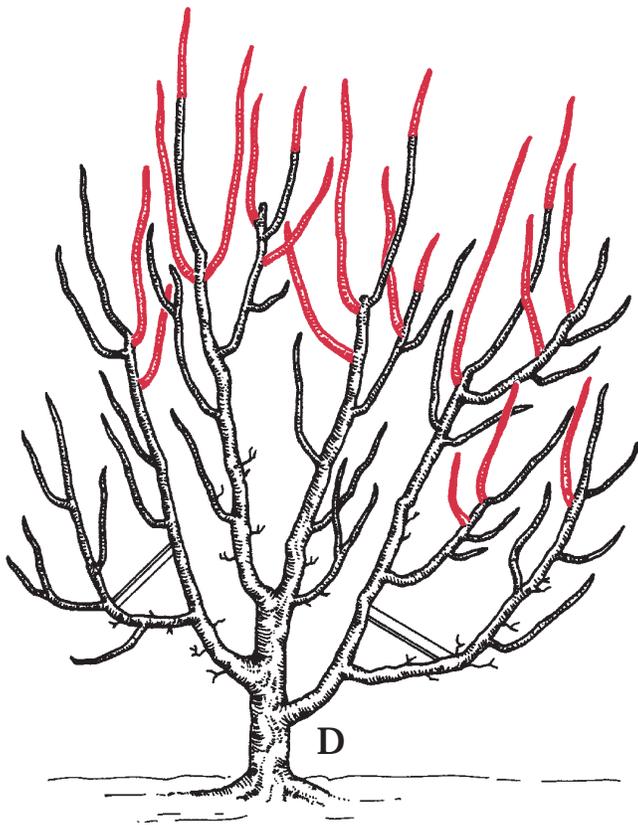
**A:** The first winter, choose three or four shoots to form main scaffold branches; remove or severely head all others. Scaffold branches should be at least 8 inches apart on the trunk for a strong tree structure.

**B:** The second winter, choose one or two more.

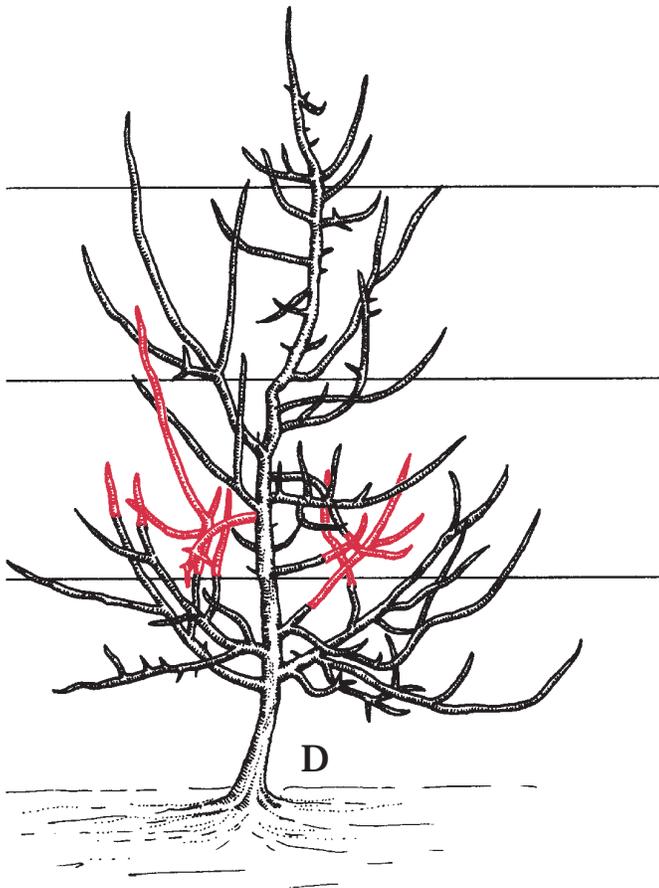
**C:** By the third winter, scaffold selection should be complete.

**D:** The fourth winter shows a good open center. Four main scaffold limbs evenly distributed around the trunk are enough; a fifth limb crowds.

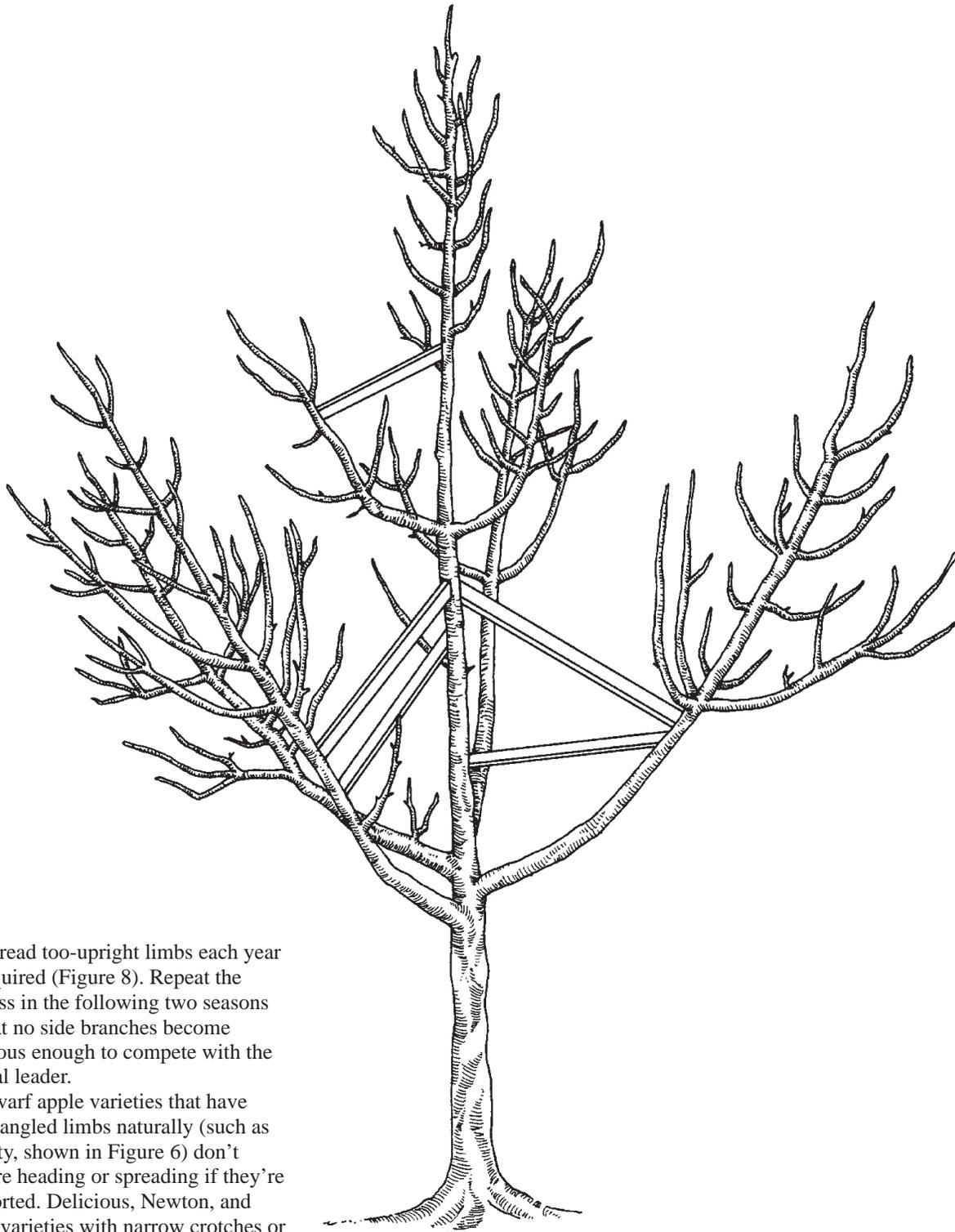




**Figure 7.**—The highest portion of a scaffold limb is called the “leader.” Thin it to an upright side shoot. Head that shoot and remove all upright shoots that might compete. To avoid overgrowth in the tree top, repeat this process annually.



**Figure 6.**—To train trees to a central leader, you’ll need four seasons (red indicates removed or headed shoots).  
**A:** The first winter after planting, choose a vigorous shoot high on the tree. Cut off the top in to stimulate branching if it’s 2 feet long or longer. Head all other vigorous shoots more severely.  
**B, C, and D:** Repeat the process the following three seasons so that no side branches become vigorous enough to compete with the central leader.



Spread too-upright limbs each year as required (Figure 8). Repeat the process in the following two seasons so that no side branches become vigorous enough to compete with the central leader.

Dwarf apple varieties that have wide-angled limbs naturally (such as Liberty, shown in Figure 6) don't require heading or spreading if they're supported. Delicious, Newton, and other varieties with narrow crotches or upright limbs—or both—do require spreading. The central leaders of non-supported trees need annual heading to develop short, stout limbs.

**Figure 8.**—While the tree is young, spread branches that make very narrow angles with the main trunk. If such limbs are allowed to grow to a productive age, they usually break out, often splitting the entire tree.



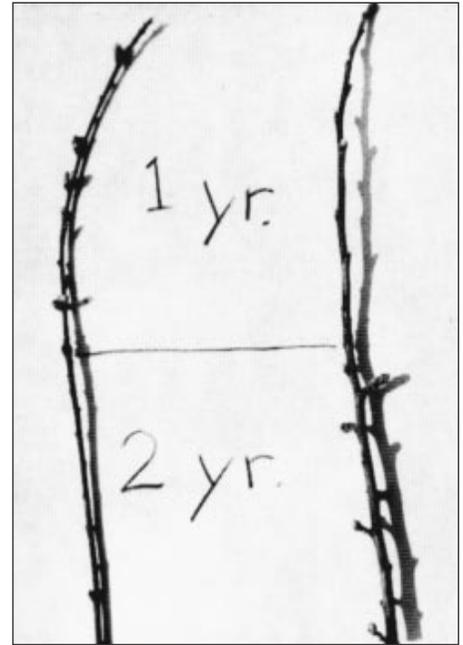
**Figure 9.**—Thinning out (left) and heading back or “stubbing” (right).

**Thinning out and heading back (Figure 9).** Thinning-out pruning results in long, flexible limbs that bend down when loaded with fruit. Heading back or “stubbing” causes limbs to branch and stiffen. Light heading stimulates branches when you train young trees.

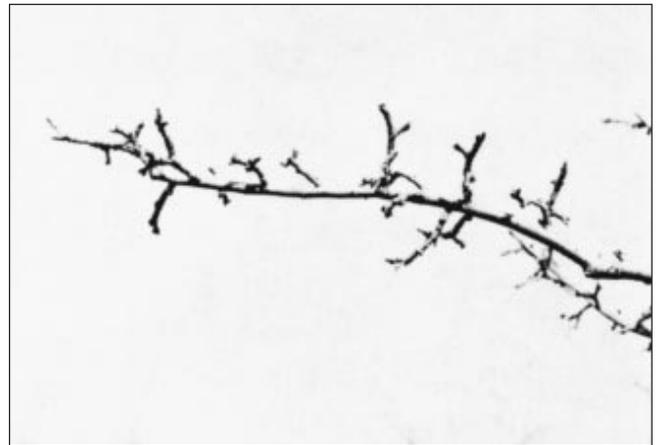
## Fruiting habits

Figure 10 shows the difference in fruiting habit between peach and apple. Peaches bloom only on 1-year-old wood; apples usually bloom on spurs or shoots from 2-year-old wood.

Figure 11 shows a mature apple tree’s fruit spurs, which will bear the fruit crop. Because peach and apricot trees bear only on 1-year-old wood, they require more annual pruning to renew fruiting wood than apple and pear trees do. Cherries and prunes require relatively little pruning.



**Figure 10.**—One-year-old wood is wood that grew during the previous summer: peach (left), apple (right).



**Figure 11.**—The fruit spurs on a mature apple tree bear the fruit crop.

## Espalier and palmette training

Espalier and palmette training develops trees in two dimensions only. In a home garden, you might use it to save space and to enhance the esthetic appeal of fruit trees. You can do it most successfully with dwarf apple and pear trees. Select buds to form the branches at the proper height and cut off the tree just above them.

As these buds grow—and before they've produced enough wood to become stiff—fasten the shoots that grow from them to training wires or sticks with masking tape or other suitable material.

Develop the lowest branches first, angling them at about 30 degrees at the start. Widen this to 45–50 degrees when they're as long as you want them (Figures 12 and 13).

By heading the central leader just above where you want branches, develop one or two higher pairs of branches, keeping them shorter and slightly more spreading than the lower pair. It's best to have at least 18 inches vertically between branches.

Balance the growth of limbs by bending strong limbs down more or weak limbs up more. Withhold or apply fertilizer to keep growth within desired bounds.

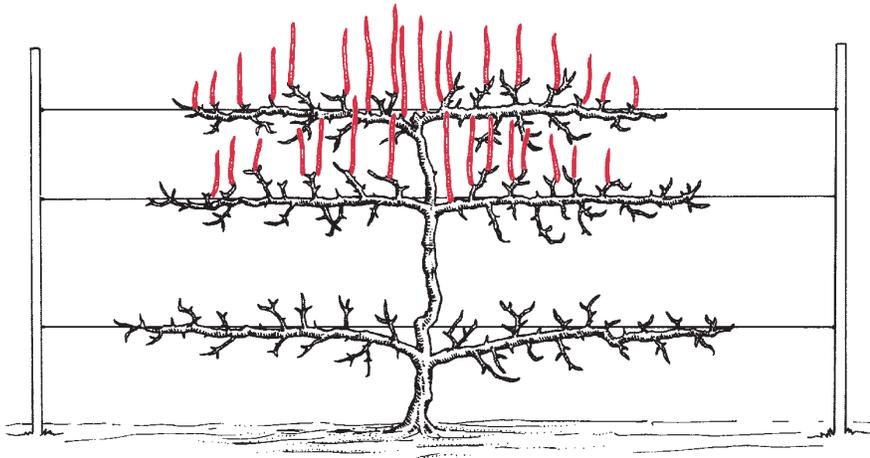


Figure 12.—Espalier training.

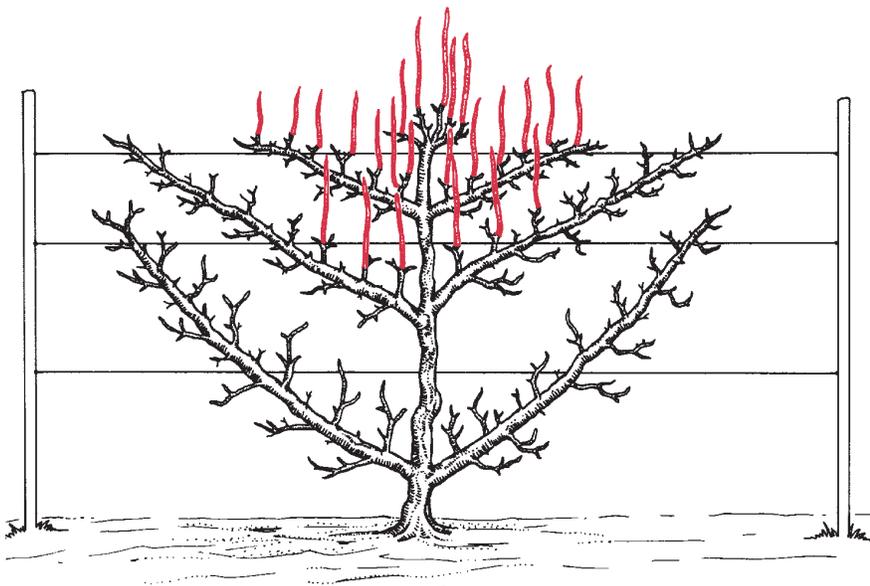


Figure 13.—Palmette training.

## Tools

Long-handled pruning shears (Figure 14, center) are the most useful tool for almost all pruning jobs.

Hand shears (Figure 14, bottom) are useful for training young trees.

If you need to make large cuts, use a pruning saw (Figure 14, upper left).

Use only a sturdy stepladder. Set it firmly on the ground to prevent accidents.

## Applying the basics

### Apple trees

**Fully dwarf trees.** You must support these trees in some way, or they'll bend to the ground under the weight of their fruit. You could support the central trunk against the side of your house or a fence with adjustable eye-bolts or turnbuckles and wires.

If you use individual posts, make sure they extend at least 6 feet above the ground, and drive or sink them at least 2 feet into the ground. Wooden tree stakes should be 2 inches or more in diameter.

You can grow dwarf apple trees on a post-and-wire trellis in a hedgerow. Posts may extend from 6 to 10 feet above the ground. Treated posts are best, but sound, untreated 4 x 4 cedar posts may be satisfactory. Use galvanized wire, 12-gauge or heavier. The lowest wire should be about 4 feet above the ground, with higher wires at 2-foot intervals.

Anchor the end posts against another post driven several feet into



**Figure 14.**—Pruning saw (upper left), long-handled pruning shears (center), hand shears (bottom).

undisturbed soil at an opposing angle. Tie the main trunk to these wires, using a loop big enough to allow the trunk to grow without being girdled. If you attach the trunk to the trellis wire with 5/8-inch box staples, it will graft to the wire and not girdle.

Train fully-dwarf apple trees to a central leader (Figure 6). If you train them to a central leader, and support them from a post or trellis, they'll make highly productive 6-, 8-, or 10-foot trees.

If you don't train them in this manner, the weight of the fruit will bend them down so that they make bushlike trees only 4 or 5 feet tall.

In the spring following planting, when shoots are 3 to 4 inches long, select the uppermost vigorous shoot and remove other shoots near it. Return several times in summer and remove any shoots that, because of their upright aspect and vigor, will compete with the lead shoot.

Head this shoot by a third in the dormant season, and tie down or remove competing shoots. Repeat the process in the following two seasons so that no side branches become vigorous enough to compete with the central leader.

Keep three to five branches 18 to 30 inches above ground to form a basic set of permanent branches. If they're upright, tie or weight them down to a nearly horizontal aspect. Try filling sandwich bags with soil, sand, or gravel and draping them over limbs as weights; use staples to keep them in place during high winds. Position higher limbs to below horizontal to reduce their vigor relative to the permanent basic set.

**Semidwarf trees.** You can train these trees to a central leader or develop them with three or four lead branches. Central leader is best for weak-growing varieties on poor soil.

Train vigorous varieties with multiple leaders (when trained to central leaders, they may become too tall). In a windy site, use a sturdy stake for support in the first 10 years.

Head nursery trees the same as for central leaders, but develop three or four shoots instead of one. When they're 4 to 6 inches long, spread these shoots using cocktail-style toothpicks or spring-type clothespins.

In the following years, spread or tie out the lead limbs to an overall aspect about 30 degrees from vertical. You could weight the side limbs that arise from these or spread them to horizontal to stimulate early production. As the tree begins to bear fruit, limbs may require propping or tying to prevent breakage.

**“Spur-type” trees (Figure 15)** form many small spurs on young growth rather than the usual long shoots and leaf buds—this is how they got their name.

Each spur bears a flower cluster. The leaves are close together, the tree



**Figure 15.**—On this central leader of a 2-year-old spur-type Delicious apple strain, notice the numerous short spurs with blossom clusters. Extensive fruit thinning would be required to allow this tree to grow and ripen the remaining fruit.

branches are less frequent, and the tree grows slowly. Because these trees are smaller than the standard strains of the same variety, and fruit at a young age, they make ideal home-orchard trees.

If you grow them on vigorous rootstocks, spur-type trees may not require artificial support until they are in production.

Spur-type trees are available on both vigorous and dwarfing rootstocks. Because they branch sparsely, leave more branches in a spur-type than in a tree of standard growth habit. To train them to a central leader, space the lower set of limbs several inches apart vertically on the leader, and reduce their number to four or five (Figure 6).

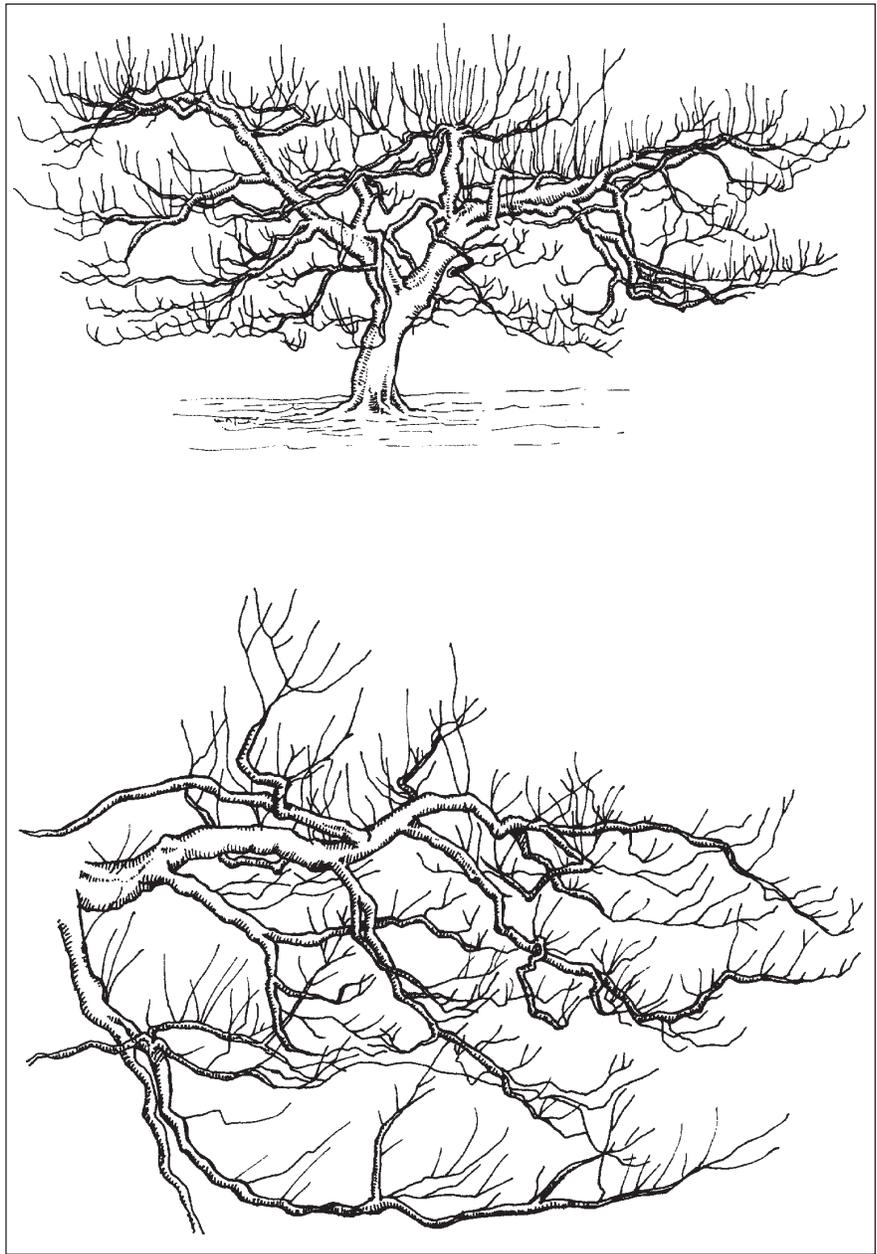
**Standard trees (full size on seedling roots).** Cut back trees at 24 to 30 inches from the ground at planting time. Train them on nondwarfing roots to the modified central leader system: Leave the central leader in place until fruiting begins, then gradually remove it.

It's desirable to have only four main scaffold limbs, equally spaced around the trunk and vertically spaced several inches apart. Develop the main scaffold limbs to an overall aspect just a few degrees above horizontal. Make sure that all secondary branches also have a gradual upward aspect (Figure 5).

The branches of a mature nondwarf apple tree may spread over an area 40 feet in diameter and reach a height of 30 or 40 feet. Regular pruning, and tying down of upright limbs in the top, are required to maintain a height of 12 to 15 feet. Prune to make the lowest limbs the most vigorous and productive in the tree (Figure 16).

Shorten, thin out, and bend down the upper limbs to accomplish this. By removing risers that go straight up and hangers that grow straight down from the permanent limbs, open a vertical space of about 3 feet between the lowest limbs and those above, so that light can penetrate.

If a tree hasn't been pruned for several years, it will have a dense thicket of upright shoots in the top and many weak, pendulant spur systems further down. Prune it back into shape gradually over several years, rather than trying to do the whole job in 1 year (Figure 2).



**Figure 16.**—(Above) This old seedling-rooted apple tree is maintained at a height of about 12 feet by extending the branches horizontally, rather than vertically. (Below) This enlarged view shows how the slightly upward aspect of the entire main limb and the terminal part of the side limbs maintain a good balance between shoot growth and fruiting. Pruning consists of many small thinning cuts.

After you identify the main scaffold branches, saw out any excess large branches. Cut ladder bays so that you can place your ladder in the tree's center. Climb as high on your ladder in the tree's center as you intend to pick, and cut the main scaffold limbs down to a height that you can reach.

Remove limbs that lap over or hang down into other limbs. Thin out the upright shoots, leaving some of the smaller ones. Cut back weak pendulant

limbs. Gradually invigorate the spur systems by cutting back some and removing others. For better sunlight distribution, the center of the tree should be fairly free of limbs.

Don't head shoots—remove them entirely or let them bear fruit and rely on the weight of the fruit to bring them down. Thin off shoots on the inside of upright branches so that the fruit will pull them to the outside.

## Pear trees

Head trees at about 24 inches at planting. If the top is branched, retain some branches as leaders. Train pear trees to three or four leaders. Select these leaders early in the first summer and spread them. Do little or no pruning except to head and spread the leaders annually until the tree starts to bear.

Don't head side branches—heading would maintain their upright position. Spread or weight all vigorous shoots except the lead shoots.

Open ladder bays between scaffold limbs, and regularly reduce tree height to one you can reach from your ladder. Shorten or remove upper limbs so they don't shade the lower limbs. Thin out the branches of the mature trees and do the heaviest pruning in the tops.

Remove the long shoots in the center and top, but leave some short shoots and most spurs. Remove horizontal branches in the tree top so that they won't produce suckers.

Cut back the slow-growing spur systems to about half their length to invigorate them, or remove them and replace with new shoots. On Anjou and Comice varieties, cut back most of the spur systems and some shoots to increase the size of the fruit.

## Sweet cherry trees

At planting, head nursery trees at a height desired for scaffold branches. Cutting a foot or two above ground level will produce a shorter tree. Train sweet cherry trees to the open-center system (Figure 5) with many scaffold branches. The vertical limbs of young sweet cherry trees often will grow 6 to 8 feet without branching.

If a young tree is growing very rapidly, cut off a foot or more of new growth after about 3 feet of growth has been made in the summer. This will cause branching. You can hasten production by tying down or weighting limbs to horizontal.

To promote branching on trees not pruned in summer, head every shoot to about 2 feet in length in the winter. After 5 to 6 years, stop heading and thin out crowded branches.

Bacterial canker, a common disease of cherry trees, frequently causes gumming and dead areas or "cankers"

on limbs—or the death of the entire tree. If a gummy dead area encircles most of a limb, you must cut off the limb.

To avoid bacterial infection, which might enter pruning wounds, pruning may be done in August. You usually can avoid death from bacterial canker by budding or grafting the variety about a foot out on the limbs of a mazzard seedling tree.

Mature trees require little pruning except as needed to reduce the tree height. Birds usually eat the top cherries. If you lower the trees too much, the birds may eat the cherries you want. If loss of fruit to birds is excessive, you may want to net the lower limbs.

To make netting easier, remove limbs to create a space of about 3 feet above the lowest set of branches. Before installing netting, tie several nearby limbs together so that you can protect more fruit with the same amount of netting. Remember to untie them later!

## Sour cherry trees

Since sour cherry wood is quite brittle, give special attention to developing wide-angled crotches in young trees. Either select wide-angled shoots to form limbs, or spread the shoots to widen the angles. Three main scaffold limbs are enough for a sour cherry tree.

In the first and second summers, remove excess shoots so that all the new growth takes place on the permanent scaffold limbs. Only occasional thinning-out is needed in mature trees.

## Peach trees

Cut off peach trees about 12 to 20 inches above ground level at planting. Train trees to the open-center system (Figure 5). Develop no more than three or four main scaffold limbs. Select the scaffolds that make the widest angles at the point of attachment with the trunk, and not all from one height. Peach limbs with poor crotches split out more frequently than limbs of many other fruit trees.

Remove the excess scaffold limbs in the spring of the second year and again in the third year if necessary. Head the scaffold limbs in the first and second dormant seasons to cause

branching until there are 6 to 8 secondary scaffold branches and 12 to 16 tertiary branches.

Peach trees bear only on 1-year-old shoots. Enough pruning is required every year to stimulate new shoot growth for the following year's crop. Peach trees branch readily and have too many weak shoots unless they're pruned properly.

Thin out the shoots, leaving shoots of moderate vigor; remove weak or very strong shoots entirely.

Prune hardest in the tops and near the ends of the major limbs. Cut the top limbs back to side shoots to stiffen them and reduce tree height. Peach trees crop more consistently and have larger fruits if they're pruned heavily. Commonly, up to 50 percent of all the previous season's growth is removed annually.

## Prune and plum trees

Train them to the open-center system (Figure 5), with three or four main scaffold limbs. Prune very lightly for the first 5 years. Head only those limbs that will be permanent scaffolds.

Japanese varieties (such as Shiro, Redheart, and Burbank) have many long, thin shoots, so heading is far more important in them than it is in most European varieties.

Weighting or bending limbs stimulates early production. Remove the excess scaffold limbs and do little else.

In mature trees, thin out the tops every few years and remove the dead limbs as they appear. Most plums and prunes have ample bloom every year; therefore, only enough pruning is required to control height and spread, to keep the trees fairly vigorous, and to prevent limb breakage.

## Walnut trees

Cut off a newly planted walnut tree 4 or 5 feet above the ground. Unless you do this, the tree won't grow much for several seasons. The lowest limbs of a walnut tree have a habit of drooping, so they should originate fairly high on the trunk.

Select three to five main scaffold branches in the first and second growing seasons and remove the excess branches at that time. After the

scaffold branches have developed, no further pruning is required.

Although pruning doesn't hurt walnut trees, they're so large that it's difficult to prune the tops where pruning would do the most good. Pruning will invigorate most old, weak walnut trees.

## **Filbert trees**

In nature, filberts grow as bushes, but you can force them to grow in a single trunk by annually removing the sprouts that arise at ground level. Train them with three or four scaffolds, similarly to peaches (page 13).

To be most productive, a filbert tree should make 6 to 8 inches of new terminal shoot growth, on shoots at shoulder height, every year. Frequent pruning helps to maintain this growth.

Prune filbert trees like peaches, but less severely. Filbert wood is especially susceptible to wood-rotting fungi, so it's important to make cuts at the branch collar with limbs or trunk.

## **Apricot trees**

Apricot trees usually develop numerous branches in the nursery. Some of these may be selected for scaffold branches at planting time. Cut these branches back a few inches and remove other branches. Cut back long shoots 1 year after planting to induce branching. Train the tree similarly to peaches (page 13).

Pruning bearing apricot trees is mostly a process of thinning out the excess wood, and heading to shorten long shoots. After a side shoot has produced for 3 or 4 years, remove it and let a new shoot grow in its place.

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