

Pruning Apple and Pear Trees

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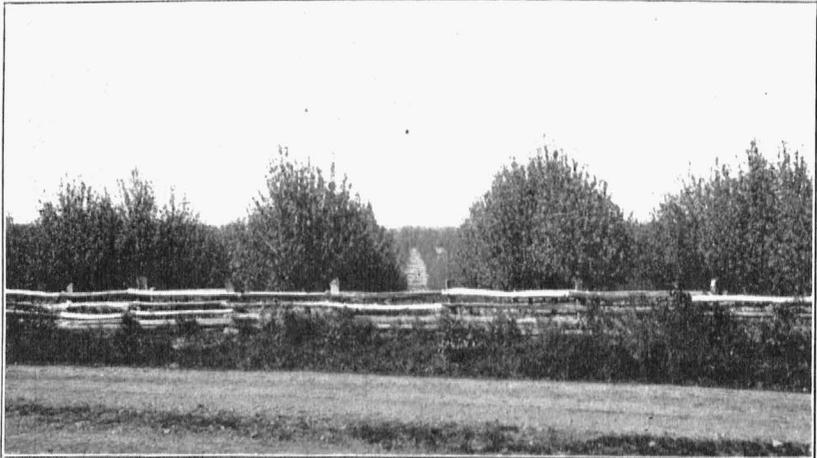


Fig. 1.—A well pruned, sprayed and cultivated young apple orchard.

Pruning is generally considered the most baffling problem with which the fruit grower deals. Experimental work is much less conclusive with regard to the best methods of pruning than with other orchard practices. The results of pruning may not all be noticeable for several years, and this fact tends to make the problem all the more uncertain and difficult.

Naturally, therefore, different systems of pruning have been popular for a time and later have come into disfavor and have been discarded. A few years ago Missouri apple and pear growers were pruning very severely; while the present tendency is to do a minimum amount of pruning. Consequently, some fear that the growers are as far wrong now as they were when the trees were pruned too severely. All admit that the pendulum has now swung its full length toward the side of little or no pruning.

The change from heavy to light pruning has resulted from a study of the performance records of the best orchards. This study has convinced a majority of the growers that, after all, the best place to study pruning and training systems is in the most productive orchards, and that the varietal characteris-

tics of the trees must be carefully considered among the factors determining the amount and kind of pruning and training to be given.

SOME 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.

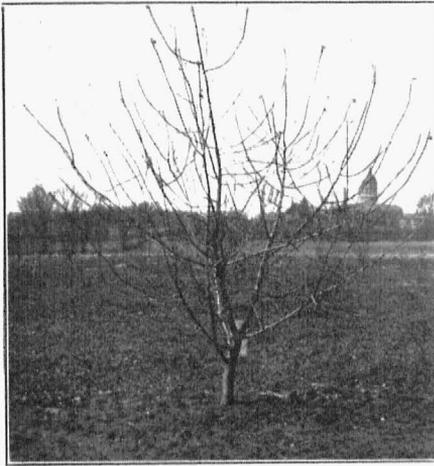


Fig. 2.—The weak, narrow crotch formed by the two largest limbs in this tree could have been modified and strengthened by pruning the ~~limb~~ limb more severely during the early years of growth.

Smaller The heavier pruning has a dwarfing effect upon the limbs. On the opposite side of the leaning trees the branches grow larger, with less pruning and their weight is increased. With such pruning, the tendency will be to produce a more upright tree.

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.

4. To procure 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.

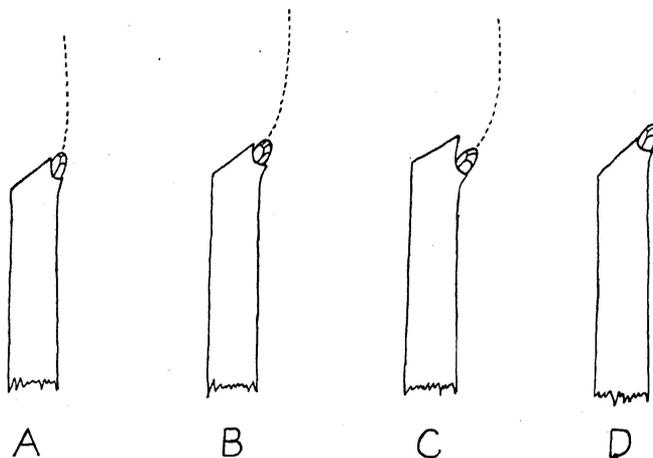


Fig. 3.—This diagram shows how the position of the cut tends to affect the growth and its direction. The direction of the growth is indicated by the dotted lines. The position of the cut surface in A and B is approximately correct. In C the cut was made too far from the bud causing the direction of growth to be more toward the horizontal and the cut surface will not heal so readily on account of the short stub left. The cut in D was made too close to the bud and too sloping. The cut surface in drying out is apt to involve the bud and prevent it from growing. If this bud dies the next bud below on the opposite side will send up a shoot thus preventing the outward spread of the branch and leaving a dead stub.

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 or 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 over-emphasized; 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 picking, spraying and cultivation.



Fig. 4.—A neglected 8-year-old apple tree before and after pruning. The work of pruning consisted of a judicious thinning out of clusters of small branches. Only a small amount of thinning was necessary to produce a tree sufficiently open to develop high color and good quality fruit. The pruning given did not alter the fruiting condition of the tree or cause an excessive water sprout growth.

FRUIT BEARING HABIT OF APPLES AND PEARS

The apple and pear may be discussed together, since their habit of bearing fruit is practically identical. Most varieties of these fruits 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 and pear 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.

SHAPE OR FORM OF TREE

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 and 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.

Central Leader Type.—The central leader type is one in which the top-most 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 tree top 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 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

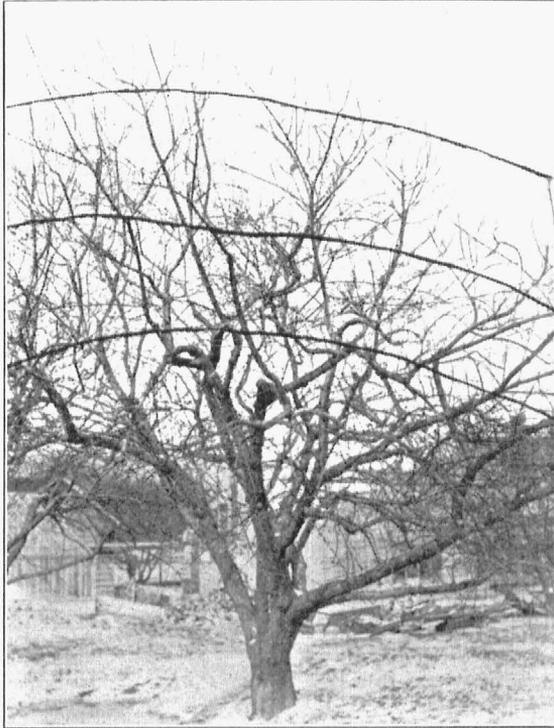


Fig. 5.—The lines drawn through the top of the tree indicate approximately the successive points at which the branches have been cut back to increase the spread of the top and prevent the branches from growing too high.

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 HEAD

There are no good reasons for high headed trees. In fact, every worthwhile argument that can be advanced favors the low headed tree. The lower the head the greater the 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.

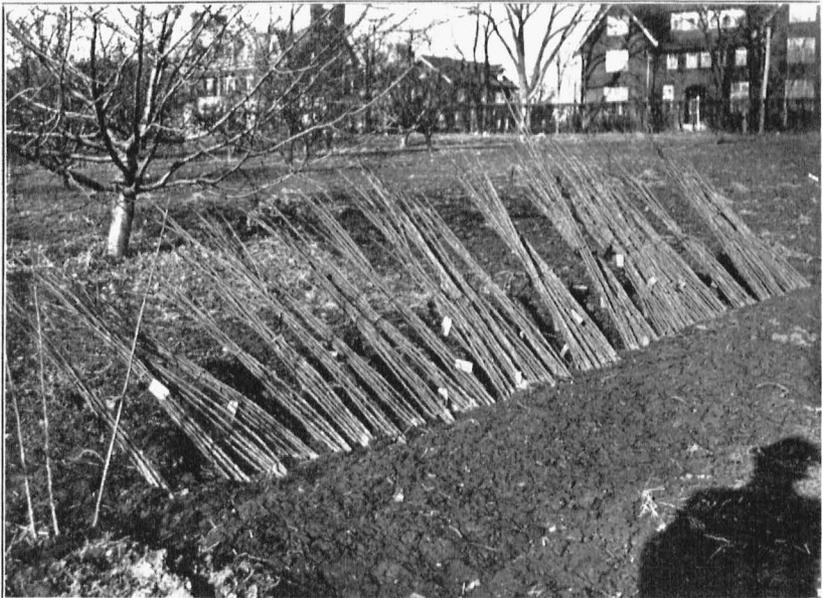


Fig. 6.—Apple trees heeled-in, awaiting conditions favorable for transplanting. If the ground is not ready when the trees arrive, select a well drained soil and heel them in.

TIME TO PLANT

Whitten found at the Missouri Station that fall planting of hardy fruit trees and most hardy deciduous trees and shrubs gave better results than

spring planting. Late fall planting also gave better results than early fall planting. Late spring planting gave as good results as early spring planting, provided the trees were kept dormant until they were planted.

The Missouri Station has also observed that trees heeled in for planting may be held dormant until late spring, sometimes early June, by lifting them out of the trench, turning them over and again heeling them in in the same trench as often as their buds show indication of starting.

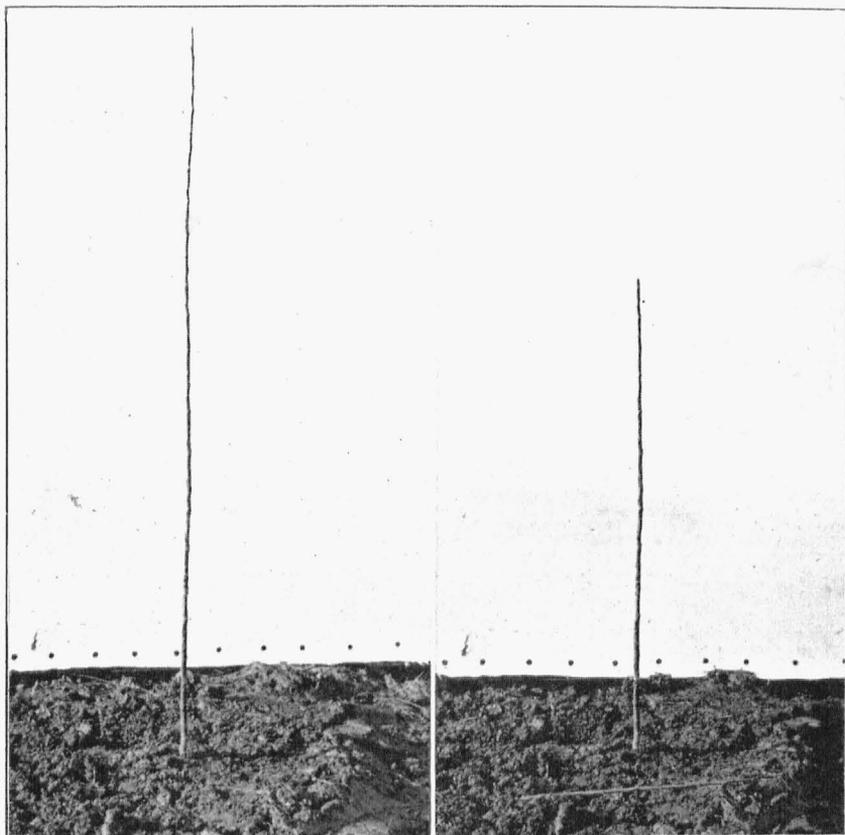


Fig. 7.—A one-year-old apple tree when planted, before and after pruning.

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 destroy-

ed 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 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 trees 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.

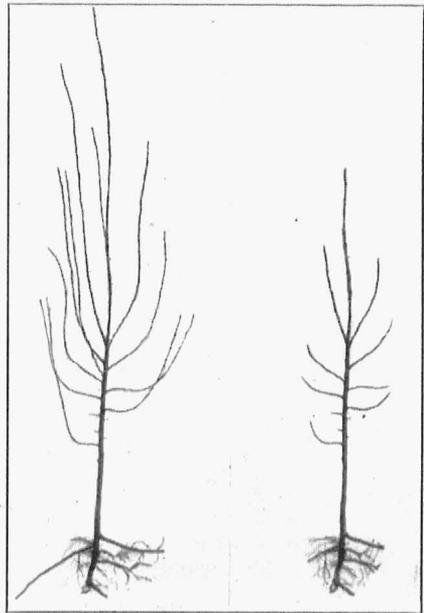


Fig. 8.—Two-year-old apple tree at time of transplanting, before and after pruning.

PRUNING YOUNG APPLE TREES UNTIL BEARING AGE

If the young trees are properly pruned at planting time they will not, as a rule, require severe pruning the first, second or succeeding years. It will be necessary, however, to thin out branches here and there and cut back particularly strong growing limbs in order to develop a well balanced top. For best results judicious training, light thinning and the suppression of strong leaders is necessary to the growth and development of well balanced branches capable of carrying a heavy load of fruit. At no time is it advisable to do severe pruning unless it becomes necessary to correct an ill-shaped or badly formed tree top. Such undesirable tops are sometimes formed by the heavy prevailing winds which blow from the southwest during the growing season. Strong, vigorous trees are, of course, less affected by the wind than weak, slow growing trees. When trees lean badly toward the east and northeast as a result of the wind, the heaviest pruning should be done on the side opposite the prevailing winds.

Rather severe pruning may also be necessary to develop a well balanced top when cultivation has broken off the limbs on one side. With this and all like problems the pruner should remember that heavy pruning usually has a dwarfing effect upon the young tree and delays the time of bearing.

This so-called corrective pruning, during the first few years in the orchard, is done largely by thinning out interfering or competing branches; and since such pruning need not be severe it does not delay bearing or reduce the size

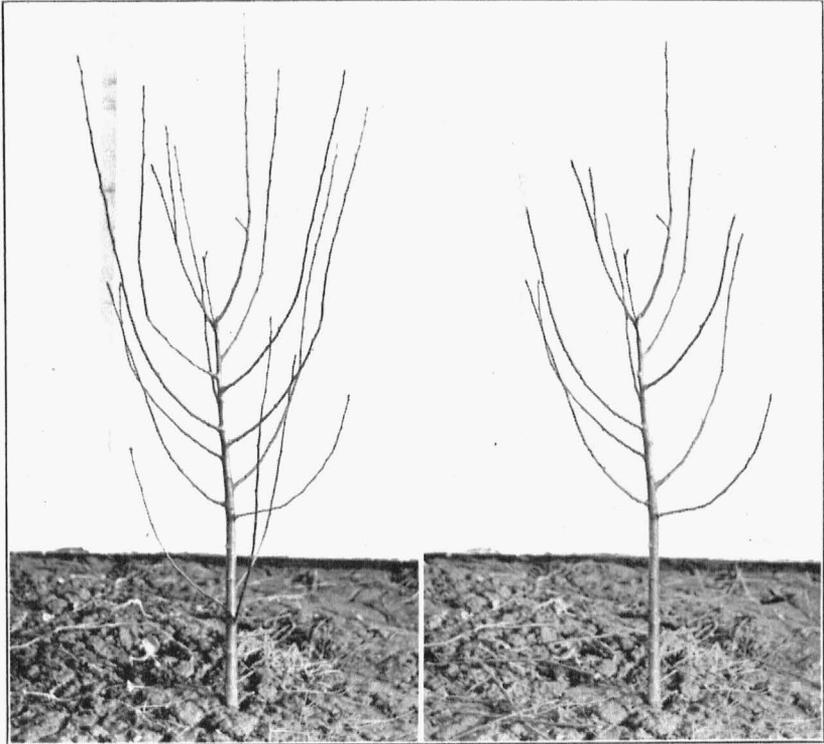


Fig. 9.—A young apple tree after a year's growth in the orchard, before and after pruning. (Was one-year-old when set in orchard.)

of the trees. That severe or heavy pruning will usually delay the time at which the trees come into bearing is a generally accepted fact. The leaf area is reduced and later, as a result, the root area is also restricted to maintain the balance. It is also true that trees with no pruning or trees that have been pruned lightly are larger at bearing age than trees which have been pruned heavily.

Another factor considered in pruning and training young trees before they come into bearing is in regard to various diseases which may enter the tree

through the wounds made by pruning. The danger from this source is not great, however, until the trees become older. Heavy pruning also encourages the growth of water sprouts, and these necessitate more pruning each year and thus increase materially the cost of bringing an orchard into bearing.

It must not be assumed from this that no pruning is needed. Pruning to correct the shape or form of the tree in order to develop strong branches which will carry a heavy load of fruit is required. Beyond this, however, severe pruning should be practiced only for the reasons mentioned above. A light pruning each year will keep the branches properly spaced and in balance. 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 amount of pruning.

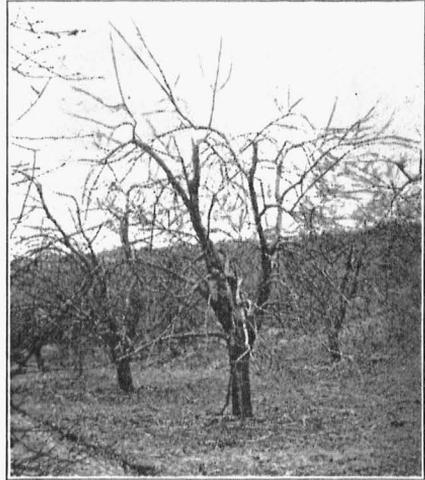


Fig. 10.—An apple tree reduced in height from 12 to 15 feet by too severe pruning, cutting back branches 4 to 5 inches in diameter. The same tree top could have been lowered almost as much by cutting back branches about 2 inches in diameter.

PRUNING NEGLECTED APPLE TREES

Many growers take possession of an orchard in which pruning has been badly neglected, or appreciate too late the value of pruning in their orchards, and in an effort to make the tree appear properly pruned remove entirely too many branches the first year. This severe pruning after years of negligence

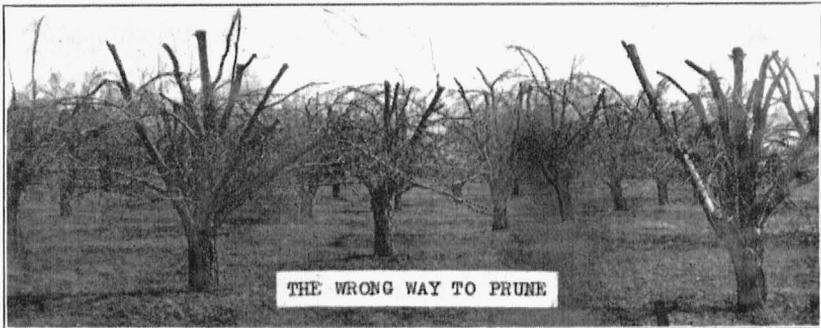


Fig. 11.—Another case of too severe pruning in which apple trees were cut back to reduce their height. As a result of such treatment practically all the trees in this orchard were destroyed in three or four years by blister canker and other diseases. Had the pruning been done correctly as described on the next page, the height of each tree could have been reduced from 5 to 10 or more feet without material injury.

may throw out of balance the top and root system and produce a heavy growth of water sprouts which may result in little or no fruit development. It is a much wiser procedure to prune only moderately the first year, removing and thinning out the small branches in the top of the tree, and also here and there in the center and on the sides, in order to open up the tree for the admittance of sunlight and air. It is seldom advisable or necessary in the neglected orchard to remove limbs larger than $1\frac{1}{2}$ inches in diameter. It is true that occasionally limbs larger than this will be found growing in undesirable places; but, though it would be much better for the tree were they not there, their removal would produce large wounds which might be very slow in healing.

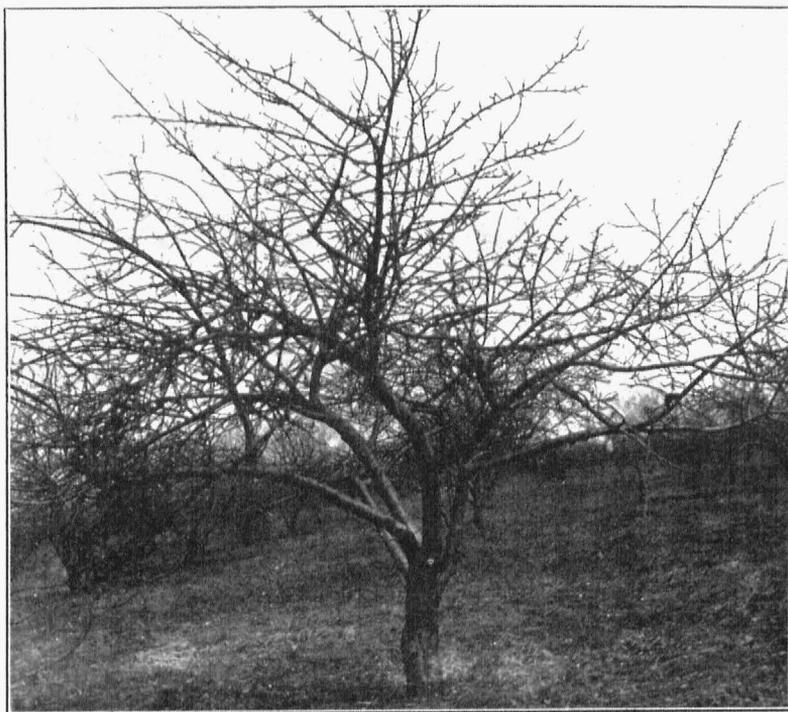


Fig. 12.—A very badly pruned tree which is *literally* low-headed, but *actually* high-headed. Every fruit spur and twig that the pruner could reach from the ground has been removed.

On certain varieties like Ben Davis and Gano which are susceptible to blister canker it is always unwise to remove large healthy limbs. This disease is apt to obtain a foothold in the wound before healing over is accomplished. The removal of large limbs will also frequently subject the limbs and main trunk to sun scald injury through lack of shade. When in doubt regarding the removal of a limb or branch it is a safe plan to leave it. It may be removed at some future time but it cannot be replaced once it has been cut off. When a large limb seems to be in the way several smaller branches may be cut off without danger from large wounds. It is usually well in neglected orchards to

extend the pruning over a period of at least four or five years, taking out a few small branches each year. At the end of this period the trees should be in a condition to bear a heavy crop of fruit possessing high color and normal development due to the proper amount of sunlight admitted. This plan avoids throwing the trees into excessive water sprout growth and, in extreme cases, out of fruitfulness by too heavy pruning in any one year.

“PRUNING-UP” APPLE TREES

“Pruning-up” apple trees is literally put into practice in many instances. The grower sometimes stands on the ground and prunes away every fruit spur and branch within reach of his pruning saw and shears. The very fruit which would have been most profitable to pick and spray is eliminated. Long, bare limbs with a tuft of small branches near the end resembling a feather duster are the result. The bearing surface is confined to the outer edge or surface of the branches, not only reducing the bearing area but making spraying and picking more difficult and expensive.

SUMMER PRUNING

Summer pruning is not generally practiced in Missouri. Light pruning 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 trunks 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 the 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 sometime 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 sulphate (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

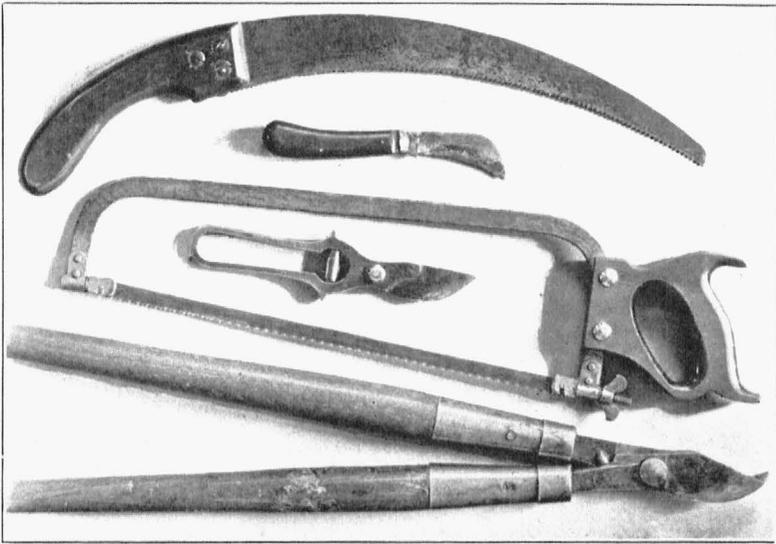


Fig. 13.—Good pruning tools. Curved saw, heavy knife, swivel pruning saw, hand shear, and long-handled shear or "lopper."

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 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.

METHOD OF REMOVING BRANCHES

In the removal of large limbs or small branches it is a good rule always to make close, clean, smooth cuts. This is important, although more time may be required for the work. By "close" is meant that the cut should be made close to the point from which the branch arises. It is never well to leave stubs, because they do not heal over readily and there is an opportunity for fungous disease to get a start. Pruning wounds should also be made at an angle corresponding to that of the branch from which it arises.

When it becomes necessary to remove large limbs from 5 inches to 8 or more inches in diameter, a cut should be made on the lower side at a distance of 10 to 12 inches from the limb or trunk of the tree and the limb sawed off from above. By this means splitting down will be prevented. When the large limb has been removed in this manner a second cut is necessary in order to make the wound close to the trunk or branch and corresponding to the angle of the same.

PRUNING PEAR TREES

The pruning of pear trees does not differ widely from the pruning of apple trees. In fact the main principles observed in pruning young apple trees, bearing apple trees and neglected apple trees may be applied to pear trees.

The pear trees, however, generally have a more upright habit of growth than most varieties of apple trees. As a consequence, they have less spreading tops. On account of this fact it is usually necessary to develop a spreading top by the thinning out of branches in the center and by cutting back the branches more severely than in the case of apple trees. However, as in the case of apples, pruning that is too severe usually delays the time of bearing, increases the water sprout growth and has a dwarfing effect on the trees. The increase in vegetative growth may cause the trees receiving heavy pruning to blight worse

than those that are moderately pruned. One of the methods of controlling fire blight on badly affected trees is to do less pruning and reduce the amount of succulent or tender growth. Dead and badly diseased limbs should always be removed. Some varieties of pears and apples may be unusually susceptible to fire blight. Where this is true, the diseased wood and cankered areas on the limbs and trunk should be removed during each dormant season. If this clean-up work is done each year the source of infection of fire blight will be largely eliminated. With apples and pears which are susceptible to fire blight it is best to have as many scaffold limbs as possible; so that if one becomes girdled near its base by a fire blight canker, it may be removed without the loss of too much of the bearing surface of the tree.

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