

PRUNING APPLE TREES

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Fig. 1.—Forty years of light pruning and training. Note the strong well placed scaffold branches with wide angles.

A multitude of different pruning systems have tended to make pruning the most baffling problem with which the fruit grower deals. Moreover, experimental work is much less conclusive regarding pruning than with other orchard practices. It is also true that the effect of the work may not be noticeable for several years, and this fact tends to cause the problem to be all the more uncertain and difficult.

On the other hand, a little time spent in a thoughtful consideration of the principles and objects of pruning, coupled with a study of the fruit bearing habits of the trees or plants to be pruned, will

usually make the work understandable and interesting. Otherwise, the pruner works in the dark, and the results are likely to be unprofitable. The pruner must first have in mind a mental picture of the form and shape toward which he expects to prune and train the trees. This information may be obtained by a study of the descriptions of the forms and shapes to which trees are pruned. To be of most value, however, this should be supplemented by careful inspections and study of orchard trees which have been pruned and trained to the different types of head.

Light Pruning Suggested

It must be admitted that those best informed on pruning have during the past ten to fifteen years advocated light pruning. This has been true because a great mass of experimental evidence from many stations has shown that the so-called conventional or heavy pruning is unprofitable. The change from heavy to light pruning has resulted from a study of the performance records of the best orchards. This study has convinced most growers that, after all, the best place to study pruning and training systems is in the most productive orchards, and that the varietal characteristics of the trees must be carefully considered among the factors determining the amount and kind of pruning and training to be given.

PRUNING PRINCIPLES AND PRACTICES

1. That there is a definite relation between the leaf area of apple trees and the rate of growth of the tree as a whole appears to be fairly well established. Pruning in young orchards, whether light or heavy, generally has a tendency to reduce the leaf area and to that extent to be a dwarfing process. Pruning may seem to increase the vigor of growth, but this is generally due to the trees being made smaller by reducing the number of growing points. The stimulating effect of pruning is temporary, lasting only until the balance between the root and top of the tree is restored.

2. When two branches grow at the same rate from a common point, they tend to form a narrow, weak crotch. If allowed to continue to grow equally, they are apt to break when loaded with fruit. This condition can be easily corrected by unequal cutting. If one of the branches is kept pruned back rather severely, it will develop into a side branch or lateral, while the unpruned branch will become the larger and the crotch between the branches is made stronger.

3. The same principle of unequal cutting to regulate the growth of branches may be applied to young trees which lean badly toward

the northeast, due to the prevailing winds from the southwest during the growing season. If the leaf surface is reduced by heavier pruning on the northeast sides of the leaning trees, the weight of the branches is reduced. The heavier pruning has a dwarfing effect upon the limbs. On the opposite side of the leaning trees the branches will grow larger, with less pruning, and their weight is increased. With such pruning, the tendency will be to produce a more upright tree.

4. To produce a general renewal of growth, pruning must be distributed over the entire tree. When large limbs are removed, the growth response is in the region near the pruned end, and it is usually manifested by a heavy growth of water sprouts.

5. The removal of large limbs near small branches will generally result in the growth of many water sprouts, while the cutting of limbs or branches near laterals of about the same size or diameter results in little or no water sprout growth.

6. If heavy pruning is given two-year-old trees at planting time, but little, if any, gain in size over yearling trees results.

7. When it seems desirable to spread the tops of trees, the cuts on the lateral branches should be made to outside buds. In the case of horizontally-growing branches it may be necessary to cut to inside instead of outside buds to keep the leader in the center of the tree top and to fill open spaces.

8. A common error in training trees toward the modified leader type is to leave the leader too much longer than the laterals. If this is done, two sets of branches, one above the other, may develop, giving rise to the so-called two-story type of tree. By proper attention to the suppression of the leader, and the arrangement of the main branches, a well balanced tree top may be formed and new branches produced in continuous succession and not in sets.

9. During the first five to six years after transplanting, to prune as little as possible should be the general rule. Heavy pruning at this period tends to make the trees smaller and to keep them in a vegetative condition. Heavy pruning also inclines to retard the beginning of the fruiting period. If it is necessary to prune rather heavily to secure the required scaffold branches and their proper spacing, it is much better to do the work during the first two or three years after transplanting.

10. When trees have reached an age of 5 to 6 years, pruning for form is usually finished. After the trees come into bearing, pruning is given for the purpose of maintaining the trees in a profitable

fruiting condition, and should consist largely of thinning out the thicker parts of the tree and cutting back rangy branches.

Objects of Pruning

The objects of pruning are essentially two in number: first, to alter the shape or growth of the trees; and second, to influence the production and character of the fruit. A more detailed statement regarding the objects of pruning, however, may be listed as follows: (1) To increase the vigor of old trees and regulate the amount and direction of any growth; (2) to prevent the formation of weak and undesirable crotches; (3) to remove all dead, badly diseased and injured wood; (4) to remove crossing or interfering branches; (5) to restore in young trees at planting time a proper balance between top and root system; (6) and to regulate and distribute the number of main or scaffold branches on the tree trunks.

The objects of pruning and training have in many instances been overemphasized; because, after all, the main purpose in pruning a fruit tree is not to produce a beautiful and shapely object, but rather to obtain a tree which is capable of carrying heavy crops of fruit without the breaking of limbs or branches. It is also true that judicious pruning and training will facilitate other orchard operations such as thinning fruit, picking, spraying and cultivation.

Fruit Bearing Habit of Apple Trees

Most varieties of apples bear almost entirely on short, crooked growths known as fruit spurs. Some varieties, when young, bear fruit from lateral buds on one-year-old wood, and from terminal buds. The general tendency, however, as the tree grows older, is to bear on spurs. Fruit spurs of the apple are produced laterally on branches at least two years of age. Individual spurs seldom, if ever, bear two years in succession. Normally, part of the spurs bear one year and the rest the following year. If all the spurs produce blossoms the same year, the tree is apt to develop the habit of bearing every other year. Careful and intelligent pruning should prolong the life and usefulness of the fruit spurs by allowing them to receive more sunlight.

The grower should keep two important facts in mind. First, fruit spurs may continue to bear for 12 or 15 years, and their value should be appreciated. Second, once the fruit spurs are cut or broken off, they cannot be developed again at that particular point. The only way that this part of the tree can be made profitable again is to allow water sprouts to grow in the bare places and develop fruit

spurs. It is usually necessary to cut back the water sprouts two or three times to prevent too vigorous a growth. At best the development of fruiting spurs on water sprouts is a long and difficult process and it may prove unsatisfactory.

Pruning Systems

In the past 15 to 20 years the following are a few of the pruning systems that have had their ups and downs in about the order mentioned: Central leader, open center, modified leader, delayed open center, long pruning, long or high renewal, fine pruning, detailed pruning, corrective pruning, twig pruning, and thin wood pruning.

Common Sense Pruning

It is clear that there is an urgent need for pruning suggestions which will incorporate the best ideas and most practical and workable methods to be obtained from all the different pruning systems. The Missouri Agricultural Experiment Station has developed through the years such a system. It is known as Common Sense Pruning, or the "Show Me" System. The method as suggested in this publication is not claimed to be new, but it takes advantage of all the practices and systems that have gone before. It is based upon the profitable yields obtained by successful growers and its practical application to the variety, growth, production and needs of the trees. The system should appeal especially to those who wish to make pruning understandable and at the same time increase production, grade and quality of fruit. The ultimate aim is not the appearance of the tree or its beauty but rather the quality and quantity of fruit produced. In general, fruit trees should be allowed to assume their natural shape, and pruning may profitably be confined to the judicious removal of dead, weak, crowded, superfluous and rangy branches.

Pruning is Dwarfing Process and Delays Bearing

It is now generally agreed that any kind of pruning, including trees of all ages, is a dwarfing process and delays time of bearing in young trees, depending upon the extent or severity of the operation. Furthermore, our investigations have repeatedly shown that unless pruning is light and of a corrective nature it does more harm than good. That is, it reduces yields, profits, and shortens the life of the trees. No pruning from planting until old age is generally far superior to pruning without an object or purpose based on tree growth habits and yields.

Low vigor trees usually produce more apples of larger size when pruned than when not pruned. Old trees in a low state of vigor are generally made more profitable by light pruning. Orchard practices that tend to reduce yields in order to improve grade of fruit may be unprofitable unless there is a wide range between selling prices for A and B grades. Weak, slow-growing branches and twigs should be removed.

Shape or Form of Tree Top

At the present time trees are trained and pruned toward three types or forms: the open head, the central leader, and the modified leader. Since the natural form of the tree is now considered most productive, there is less emphasis laid upon the particular type of head. It is important, however, that the grower become acquainted with the habits of growth of the different varieties and the form of the tree at different ages. When growers have been successful with a particular type or form of tree they should not change their system too quickly, except for very good reasons.

Open Head Type

The open head type of pruning is one in which the main leader of the tree is suppressed by rather severe cutting back. The lateral or main branches in this type of head are generally forced to grow closer together. The open head tree has an advantage in being lower and consequently easier to spray or prune. In such a type of tree, picking operations may also be facilitated. The disadvantages are that the main branches are closer together in this type of head, the crotches are weaker and the trees are more apt to break when heavily loaded with fruit and when subjected to wind storms. With this type of head, the breaking of one of the main branches usually means severe injury to the tree. The trees are also smaller and do not have as large a bearing surface as trees pruned to other shapes or forms.

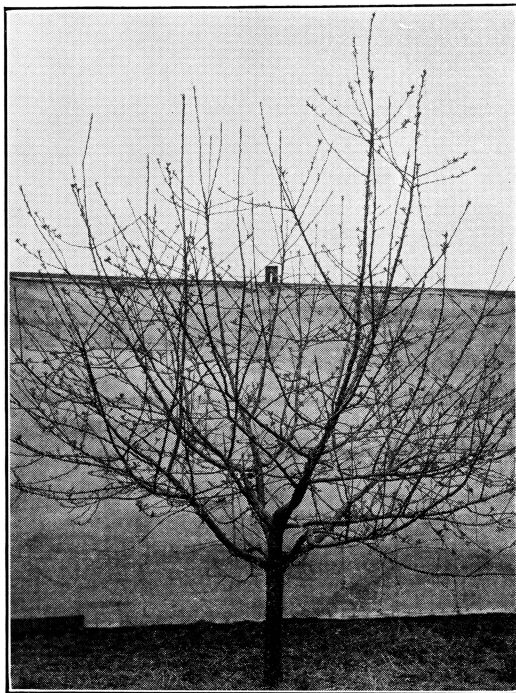


Fig. 2.—A five-year-old apple tree pruned to open center type of head.

Central Leader Type

The central leader type is one in which the topmost branch is allowed to gain the ascendancy. Consequently, more lateral branches may be procured, spaced farther apart up and down the trunk, and stronger crotches or angles may be formed, than in the open head type of tree. This form is the one which the tree would generally develop were no pruning done; and usually a tall, narrow tree top is the result. Some of the chief disadvantages of this training system are that some varieties may grow so tall that such operations as spraying, pruning and harvesting are made difficult and expensive. It is also true that on account of the shading of the upper branches it may be difficult at times to control fungous diseases, to obtain well colored fruit and to keep the lower branches productive.

Modified Leader Type

The modified leader is one in which the central stem or leader is allowed to grow much as in the case of the central leader type, but it differs from the central leader type in that from time to time

the leader is lightly suppressed by cutting it back. To produce this type of head the main stem or the highest branch located near the center of the tree top is allowed to grow a little faster than any of the lateral or side branches about it. The modified leader tree

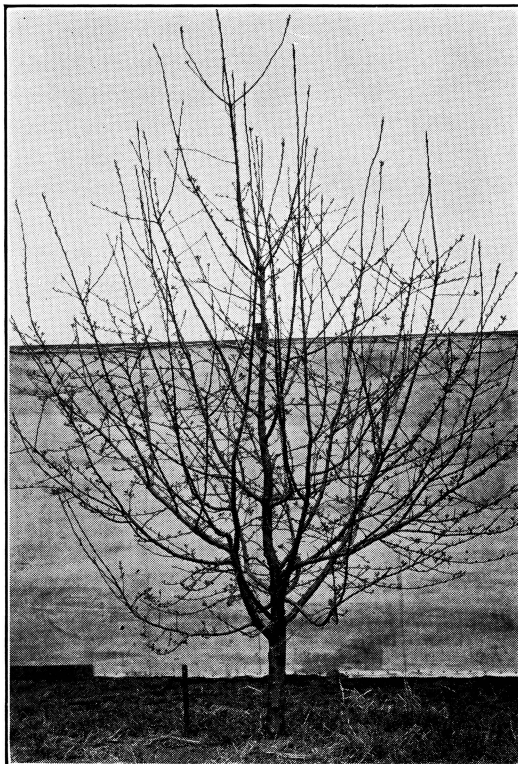


Fig. 3.—A four-year-old apple tree trained and pruned to the modified leader type of head.

is thus formed by adding each year a length of 18 to 20 inches to the main stem. Upon this a few well placed main branches are allowed to grow. When a height of six or eight feet is reached, the leader, if not already suppressed sufficiently, may be removed. The suppression of the central leader at intervals generally tends to produce a tree less in height than the central leader and with stronger crotches than are formed in the open head type of tree. Such a tree should have as great a bearing surface and as strong branches as the central leader tree. It has the distinct advantage, therefore, of being lower; and the form of such a tree is usually the one naturally best suited to the particular variety. The tree can

be kept more open in the center than the central leader, thus admitting more light. This type of head is generally considered the best one to which trees may be trained and pruned in their early years of growth. Not only a lower and more spreading tree than the central leader is produced, but a larger number of well placed lateral fruiting branches may be developed, and the results are that a better and more satisfactory fruiting system is established than in either of the other types of tree heads.

HEIGHT OF TREE HEAD

There are no good reasons for high headed trees. In fact, every worth-while argument that can be advanced favors the low headed tree. The lower the head the greater shading of the tree trunk; and, as a consequence, less sun scald injury and less damage from borers and blister canker. The trees generally stand straighter and are not subjected to so much injury from strong winds.

Whitten, of the Missouri Station, states that records taken during the hottest days in Missouri showed the temperature of short trunks to be several degrees lower than that of long trunks, even when the branches of the former were spread upward. Tall trunks exhibited more sun scald than did short trunks, even where the latter were not shaded. It was also shown that low-headed trees exhibited a more vigorous condition and greater trunk and root development than did the high-headed trees. In general, the lower the head the more profitable the tree. Spraying, pruning and harvesting operations are made easier and less expensive.

PRUNING AT PLANTING TIME

On account of the danger of winter injury, the pruning of trees planted in the fall is often delayed until just before growth starts the following spring. Damage from this source is rarely experienced in Missouri; and if it is difficult to find time in the spring to prune fall or winter set trees, this work may be done at planting time.

Proper pruning of the tree top will restore the balance between the root system and the top of the tree, which is disturbed when many roots are destroyed at the time the trees are dug for transplanting. One-year-old trees usually grow in the form of a straight whip or stem. The pruning in such cases will consist of cutting the tree back at planting time to a height of 28 to 36 inches from the ground. Such pruning will force the main or scaffold branches out below the point where the cut was made. The height of the tree head is, therefore, largely determined by the height at which the

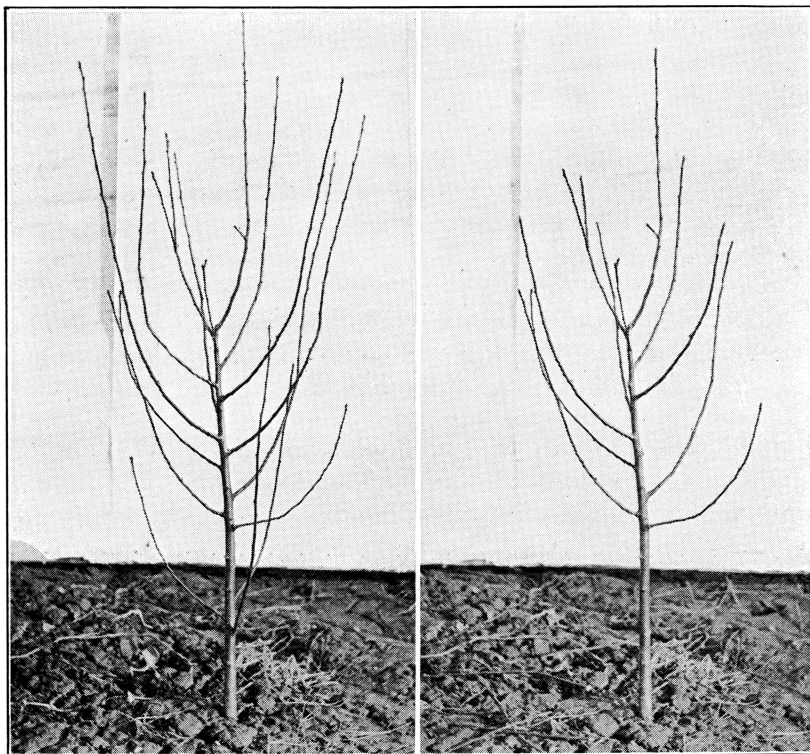


Fig. 4.—A young apple tree after a year's growth in the orchard, before and after pruning. (Was one-year-old when set in orchard.)

newly set tree is topped. The main or scaffold branches usually start from buds in a space 10 to 14 inches immediately below the point at which the tree is headed or its top removed.

When two-year-old trees are used for planting, we usually have from two or three to five or six branches on the young tree. It is generally advisable to remove a few and cut back all the remaining side branches to a distance of from 6 to 10 or 12 inches, and shorten the leader to a height of about 36 to 40 inches from the ground. In some cases it may be best to remove all of the laterals to secure a satisfactory framework of branches, in which case the tree should be cut back to a height of 28 to 36 inches and treated as a one-year-old tree.

The roots of young trees are usually cut back to a length of 8 to 10 inches; and diseased roots or badly mangled roots are generally removed. Nothing is gained by leaving long roots.

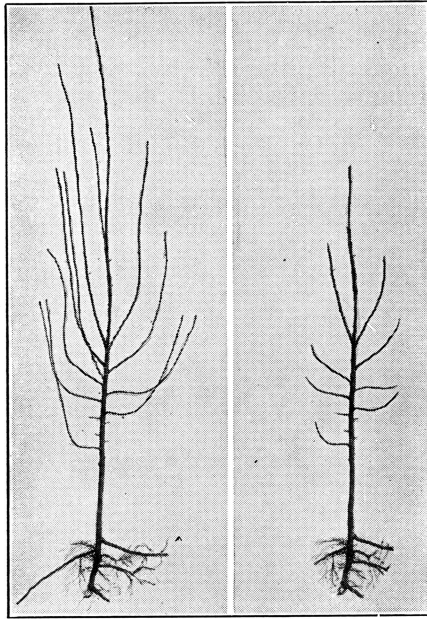


Fig. 5—Two-year-old apple tree at time of transplanting, before and after pruning.

PRUNING YOUNG APPLE TREES UNTIL BEARING AGE

During the first five years, corrective pruning is done largely by thinning out thick clusters and interfering or competing branches. Since cutting is not severe, it does not delay bearing materially or reduce appreciably tree size. At this time an effort is made to select fairly wide angle scaffold branches spaced 6 to 12 inches up and down and around the trunk. To produce a lower and spreading tree, it may be necessary to suppress lightly the central leader a time or two. In the main, however, the tree is trained and pruned to its natural shape and form. The pruning done in most varieties is to facilitate the habit of growth rather than to change it. Such pruning should go a long way toward the development of strong, properly placed branches which will carry heavy loads of fruit.

A light pruning each year should keep the branches properly spaced and in balance. To facilitate spraying and pruning, small side branches on scaffolds should be removed in sufficient numbers to allow passage at three or four places from the periphery or out-

side of the main stem or trunk. Moreover, pruning should be reduced to the minimum as the trees come into bearing. It is well known that the most productive orchards are usually the ones receiving the least pruning.

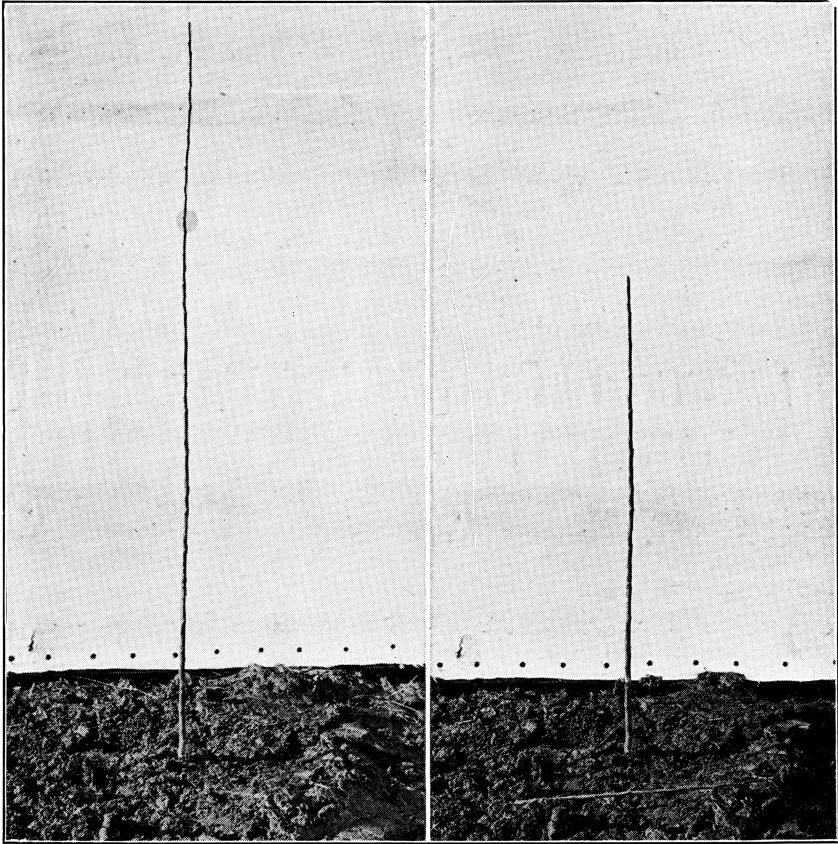


Fig. 6.—A one-year-old apple tree when planted, before and after pruning.

PRUNING BEARING APPLE TREES

After the trees comes into bearing, the Common Sense Pruning System allows them to assume their natural form and shape, and pruning is largely confined to the removal of thin unproductive wood in the interior shaded and lower parts. Occasionally it will be necessary to shorten back rangy branches and thin lightly thick clusters, interfering and crossed branches. It is seldom advisable or necessary, even in neglected orchards, to remove limbs larger

than $1\frac{1}{2}$ inches in diameter. The cutting should proceed moderately the first year and in the succeeding years.

Since the outside portions of the trees usually bear the most profitable fruit, the grower should seek to develop and maintain as much of this bearing surface as possible. Through growth and cropping the spread of the trees is increased with age and with low branches good fruit may be borne from the ground to the tops, thus increasing the size and color of the fruit produced.

It is true, however, that trees twenty or more years old generally bear about half their crop from the periphery or outside portions and the fruit grades higher and sells better than the fruit from the inner lower and shaded parts. With less cutting back of tops and opening up of centers the outside bearing surface is increased. Moreover, rarely will it be necessary to practise much cutting back even with trees that tend to grow too high for economical production.

Each apple tree, as well as each variety, requires individual pruning treatment because of growth, soil, variety, health and age differences. The Common Sense System allows the tree to assume its natural form except where it is evident pruning should be done to eliminate or improve weak crotches and unproductive wood. There is little conclusive evidence as to the value of one system of light pruning over that of another. It is the right combination of all systems used with judgment and common sense that generally gives the best results. Such a system, it is believed, is found in the Common Sense or "Show Me" Method. It has proved its worth through experimental evidence and its value has been demonstrated in many orchards throughout Missouri.

SUMMER PRUNING

Summer pruning is not generally practiced in Missouri. Light summer pruning of a corrective nature before the trees come into bearing is important, however, in the young orchard. If the grower has time he may thin out the thick growth in the young tree tops, cut back vigorous branches, remove sprouts to secure the proper spacing between the main branches and develop a more symmetrical tree top. If water sprouts are rubbed off the trunk and removed from the base of the trunk the trees will be benefited.

In bearing orchards growers can do very worthwhile work in May and June in the way of thinning out small branches and at the same time thin the fruit. As with dormant pruning, if good judgment is used the pruning work will consist largely of thinning out small

and crossed branches to admit sunlight and to prevent shading of fruit spurs. Such treatment will cause no injury and will be of value if no large amount of wood is cut off during the summer.

THE TIME TO PRUNE

Someone has said that the time to prune is when your knife is sharp. There is a great deal of truth in this statement, because pruning work, if done properly, may be helpful at any season of the year in the formation of the main branches and in the elimination of thick clusters of branches which cause excessive shading of fruit spurs. Pruning at any season may also be helpful through the removal of dead and badly diseased limbs and broken branches.

In general, however, it may be said that the principal work should be done some time after the leaves drop in the fall and before they appear in the spring. Any time during this dormant season when men may work comfortably out of doors, the pruning work may be carried on with profit. With large orchards one of the main problems confronting the grower is the matter of securing labor for the pruning work. The question is not, therefore, so much a problem of when it should be done as it is a matter of getting the pruning done. It is true, however, that labor may usually be secured with less difficulty during the fall and winter than during the early spring just as growth is starting.

THE TREATMENT OF PRUNING WOUNDS

In pruning young orchards it is seldom necessary to use a disinfectant to sterilize the small wounds made by the removal of branches. It is also true that there is much less disease in the young orchard than in the old. There is less opportunity therefore for spreading disease as a result of pruning work.

In bearing and neglected orchards where the presence of fire blight or blister canker is suspected it is advisable to disinfect and paint all wounds 2 inches or more in diameter. Several disinfectants may be used for this purpose, the most important of which are: mercuric cyanide and corrosive sublimate, one part of each to 500 parts of water; and copper sulfate (blue stone) dissolved in water at the rate of 1 lb. to 5 gallons of water, and this is one of the cheapest and most effective disinfectants. These disinfectants may be applied by means of a sponge or several thicknesses of a soft cloth tied around a stick about 12 inches long. After each wound has been thoroughly moistened with the disinfectant and allowed to dry, it should be painted with ordinary house or barn paint, which consists of white lead and raw (never boiled) linseed oil. Several

commercial preparations are now on the market for painting pruning wounds. Many of these paints are also satisfactory disinfectants and may be used according to directions.

Some authorities advise against the use of paints to cover pruning wounds because it is claimed that wounds heal more readily when not painted. The observations and experiments at the Missouri Station show that there is little difference in the rapidity of the healing of pruning wounds when painted with white lead and raw linseed oil and when no paint is used. Moreover, cracking of the wounded surface is largely prevented by painting and thus fungous diseases cannot so readily gain access to the wounded portion. To keep the large wounds covered, it may be necessary to repaint at least once each year until the wounds have completely healed over.

PRUNING TOOLS

If pruning work is to be performed properly, interestingly, and with the least amount of effort to the laborer, good pruning tools are necessary. It is no more possible for the pruner to do good work

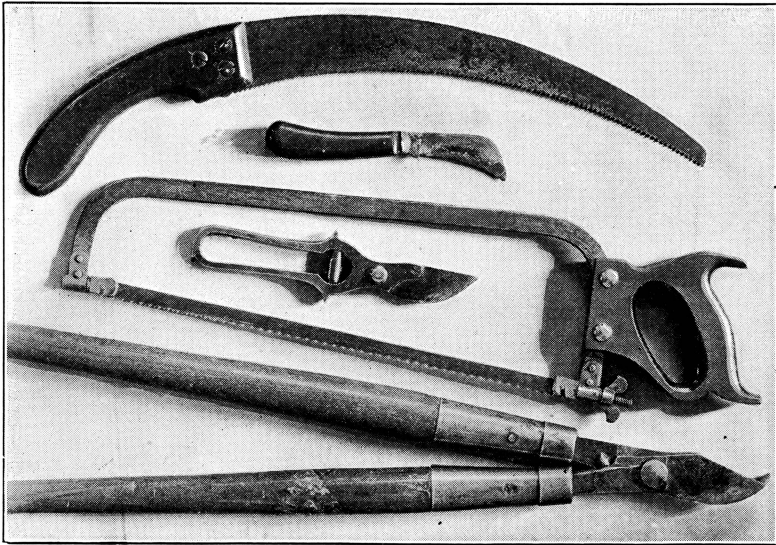


Fig. 7.—Good pruning tools. Curved saw, heavy knife, swivel pruning saw, hand shear, and long-handled shear or "lopper."

with poor and inadequate pruning tools than it is for the carpenter to do good work with tools which are unsuited to the task.

The two most important pruning tools are the swivel pruning saw and the pruning shears. With these two implements the grower

may handle the pruning work efficiently in a young orchard until it comes into bearing. After the trees reach the bearing age and there is occasion to do more and heavier pruning work other pruning tools will facilitate the task. A larger pruning saw, a pair of long-handled shears or loppers and other implements may be needed and used effectively and economically. It is just as important to keep the tools in first-class condition for work as it is to have a complete and satisfactory outfit.

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