Utah State University EXTENSION

Pruning the Orchard

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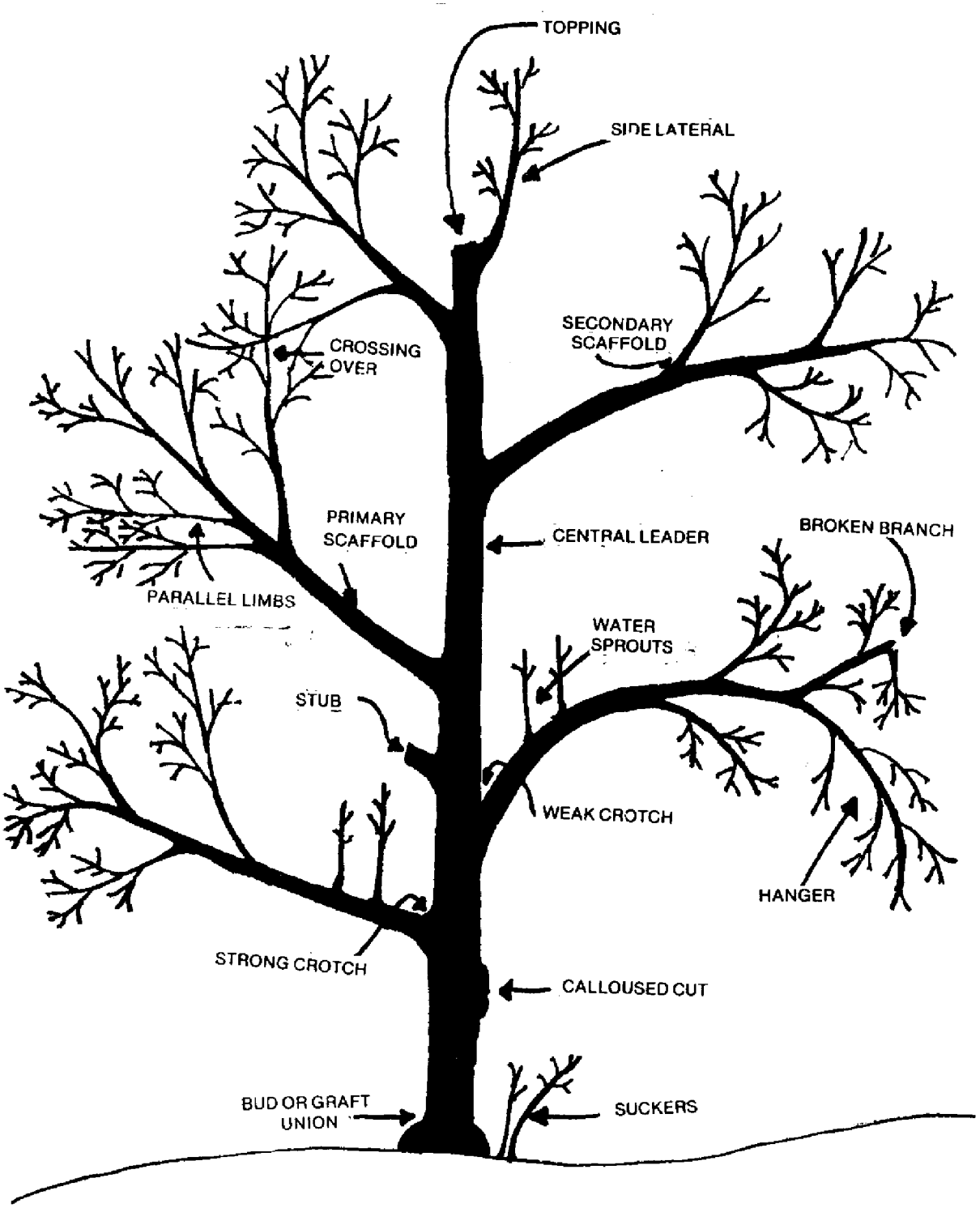
CONTENTS

Introduction 1
Pruning Equipment 1
Apple Trees 1
Central Leader Pruning 2
Modified Leader or Modified Central Leader Pruning 3
Peach and Nectarine 5
Open Center Pruning 6
Pear Trees 7
Sweet Cherry Trees 8
Tart Cherry Trees 8
Plums 9
Apricot Trees 9
Walnut and Pecan Trees 10
Espalier 10
Pruning Neglected Trees 11
Grapes 12
Raspberries 13
Red Raspberries 14
Everbearing Raspberries 15
Blackberries 15
Currants and Gooseberries 15
Glossary 16
General Rules for Pruning 17



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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 ½ 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.

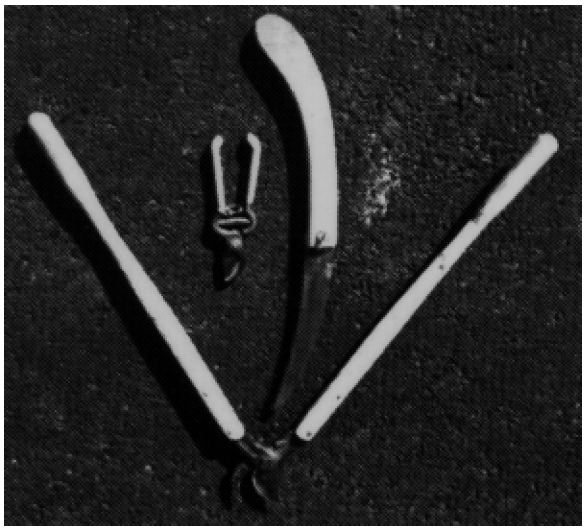

Figure 1. Common pruning tools (lopping shears, hand shears and hand saw).

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.

Figure 2. Dwarf tree trained to a wire trellis for support can be very productive.

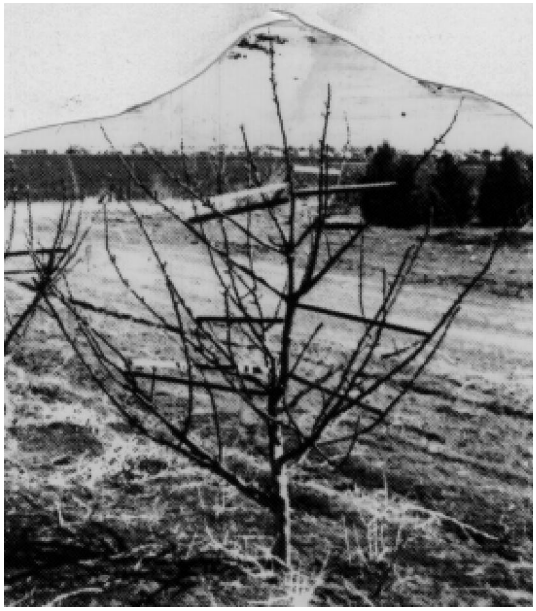

Figure 3. Four-year-old semi-dwarf apple tree trained to the central leader form. Note the limb spreaders.

CENTRAL LEADER PRUNING

At Planting: Head back the newly planted tree to a height of 30 to 36 inches (Fig. 4). The uppermost bud remaining will usually develop into the central leader. During the following spring and summer, check the tree at 4 to 6 week intervals to make certain that one central branch continues to grow upward as a dominant leader. Remove any narrow-angled laterals that compete with the central leader.

First dormant pruning: Select three to five wide-angled lateral branches along the leader and remove the others (Fig. 5). They should be distributed as evenly as possible around the tree and spaced vertically along the leader, 3 to 4 inches apart. If the lateral branches are too upright or the crotch angles too narrow, wood or metal spreaders should be used to position the laterals in the proper position. Laterals should be spread to approximately 60 degrees from vertical. The spreaders usually need to be left in for two or three growing seasons before removal. Next, the central leader is headed just above the point where a new set of lateral branches is desired. The last step is to head back any strong growing laterals so that growth is balanced between all those remaining. Such heading cuts will also induce secondary branching.

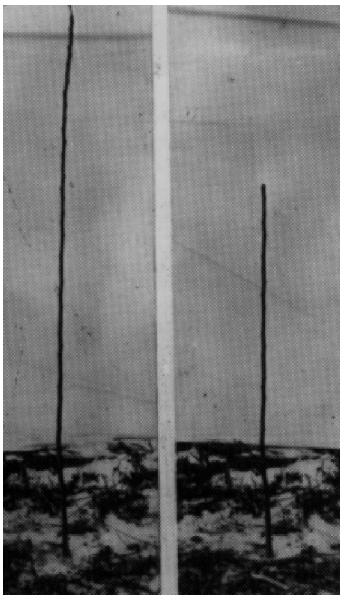

Figure 4. For many nursery trees that have no lateral branches, the unheaded tree (left) is cut back after pruning (right) to the desired height for primary scaffold branches.

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.

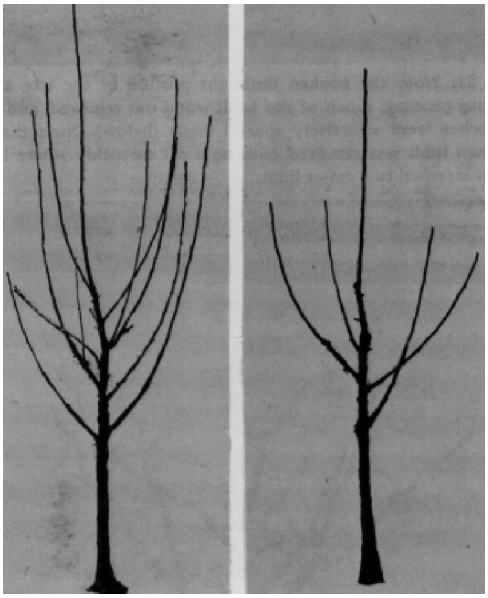

Figure 5. An unpruned, 1-year-old apple tree is shown before dormant pruning (left). At the right, the same tree has been pruned to the central leader system with a dominant central leader, which has been topped slightly, and selected lateral branches spaced vertically along the trunk.

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 6. Here is an excellent example of the modified central leader type of apple tree. The picture on the right is a closeup view of the tree on the left. It was set as a 1-year whip and is shown at the beginning of the second year in the orchard. Note the good strong crotch angles and the way they are spaced along the central leader.

framework should be spaced 8 to 10 inches apart vertically on the trunk. The lowest should be at least 24 inches above the ground. Each lateral should occupy a specified sector of the tree. It may require two or three seasons to grow and select proper branches.

Second Year to Bearing: If the newly planted tree is properly trained during the first 2 years, little pruning will be necessary for the next 4 to 5 years.

The leader or any scaffold branch should not be allowed to completely dominate the growth of the tree to the point where another scaffold is dwarfed. An over-vigorous scaffold branch should be headed back, possibly ⅓ or ½ its length. The leader should be removed after the desired number of main branches have been selected. Spacers should be used to help develop wide angled crotches on scaffold limbs.

Pruning during the pre-bearing, and even early bearing years, involves the removal of cross branches, those that rub together, water sprouts, and some small branches from the interior of the tree. Branches growing in undesired directions should be removed completely, or cut back to a lateral growing in a desired direction.

Bearing: Pruning to maintain tree shape and size is necessary throughout the life of the tree. In addition to such maintenance pruning, young bearing trees do require some branch thinning to increase light penetration. The removal of large limbs should be unnecessary.

Remove dead, diseased or damaged branches annually, regardless of tree age. Likewise, remove water sprouts each year except for an occasional one needed for developing new bearing surface. The best time to remove water sprouts is in early summer when they are soft and succulent. At this time they can be rubbed off easily with a gloved hand. If removed by mid-summer, water sprouts seldom grow back.

As the trees grow older, an increasing number of heading back cuts are needed to maintain size and shape. The branches of mature standard apple tree may spread over an area 30 to 40 feet in diameter and reach a height of 30 or more feet. Regular pruning, especially in the top limbs, is required to maintain a height to permit spraying and harvesting. Most of the pruning should be limited to thinning and cutting back of side shoots.

Color of fruit produced the previous season is also an important guide to the amount of pruning needed. Poor color will, in many cases, indicate a need for more detailed pruning, particularly of the thinning-out type. Branching in the center of the canopy needs to be minimized to maintain an open structure and minimize excessive competition between branches (Fig. 7). The nitrogen application rate should be reduced in years of heavy pruning. Extra nitrogen will encourage excessive water sprout growth.

Annual pruning is recommended. When followed, only a moderate amount is necessary each year. One objective is to remove branches that are severely shaded and will bear few fruiting spurs. Remove branches that bend to the ground or head back to upward-growing laterals.

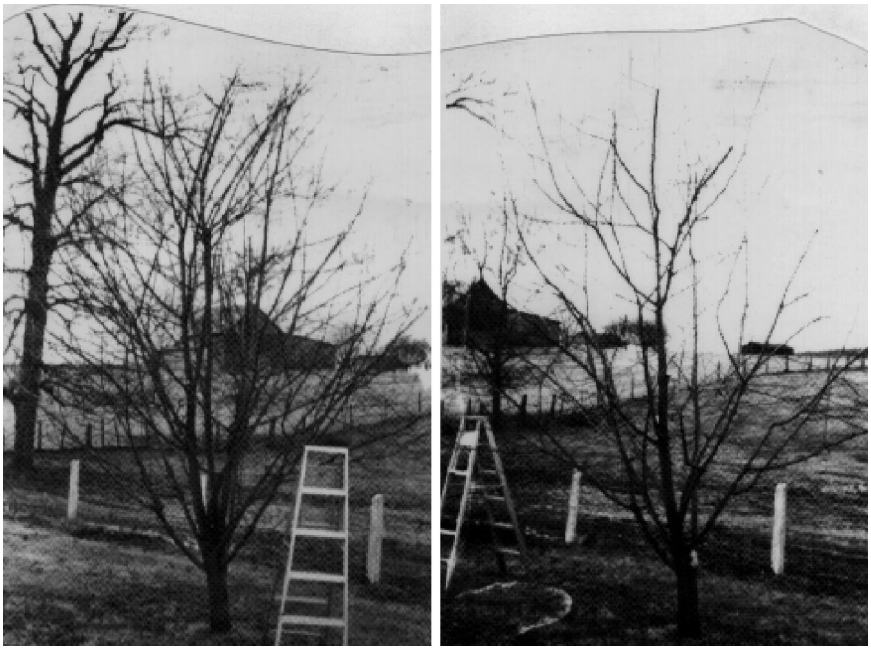

Figure 7. The apple tree (left) has not been pruned properly. There are too many branches originating from the same point with acute angles. Right, the same tree following pruning and removal of the multiple leaders.

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.

Trees trained with scaffold branches making wide angle crotches with the trunk posses a higher degree of winter hardiness in the tree than trees with narrow crotch angles. Preferred crotch angles are 60 to 90 degrees. Branches with narrow crotches often split when under a heavy fruit load or stressed by snow or wind.

OPEN CENTER PRUNING

Pruning at planting: A 1-year old tree is headed to a height of 28 to 30 inches (Fig. 9). It is possible that the tree will have one or two branches already started which could be utilized as primary branches. If so, these are headed back so that only two or three buds remain on each. All other branches are removed. If no laterals suitable for scaffold branches are present, then all branches are removed.

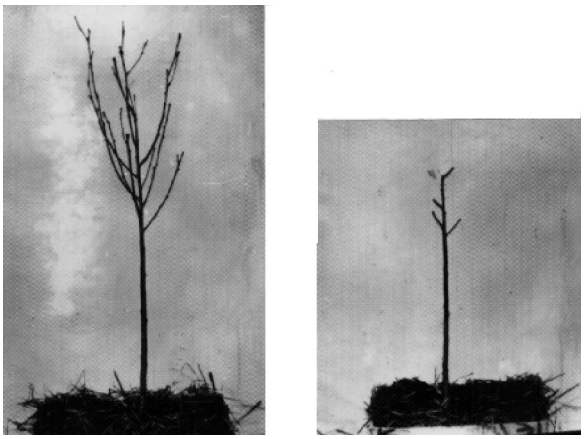

Figure 9. Left, peach tree at planting. Right, same tree pruned for developing an open center framework.

By late June most buds on the tree will have developed into leaf rosettes or growing shoots. Three lateral shoots can be selected at this time to develop into the primary scaffolds. Any shoots arising above or below the selected scaffold branches should be headed back, leaving only 2 or 3 inches of growth. Do not remove these branches entirely, as the leaf cover is needed to maintain tree growth. If one of the shoots left for a scaffold is overly vigorous, it should be shortened to bring it into balance with the other branches.

First Dormant Pruning: Those branches remaining in the center above the primary scaffold branches or any growth below the scaffold branches should be cut off. Any growth arising on scaffold branches within 6 inches of the trunk should also be removed.

If for some reason, the primary scaffold branches could not be selected the previous June, they may be chosen at this time. All branches above or below the scaffold branches should be removed.

Avoid cutting (heading) the main scaffold branches unless necessary to maintain balance in the tree. If one scaffold branch dominates the tree, it should be headed back to a size proportionate with the others. It is necessary to have all scaffold branches growing at approximately the same rate to maintain a well-balanced tree.

Subsequent Pruning: After the second or third season's growth, the permanent shape of the tree should be well established. Dormant pruning during this period will consist of light heading back where needed and removal of damaged and undesirable branches. Keep the center of the tree open by removing all branches that arise within 1 foot of the trunk. As the trees come into bearing, the weight of the crops can be expected to open and spread the trees.

Annual pruning of **bearing** trees is essential if fruiting wood production and high yields of quality fruit are expected. Peach and nectarine trees only produce fruit on wood that grew the previous year; therefore, they require extensive annual pruning to develop the fruit wood for the following year's crop. This becomes particularly important as the trees age.

Peach and nectarine trees that have reached bearing age require some heading back and annual careful thinning out (Fig. 10). In addition, all damaged or diseased wood, hangers,

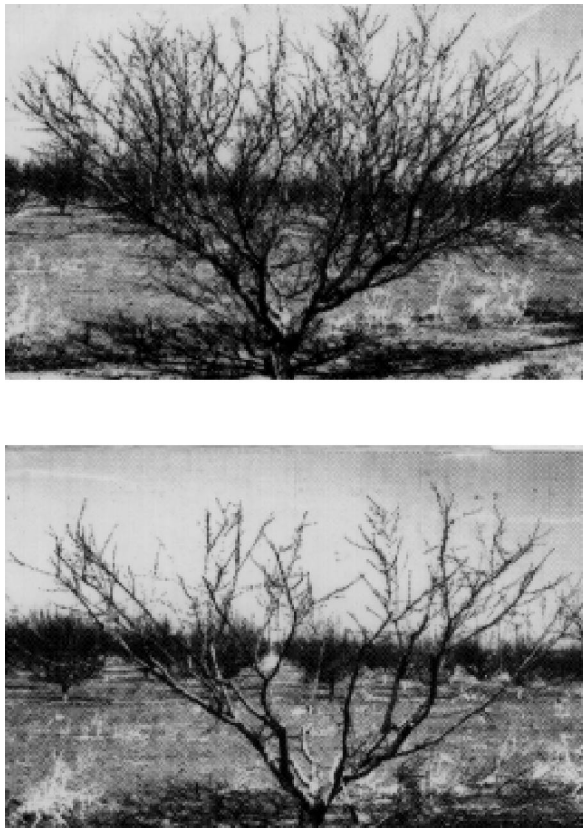

Figure 10. If mature peach trees are improperly pruned or left unpruned, they will become bushy (top) and will produce excessive numbers of small, poor quality fruit. Such problems can be corrected by selected thinning of numerous limbs (bottom). New vigorous fruiting wood will develop following pruning.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

During and after bloom, inspect trees weekly until midsummer for shoots and spurs that may be infected (blackened) with blight. Promptly remove the diseased portion 4 to 6 inches below the obviously injured part by breaking out the infected shoots by hand.

When the scaffold branches reach the desired height they should be headed back to outside branches. This will help develop new fruiting wood near the center of the tree and may also prevent limb breakage. Mature trees require little pruning other than to remove dead, broken and weak branches.

SWEET CHERRY TREES

The **modified leader** system of training is most desirable for the sweet cherry tree. Three to five primary scaffold branches with 8 inches or more vertical distance between them and with proper spacing around the trunk are recommended.

The limbs of young sweet cherry trees often will grow 6 to 8 feet without branching. If this occurs, branching on these limbs can be promoted by heading them back.

TART CHERRY TREES

Tart cherry trees may be satisfactorily trained to either the **modified leader** system or to the **open center** system (Fig. 12).

Tart cherry wood is quite brittle and characteristically the tree tends to produce narrow angle crotches. Special attention should be given to the development of wide-angle crotches in young trees.

Trees tend to open up with the crop. The use of spreaders in young trees is helpful in developing a strong tree framework.

Mature tart cherry trees perform best under light, annual pruning. Remove dead wood and broken branches as well as cross growing branches. Some thinning out is occasionally necessary to aid in maintaining annual production and to make harvesting easier.

Figure 12. A 1-year-old tart cherry tree (before (left) and after pruning (right). Pruning developed a modified leader with well-spaced branches for the primary scaffolds.

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.

WALNUT AND PECAN TREES

Walnut and pecan trees should be trained to the **modified leader** system.

Pruning at Planting: Severely head back the nursery tree to about five buds above the graft union. Nut trees generally grow very little during the first 2 years unless they are headed back at planting. Place a support stake next to the tree, and train one dominant leader up the stake during the first summer.

First Dormant Pruning: Top the dominant leader 5 to 6 feet above the ground. Select properly positioned laterals and head them back to two or three buds. Remove all other laterals. Often, long-necked buds will appear near the top of the leader. These should be rubbed off since limbs developing from these are attached weakly to the trunk.

Subsequent Pruning: Four to six scaffold limbs should be developed from the main leader. Often it takes 2 or 3 years before these limbs develop and can be selected (Fig. 14).

After 3 to 4 years of pruning the central leader should be allowed to spread and become another scaffold. Some heading back of scaffolds should be continued to maintain vigor and upward and outward growth. Once properly trained, mature trees require little or no subsequent pruning.

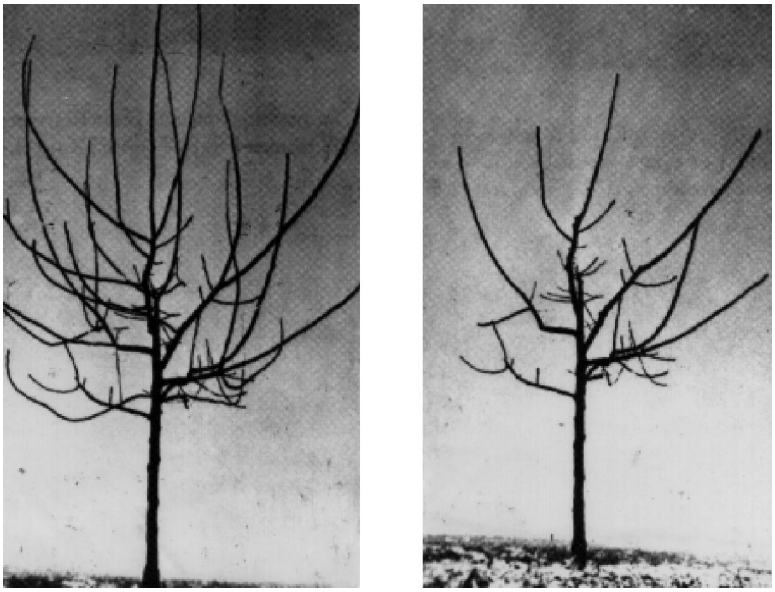

Figure 14. After 3 to 4 years of training for a modified central leader, this walnut tree (left) will have main structural limbs present after pruning (right). The leader will now be allowed to spread and become another scaffold.

ESPALIER

Espalier is the training of fruit trees to grow in various forms, including picturesque shapes, on walls or other permanent structures. It is a technique used widely in Europe and England. This method also makes it possible to grow fruit in small areas on a home lot.

Through proper pruning and fastening of shoots or branches in place, the grower may develop any design he or she desires. The following are a few general pruning principles that can be used in espalier training.

1. Head back central leader and branch terminals by cutting into 1 year wood at points where additional branching is desired.
2. Secure shoots in desired places the year they first develop; each year new shoots, as well as older branches, need to be secured in place and kept there until permanently formed to the shape. This may require 2 or more years.

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.

4. Head back lateral branches that are too long, bringing the tree to a desired breadth. Prune upper branches to shorter lengths than those lower on the tree.

5. Thin out branches in all parts of the tree. Remove under hanging branches, strong upright growing shoots, water sprouts and other weak growing shoots. Thin the outer areas of the tree first and the interior last.

Thinning the outer area of the tree first permits the pruner better vision into the tree canopy. This insures that some fruiting wood is left in the center of the tree. The amount of thinning-out will be determined by the original density of the tree. Thinning should be done to permit adequate light penetration to the center of the tree when in leaf. Light is necessary to the regenerate fruiting wood in all parts of the tree.

6. Complete rejuvenation of a neglected tree may take up to 3 years of severe pruning. For apple and pear trees, it is usually best to distribute the pruning over 2 or 3 years, especially when large cuts are needed. Peach, plum and cherry trees can often be completely pruned back and thinned out in 1 year.

7. Follow annual, moderate pruning as described earlier once the tree has been rejuvenated.

GRAPES

Before pruning or training, one should understand the fruiting habits of grapes and have a clear understanding of the objectives of pruning. Grape clusters grow on this year's leafy shoots that develop from buds borne laterally on woody canes produced the previous year. Thus, fruit production depends on the vegetative growth of the previous year as well as current season growth.

The pruning is used to regulate fruit production and keep it in balance with foliage and wood growth. In general, the more cane growth this year, the larger the potential fruit yield the following year. Conversely, the larger the fruit yield, the smaller the amount of vegetative growth and the smaller the fruit potential for the following year.

Training involves manipulating or directing plant growth to the desired shape or form. Commercial growers are primarily concerned with high yield and quality while the home gardener may be concerned also with the aesthetic appearance of the grape plant. Proper pruning and training will assure a consistent yield of high quality fruit as well as improving its use as an ornamental plant. The suggested method of training grapes in Utah is called the "four cane Kniffin system." The mature vine is trained to a two-wire vertical trellis. Training consists of selecting a permanent trunk and four 1 year old fruiting canes which are supported by the trellis.

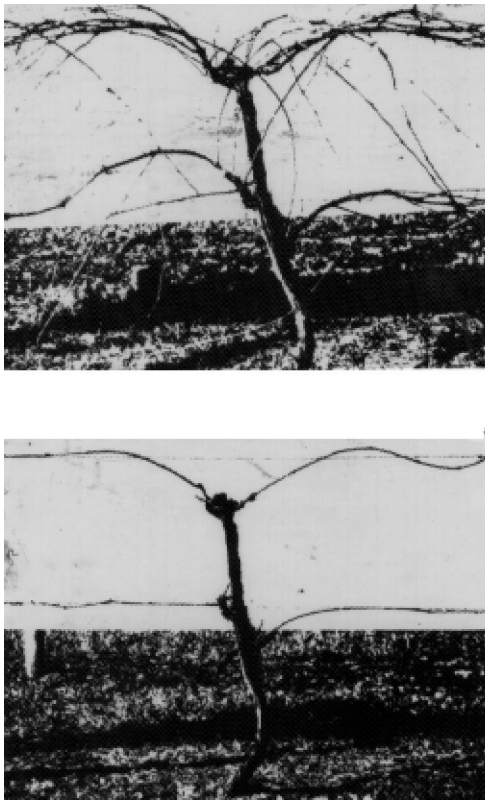

Figure 16. Four-cane Kniffin system of training before pruning (top). Bottom photo shows the four-cane Kniffin system of training after pruning. Note renewal spurs.

First Year: At planting time, prune the plant to a single stem with two buds. A shoot will grow from each of the buds left on the young plant. If the trellis is not constructed, tie the most vigorous shoot to a stake 4 to 5

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 ¼ to ⅓ of an inch in diameter, straight, and preferably unbranched. Do not select canes less than ¼ 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 budsSQ12 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 ½ 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 ½ feet tall, pinch off the growing tip. This makes the canes stocky, and at the same time causes the side branches to grow,

greatly increasing the bearing surface of the plants. The following spring, prune the side branches to about 10 or 12 inches. Determine the number of canes to leave by the vigor of the plants and the richness of the soil. Ordinarily one should leave about four to six canes per hill. In general, pruning decreases the number of berries and increases the individual berry size. A common mistake in pruning black raspberries is leaving the side branches too long. By so doing, more fruit buds are left on the plants than can be grown into well-developed large berries.

Figure 17. Black raspberries before pruning (top) and after pruning (bottom).

RED RASPBERRIES

(Spring Bearing)

The Hedgerow: The most common method of training red raspberries is the hedgerow system. Narrow the row to 18 to 24 inches and thin the fruiting canes to about 10 vigorous canes for each 4 feet of row (Fig. 18). Prune them to about 4 to 5 feet tall.

Don't pinch off the tips of red raspberries in the summer. They have little tendency to form side branches and pinching causes increased sucker growth.

In the spring take out the weak canes, and prune the vigorous ones to a height of about 4 to 5 feet.

The fruiting canes of all kinds of raspberries and blackberries normally die after the summer harvest. It is best to remove and burn these canes as soon as harvest is over to reduce the spread of diseases to the young canes.

Figure 18. An established hedgerow raspberry planting which has both pruned and nonpruned sections. The pile of canes in the foreground came from a 20-foot section of row.

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.

GLOSSARY

1. **Arms (grapes)**—the canes that are left after pruning and that produce the fruiting shoots and canes.
2. **Bark inclusions**—bark that is wedged in between one branch and another. They arise from development of narrow crotches. Same as imbedded bark.
3. **Bearing tree**—a fruit tree that has reached the age of producing fruits annually.
4. **Bud**—the initial of an unelongated shoot or flower. A bud may develop into leaves, a vegetative shoot, or into flowers. It may be terminal as at the end of a branch or shoot, or lateral as in the axil of a leaf.
5. **Bud union**—the point of attachment between the scion cultivar and the rootstock upon which it is budded or grafted.
6. **Canes**—the mature shoots of the current season or the dormant growth of the preceding season.
7. **Central leader**—the unbranched trunk of the tree from the ground level to the point at which the topmost branch arises from it.
8. **Corrective pruning**—removal of dead, diseased, broken, closely parallel and crossing limbs.
9. **Crotch, crotch angle**—the angle between two contingent shoots or branches near the point of the union.
10. **Crown**—the point of root trunk union.
11. **Cultivar**—a term that is now used in place of the older term, variety, when designating a specific horticultural variation in a plant species.
12. **Deshooting**—the practice of removing young shoots from a tree during the growing season for the purpose of aiding in the training of the plant.
13. **Dwarf tree**—a cultivar that has been propagated on a size controlling rootstock, as Malling 9, in apple, or a genetically dwarfed tree, as Bonanza peach, and produces a small sized tree.
14. **Espalier**—a wall or framework upon which a tree or other plant may be trained; or, the shape of which a plant is trained to be picturesque as well as productive.
15. **Fruiting wood**—branches of a tree arising from scaffold or secondary branches carrying flower buds and the potential for bearing fruit.
16. **Heading back**—cutting away a portion of the terminal growth of a branch; it may be an upright branch or one growing laterally.
17. **Hanger**—a slow growing drooping branch.
18. **Malling rootstock**—a group of rootstocks classified at the East Malling Research Station in England so that they represent various degrees of size control of the trees or cultivars propagated on them.
19. **Modified central leader**—a tree trained for the first few years similar to a central leader tree and then trained so that a scaffold branch in a more horizontal position takes the dominant center away from the tree.
20. **One-year wood**—wood or branches that were produced by the previous season's growth.
21. **Open center tree**—a tree trained to a vase conformation. No central leader is retained.
22. **Renewal spurs**—in grapes, canes pruned to two or three buds. New canes from these spurs are selected for arms the following season.
23. **Scaffold branch**—one of the branches comprising the basic framework of a tree;

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

sealing compounds are available at garden and hardware stores. It is better to leave a wound unpainted than to use a paint developed for another purpose, which might be toxic to live tree bark.

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