



Pruning the Orchard

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INTRODUCTION

Pruning means removing certain parts of the tree in order to regulate the shape and bearing habits of the tree and quality of the fruit, but with a minimum of interference with natural growth habits. Not all kinds of fruit and nut trees are trained and pruned the same way, but most fit into one or more of the basic systems. To be able to prune intelligently, one must understand the basic principles. It is the aim of this bulletin to present basic principles and methods of pruning young and old fruit trees, vines, and bushes.

PRUNING EQUIPMENT

Long-handled pruning shears (loppers) are the most useful tools for almost all pruning jobs (Fig. 1). Hand shears can be used on young trees and limbs of $\frac{1}{2}$ inch diameter or smaller.

If many large cuts are to be made, a pruning saw should be used. Pruning saws consist of a wooden handle with an 8 to 15 inch curved saw blade with the teeth set wide with about 6 teeth per inch.

Orchard ladders are made of wood or aluminum and are manufactured in even-foot lengths of 6 to 12 feet. The most dependable are three-legged (tripod) with the third or positionary leg hinged to the top of the other two. Four-legged ladders should only be used on level surfaces because they lack stability on uneven ground surfaces. Do not use tripod orchard ladders on smooth cement surfaces because the single leg will slide and the ladder will collapse.

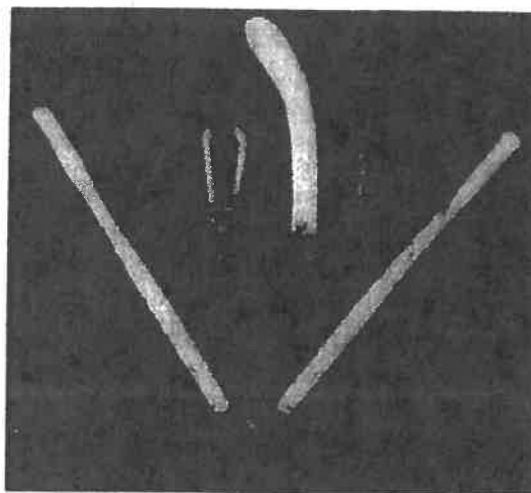


Figure 1. Common pruning tools (lopping shears, hand shears and hand saw).

APPLE TREES

Fully dwarf apple trees will fall over from the weight of their fruit or in heavy winds if not supported. The central trunk may be supported by the side of a house, fence, post, or trellis. If individual posts are used, they should extend to at least 4 feet above the ground.

Dwarf apple trees may be grown on a post-and-wire trellis in a hedgerow (Fig. 2). The lowest wire should be about 2 feet above the ground with higher wires at 2 and 3 foot intervals. Tie the main trunk to these wires with wire, strong twine, or plastic ties, but be sure and leave enough slack to allow for growth so the trunk will not be girdled.

Fully dwarf apple trees should be trained to a **central leader** (Fig. 3). The general concept involves training the tree in a manner that permits the development of lateral branches in layers or whorls from a central system. Each layer may be 20 to 25 inches above the one below, and will be one year younger. When the tree reaches the desired height, the central leader is cut to a short lateral branch, and this height maintained in succeeding years. The central leader tree is maintained in a pyramidal "Christmas tree" shape.

Third Spring to Bearing: The central leader is headed back each spring in order to induce lateral branching and promote growth of the central stem. It is still essential to insert spreaders in appropriate places to spread the younger laterals. Strong laterals may again be headed back to balance growth around the tree. Very little, if any, thinning of secondary branches on the scaffolds is needed at this time. The oldest scaffold branches should be forming fruiting spurs the third growing season on most trees on dwarfing rootstocks.

Apple flower buds are generally found on spurs growing on 2-year old or older branches. Remove any fruit that will interfere with the growth of the central leader.

Bearing: When the tree reaches the desired height, the leader is cut to a short lateral branch at this height. In succeeding years upright growth is removed annually from the top or is severely headed back to maintain the desired height.

When the desired spread of the tree is reached, scaffold branches are headed back in order to curtail extension growth. Some thinning out of secondary branches is necessary to reduce total growth of the scaffolds and to promote good light penetration into the canopy.

It is important to maintain the pyramidal tree shape throughout the life of the central leader tree. To do this, it will be necessary to promote maximum fruiting on all lateral and scaffold branches. This involves thinning out so fruiting spurs near the center of the tree can receive good light exposure. In addition, upper lateral branches and scaffolds need to be headed back annually to maintain growth shorter than those lower on the tree.

Semi-dwarf apple trees may be trained to either central leader or modified leader type of trees.

Standard trees (full size) should be trained to a modified leader system.

MODIFIED LEADER OR MODIFIED CENTRAL LEADER PRUNING

At Planting: For standard trees, it is best to plant 1-year old unbranched trees. This permits heading the trees to 36 to 40 inches at planting. If branched 1 or 2 year old trees are planted, pruning involves selecting the most desirable laterals (not more than four) and removing all others (Fig. 6). Selected laterals should have wide-angled crotches, preferably greater than 45 degrees. The leader, or top lateral, is usually left about twice as long as the longest side lateral.

First Dormant Pruning: Pruning after the first season's growth involves the selection of primary scaffold branches. Ideally, the four or five lateral branches chosen for the

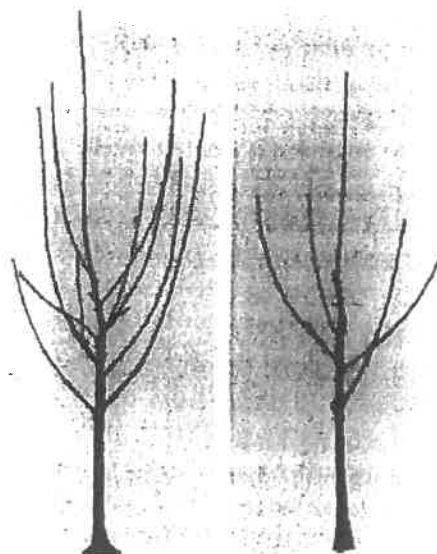


Figure 5. An unpruned, 1-year-old apple tree is shown before dormant pruning (left). At the right, the same tree has been pruned to the central leader system with a dominant central leader, which has been topped slightly, and selected lateral branches spaced vertically along the trunk.



Figure 7. The apple tree (left) has not been pruned properly. There are too many branches originating from the same point with acute angles. Right, the same tree following pruning and removal of the multiple leaders.

PEACH AND NECTARINE

Peach and Nectarine trees should be trained to an open center or vase system.

An open center pruning system will result in the development of two to four scaffold branches arising near each other on the trunk (Fig. 8). All scaffold branches are pruned to develop about equal in size, spaced as equally as possible around the trunk at a height 18 to 24 inches from the ground.



Figure 8. Two-year old peach tree trained to the open center system. This strong, wide-angled crotch (three scaffolds) is resistant to winter injury and breakage by fruit weight.

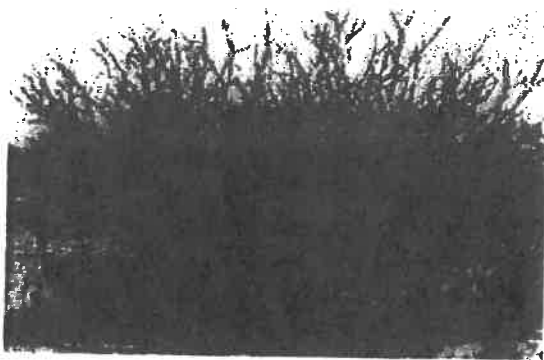


Figure 10. If mature peach trees are improperly pruned or left unpruned, they will become bushy (top) and will produce excessive numbers of small, poor quality fruit. Such problems can be corrected by selected thinning of numerous limbs (bottom). New vigorous fruiting wood will develop following pruning. Too many scaffold limbs were left on this tree following the initial training.

and branches growing in an objectional direction or with weak narrow crotches should be removed. After thinning out branches, distribute additional cuts over the tree so as not to leave a cluster of twigs at the end of the branches.

Vigorous, upright water sprout growth frequently develops in peach trees. It is most abundant following severe pruning or loss of large limbs. Most vigorous upright growth needs to be removed during dormant pruning, but some may remain for developing into new fruiting wood. These are headed back to an outward lateral branch with some thinning out of the remaining laterals.

To maintain the trees at the desired height, it is important to head the upward growing branches to outward growing laterals. The renewal point is first established by heading back each main branch as soon as it reaches the desired height. This cut is ordinarily made in 1 year old wood. In succeeding years the renewal cuts are to be made in the vicinity of the original cut. New shoots ordinarily develop near the renewal cut. The best of these can be used for fruiting wood and the others removed. The center of the tree is kept open in order to maintain the spreading form.

Avoid climbing in peach trees while pruning, especially with hard-soled shoes. The bark can be easily scuffed, which results in open wounds where canker infection can take place.

PEAR TREES

Pear trees should be trained to a **modified leader** with four or five main scaffold limbs. Select these branches early, remove the undesirable laterals and do very little more pruning during the first few years. Very light pruning is practiced on young or bearing pear trees. Even moderate pruning may induce development of water sprouts and fast-growing terminal growth. This type of growth is very susceptible to a bacterial disease called fire blight.

Pruning cuts should be restricted to branches that severely rub each other and to water sprouts as they appear. Heading back of terminals to a lateral should be done only as the tree becomes too high.

During dormant pruning, remove all fire blight infected branches by cutting 12 inches below blight cankers in mid-winter. The disease is less likely to be spread at this time by pruning cuts. Blight cankers can be detected by their dead, blackened and sunken appearance. Blighted areas blacken and often retain dead leaves through the winter.

PLUMS

European Plums, such as Italian Prune and Stanley, are best pruned and trained to the **modified leader** system. About 6 inches of vertical spacing between scaffold branches is desirable.

Cultivars of the **Japanese-type** plums such as Beauty, Methley, Santa Rosa, etc., grow in a more spreading fashion than European plums and should be trained to the **open center** system.

Prune very lightly for the first 5 years. Remove the excess scaffold limbs and do little else. As trees reach heavy bearing, there is reduced growth of terminals and increased growth of fruiting spurs. At this time, the amount of pruning may be increased. Detailed pruning throughout the tree and enough thinning-out to maintain desirable growth and production of large size plums is desirable.

APRICOT TREES

Apricot trees may be trained to either the **modified leader** or **open center** system (Figure 13).

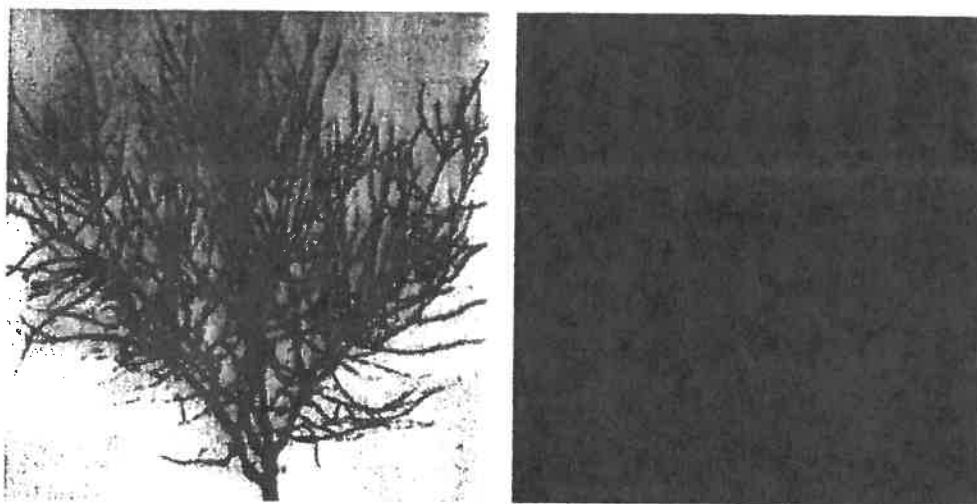


Figure 13. An apricot tree before (left) and after thinning (right). Note improved light penetration and fruit spur development.

With young or mature trees, long slender branches require heading back to induce branching. Trees should be kept open with considerable thinning-out in order to induce annual formation of fruit-bearing wood.

Apricot fruit is borne on short spurs that are short lived.

Apricots bloom very early; consequently, all or most of the flowers or young fruits are frequently killed by frost. Delaying pruning until after bloom may be advisable with apricots. Prune less heavily if there is a light or no crop at all.

3. Regulate branch growth by summer pruning. In most cases this involves pinching back young succulent shoots so as to dwarf their growth. This practice is essential for shoots that grow vigorously.

4. Each spring prune back the terminal growth of all branches to suppress extension growth and to induce spur development close to the primary arms of scaffold branches. Each terminal is cut so that only 2 or 3 inches of the preceding season's growth remain.

5. As the tree grows older and full of secondary branches, some removal of these branches and fruiting spurs will be necessary each year to maintain the tree's shape and productiveness.

PRUNING NEGLECTED TREES

Occasionally it becomes necessary to prune fruit trees that have been neglected for many years. The primary objectives are to reduce tree height and to thin out branches. This will insure good light penetration throughout the tree, better spray coverage, and increased fruit production.

A pruning procedure for neglected trees should:

1. Lower the height of the tree where necessary. Up to 4 or 5 feet of growth can be removed in 1 year. The cut in the top should be just above an outside lateral branch. Subsequent pruning in the tree top will consist of annual water sprout removal.

If it is necessary to remove more top growth, spread the pruning over 2 or 3 years, removing 3 to 5 feet of the older wood each year (Fig. 15). Water sprout growth in the tree top, resulting from the previous year's pruning, will be removed with the older growth taken out in years 2 and 3.

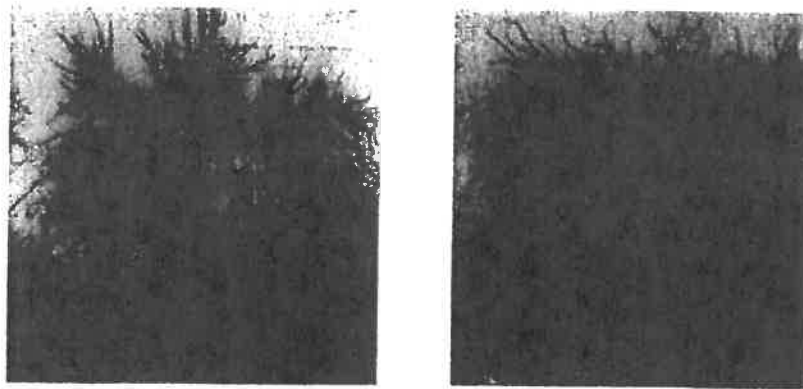


Figure 15. Pruning a neglected apple tree (left) can aid in bringing it back into useful production. The same tree following pruning (right) will benefit from further thinning out and topping during the next 1 to 2 years.

2. Remove undesired, large (over 2 inches diameter) branches from the interior of the tree. It is usually best to remove all branches at once rather than distributing the cuts over a period of years as in top removal. Use these cuts to open the center of the tree. If more than four large branches must be removed, remove half one year and half the next year.

3. Prune off low hanging and crossing branches and dead, diseased or broken branches wherever they exist in the tree.

feet high. At the end of the first summer the main shoot should be 3 to 4 feet high and long enough to reach the top wire of the trellis.

Second year: In early spring, while the vine is dormant, prune off all but the strongest cane (Fig. 16). Tie the cane tautly to the top wire of the trellis or to the lower wire if it is not long enough to reach the top wire. This cane will form the permanent trunk.

During the second growing season, remove shoots that develop below the lower wire and all flower clusters. The main trunk should reach the top trellis wire and some short lateral canes may develop.

Third year: If one to four strong lateral canes develop during the year, they may be trained to the trellis wires. Otherwise, cut the vine back to a single vertical trunk. In either case leave two buds (renewal spurs) on each of two shoots near the lower and upper trellis wires. Fruiting canes for next season grow from these buds.

During the third summer, numerous lateral canes will develop which should bear a good crop during the fourth year. A few grapes may be produced during the third year from the laterals, or from buds on the upper part of the main trunk.

Pruning Mature Vines: After the third year, most vines can be treated as mature. In early spring, prune the vine to four lateral arms, each with 6 to 12 buds, arising from the main trunk. Each bud is capable of producing two or three clusters of grapes. Leave two renewal spurs near the main trunk for future fruiting canes. Remove all other growth.

Select canes of moderate vigor for the lateral fruiting canes. They should be $\frac{1}{4}$ to $\frac{1}{2}$ of an inch in diameter, straight, and preferably unbranched. Do not select canes less than $\frac{1}{4}$ of an inch in diameter, or canes that are long, heavy, and vigorous. These vigorous canes generally do not produce fruit and are called "bull canes." Train one cane each way on the trellis wires. These lateral canes should originate from the main trunk or as near to it as possible on the arms.

After pruning, loop or spiral the canes over the support wires and tie with twine or other durable material.

A vigorous grape vine can support 45 to 60 buds—12 to 15 buds at maximum on each lateral cane may be left on vines which grew vigorously the previous year. Leave fewer buds (total 30 to 40) on less vigorous vines. Proper pruning necessitates removal of 80 to 90 percent of the wood. Most gardeners fail to prune severely enough to ensure continuous strong vine growth. Prune after the coldest part of winter is past and before the buds begin to swell. Late February and March are the best times to prune in Utah. Summer pruning is not recommended. The fruit does not require direct sunlight to ripen and develop full color.

RASPBERRIES

Black and Purple Raspberries: These raspberries give best results when trained to the hill system. They are easily maintained in this way because they do not spread beyond the point at which they were originally set. For support, tie the canes to a stake in each hill, or use a two-wire trellis made to stand about 2 $\frac{1}{2}$ feet above the ground (Fig. 17). Fasten cross arms of 2" x 4" pieces, 2 feet long, to the posts and run a wire through or fasten it to each end of the cross arms. Pull the canes and fruiting shoots between the two wires for support. Some growers have been successful in growing these raspberries without supports, by cutting the canes back to about 2 feet.

Early each summer when the new shoots are about 2 $\frac{1}{2}$ feet tall, pinch off the growing tip. This makes the canes stocky, and at the same time causes the side branches to grow,

EVERBEARING RASPBERRIES

(Often called "Fall Bearing")

For all practical purposes these are restricted to the red raspberry type. The plants bear a fall crop on the tips of the new canes that developed the first year. Ripe berries appear by late August and continue until frost. The spring crop is then borne just a bit further down on the same canes in the following year. After the spring (or summer) crop is harvested, these bearing canes die naturally while a set of new canes develops.

The fall crop of everbearing raspberries was formerly considered as a bonus in addition to the spring crop. Many are now specializing in the fall crop only, and some newer varieties are being developed for this purpose. For a fall crop only, all canes are cut off close to the ground (2 or 3 inches high) in late winter or very early spring, completely doing away with the spring crop. This puts all the vigor into growing a thick stand of new canes that will bear a heavy fall crop on their tips.

This approach eliminates all hand pruning and the problem of winter injury to the over-wintering canes, and reduces disease problems. Where a spring harvest is wanted, a special spring variety can be planted, or part of the canes can be left for spring production.

BLACKBERRIES

Erect thorny types should be pruned in a similar manner to black and purple raspberries. Blackberries are more vigorous so they may be topped higher (about 30-36 inches). Laterals may be left 12" to 16" long. Sucker plants should be thinned out during the summer, leaving three to six plants per foot of row.

Semi-erect thornless types such as Black Satin, Dirksen, or Thornfree should be trained on a trellis and not topped during the growing season. They may be allowed to produce five to eight canes per hill. Prune the canes in the spring to 6 to 8 feet long. In some cases, as the planting matures and the new canes become thick and more upright, growers do top the new canes. Early the next spring the laterals are cut back and the plants left upright or tied to stake supports as are black raspberries.

CURRANTS AND GOOSEBERRIES

Currants and gooseberries grow best in cool, moist and partially shaded locations. The north or east side of a building, fence, or arbor should provide these conditions. Currants and gooseberries require annual pruning for maximum production. Red and white currants and gooseberries develop fruit from buds at the base of 1-year wood and from spurs on older wood. The older wood becomes progressively less fruitful and canes older than 3 years are usually unproductive and should be removed.

Prune in early spring when the plants are dormant. After the first year, remove the weaker shoots and leave six to eight strong branches. On the third and subsequent years, leave four or five 3-year-old branches, four or five 2-year-old branches and four or five 1-year-old branches for a total of 12 to 15 branches per plant. Remove branches that tend to lie on the ground and remove weak branches in the center of the bush to keep the plant from becoming too dense.

- primary scaffolds** are those arising directly from the main trunk of the tree; **secondary scaffolds** are the side branches of primary scaffold branches.
24. **Semi-dwarf tree**—a cultivar which has been propagated upon a specific size—controlling rootstock that produces a mature tree somewhat smaller than a standard tree and somewhat larger than a dwarf tree; in apples rootstocks most often used for this purpose are Malling 7 and MM 106 and 111.
 25. **Shoot**—vegetative growth produced from a dormant bud; the growth developing during a current season. As soon as it drops its leaves, it is called a twig.
 26. **Spreader, spacer**—a short piece of wood or metal used to insert between a lateral (scaffold) branch and the main trunk of a young tree for purposes of producing a more horizontal growth habit of the branches.
 27. **Spur**—short shoot or twig, usually shorter than 3 inches, which bears flower buds; typically on most apple, apricot, cherry and pear trees.
 28. **Stub**—a protruding branch left after heading; may be left by design or error.
 29. **Sucker**—a rapidly growing shoot arising from the rootstock below the bud or graft union.
 30. **Thinning out**—complete removal of the branch.
 31. **Water spout**—a term applied to vigorous, succulent shoots arising indiscriminately and generally on the larger branches of a tree; they are often produced in large numbers just below a pruning cut.
 32. **Wound dressing**—a compound especially made for treating cut surfaces on plants for purposes of reducing the drying of the exposed plant tissues and protecting the open areas from invasion by infectious organisms.

GENERAL RULES FOR PRUNING

- Prune all fruit trees at planting time to balance the tops with the roots. Cut about 12 inches above the height where the lowest branches are desired.
- Train young trees in the first few years after planting to avoid corrective heavy pruning later.
- Prune young trees lightly.
- Prune mature trees more heavily, especially if they have shown little growth.
- Prune the top portion of the tree more heavily than the lower portion.
- The best time to prune is early spring just prior to the beginning of active growth. Low temperature injury is the major risk with fall or early winter pruning.
- Summer pruning causes more dwarfing of the tree than dormant pruning. If a dwarfing effect is desired, then summer pruning may be practiced.
- In controlling mature tree size, it is essential to accurately regulate the supply of nitrogen to the tree. Excessive nitrogen can result in vigorous growth and more pruning.
- Pruning stimulates shoot growth, especially near the cuts, but reduces overall tree size.
- When removing large limbs, first cut part way on the underside, then cut flush with the main limb. Do not leave stubs.
- There is no particular advantage in applying a wound dressing to cut areas under 2 inches in diameter. A wound dressing applied to larger wounds aids in the healing process. Various asphalt-emulsion and polyvinyl acetate base plastic types of wound

