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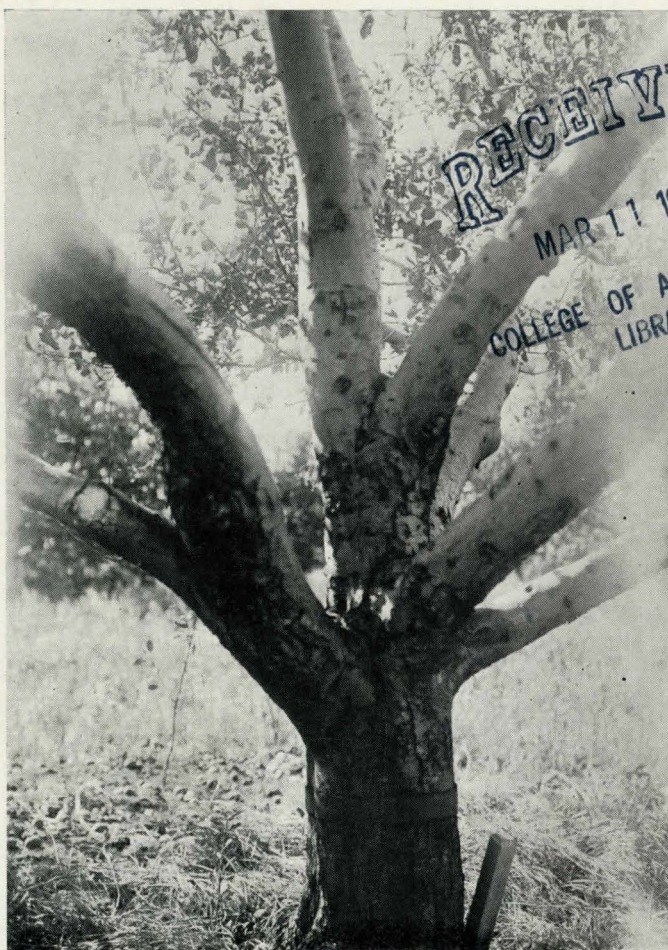
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Extension Circular 1260

Reprinted, April, 1935

Pruning Fruit Trees



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Pruning Fruit Trees

C. C. WIGGANS AND E. H. HOPPERT

Pruning is the orchard practice about which there have been more arguments and differences of opinion than any other operation with which the fruit grower deals. One of the main reasons for this is that the ultimate effects of pruning are often delayed or are so obscured that they are wrongfully interpreted. For example, it has often been said that pruning stimulates growth. This resulted, in days gone by, in excessive pruning particularly on young trees. Another statement often made was "to prune in winter for wood and in summer for fruit."

Both of these theories have been disproved by the modern investigator. With carefully controlled experiments he has shown that pruning, while stimulating growth immediately adjacent to the cut, is in fact always a dwarfing process when total growth is considered, and that fruit bud formation and fruit production depend upon nutritive conditions within the tree. While pruning does influence these conditions to a certain degree, it is now known that other orchard operations such as culture, fertilization, and spraying affect them also, often to a much greater extent than does pruning.

Basing their practices upon these conclusions, many fruit growers of today have gone to the other extreme where little or no pruning is done. This is a mistake almost as great as the excessive pruning of the earlier growers.

The main object of any orchard operation is to produce the most profitable crop, either by producing more fruit or fruit of better quality. Observations in producing orchards indicate the most profitable crops grow (1) on trees of the low spreading type with the several main branches of relatively equal size and (2) on trees with uniformly good length growth throughout the trees. The ideal tree type can be produced only by proper pruning during the early life of the tree. Pruning also is of material assistance in maintaining good fruiting wood throughout the bearing tree.

Additional reasons for pruning may be mentioned as follows: (1) At transplanting time a reduction in the top of the plant is necessary to compensate for the root pruning which occurred at digging time. (2) A mechanically strong tree supports a heavy crop and withstands strong winds better than one with weak crotches or poorly distributed main branches. Proper pruning in the early life of the tree will eliminate many such weaknesses. (3) Competition and crowding can be prevented only by removing surplus branches. (4) Certain diseases, such as fire blight, black rot, and apple blotch, can be held in check or partially controlled by the cutting away of infected parts,

SHAPING THE YOUNG TREE *

Thirty or forty years ago mature apple trees generally consisted of three or four main branches originating close together on the trunk. This type of tree was known as the open headed or vase shaped tree and was secured by eliminating the leader in the young tree and directing the growth equally to these main branches. Under heavy loads or in high winds there was a tendency for one or more of these branches to split off. Under such circumstances the entire tree was soon gone.

Today the ideal tree is one with a trunk six to eight feet long upon which there are seven to nine scaffold limbs. This is called the modified leader tree. Its principal advantage over the open headed form lies in the fact that the union between branch and tree is usually a strong one. Consequently there is much less danger of a branch splitting off. Furthermore, in case a branch does split off, the life and productiveness of the tree are not seriously impaired.

The pruning given the first few years determines the form of the mature tree. Therefore, its importance cannot be overemphasized.

At Transplanting Time.—A nursery tree before being dug has a perfect balance between the top and root. In digging, however, a large share of the root system is destroyed. Hence, root pruning at transplanting time should be confined simply to the removal of broken or injured parts. On the other hand the top should be reduced materially if the tree is to withstand successfully the shock of transplanting.

The type and amount of pruning at planting time depends upon the part of Nebraska in which the tree is being planted and also upon the age of the tree. In those sections where strong winds and sunscald injury make tree growing difficult, trees should be made to branch close to the ground. In other parts of the state extremely low branches are undesirable because they interfere with cultivation and increase the likelihood of damage from rabbits.

A one-year-old tree is a straight whip 4 to 6 feet in height. Under eastern Nebraska conditions this is shortened back to a height of 30 to 36 inches while for the western portion of the state the height should be approximately 18 inches. Since the topmost bud normally develops into the leader a straighter leader will be developed if this

* These recommendations apply specifically to the apple. Variations therefrom applicable to the other tree fruits will be discussed in the later pages of the circular.

pruning cut is made just above a strong bud on the southwest side of the tree. Such treatment helps counterbalance the effects of prevailing southerly winds during the growing season.

The two-year-old tree, however, presents a more complicated problem since here more must be done than to merely equalize the top and root. Too often the planter is content with the shortening of all the branches on the tree. While such pruning will allow the tree to establish itself it is a poor practice since many of these branches must of necessity be removed later. It is a far better policy to remove entirely at the beginning all branches except those which are to serve as main branches of the mature tree. This means then that with the ordinary tree, in addition to the leader, not more than three branches and often only one or two should be left. The lowest of these in eastern Nebraska should be approximately 24 inches from the ground and preferably on the southwest side of the tree to protect the trunk against sunscald. Care on the part of the planter will insure a satisfactory branch pointing in that direction. Under western conditions this branch should be as near the ground as possible. Since ordinarily these low branches have been removed by the nurserymen from the two-year tree, it is generally easier to secure the real low-headed type from a one-year rather than a two-year tree. The next higher one should be on one of the other sides of the tree and from 6 to 12 inches above the first one. If a third one is to be left it should be still higher and on one of the remaining sides of the tree.

In selecting these branches attention should be given to the angle they make with the trunk. The wider this angle is, the stronger will be the union between branch and trunk. Very narrow, sharp crotches are weak and very likely to split in strong winds or under a heavy load. A small branch forming a wide angle is preferred over a larger branch joining the trunk at a sharp angle. In the nursery, the one-year-old whip is topped so that the head is formed at a specified height. This topping usually results in the formation of exceptionally strong shoots from the two or three upper buds. One of these vigorous branches should be retained as a leader while the others should be removed in favor of the smaller but wider angled branches which usually have developed further down on the trunk.

The final step in the pruning of the tree at transplanting time is the heading back of the scaffold branches and the leader. With the well grown vigorous tree from which

several branches have been removed, the scaffold limbs may be left 15 to 18 inches in length and the leader 24 to 30 inches. With a weaker tree which has fewer branches, it is necessary to head back these parts somewhat more. Under any circumstances, however, the leader should be long enough to maintain ascendancy over all side branches. Otherwise, there is a tendency for two or more leaders to develop.

Summer Shaping.—Early in the growing season after transplanting, numerous buds begin development. Normally, some of these develop into strong branches at points where they are not needed while others in desirable positions often make weak growth. The removal of the undesirable developing shoots will insure better development of those that remain. Thus all branches below the height of the lowest scaffold limb are rubbed off and also all of those on the leader except the two or three which are in the proper position to serve as scaffold branches or as the leader for the following year. This treatment is especially desirable in the case of one-year trees and to be effective must be done soon after growth begins.

After the First Growing Season.—If the treatment recommended in the above paragraph is carried out, little or no pruning will be necessary immediately following the first growing season. However, most growers prefer to delay any shaping or pruning work until the dormant season. At this time, then, the problem is one of selecting those branches which are to become scaffold limbs and then removing all surplus growths.

In selecting these branches the principle followed is the one mentioned above—namely, that they must be at least six inches apart and each one at least one-fourth of the way around the trunk from the one immediately below. Furthermore, branches on the same side of the trunk should not be closer than 24 inches. Therefore, the treatment given at this time to a tree planted as a one-year whip is very similar to that given a two-year-old tree at transplanting time. In the case of the two-year transplant the problem is one of choosing the two or three scaffold limbs just above the highest one left at transplanting time.

The original scaffold branches of the two-year transplant also should receive some attention. Each of these has developed more or less similar to the main leader of the tree, in that a number of the buds have produced branches and one or more leaders. The side branches should be thinned out by removing all branches within

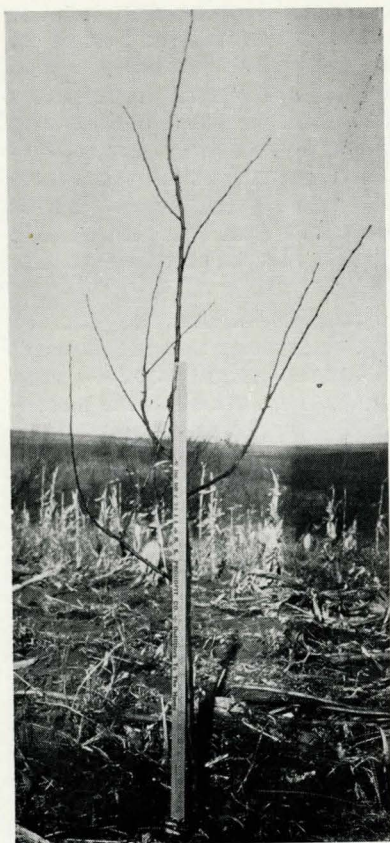


FIG. 1.—An apple tree after one year's growth in the orchard. Note the branching from the three lower branches (left as scaffold branches at planting time) and the formation of additional scaffold branches.

twelve inches of the main trunk and also those arising from the buds on the upper or lower sides of the scaffold limb. Double leaders even in the case of these scaffold limbs are not desirable. Hence, when two or more of the outermost buds have developed into nearly equal sized branches, one of these branches is left untouched while the others are either removed entirely or headed back materially.

At this stage in the tree's development no heading back is done unless for some specific reason. With certain varieties such as Wealthy and Duchess, pinching out the terminal bud will encourage branching where otherwise there would be either no side limbs or at best only weak spur-like growths. Also, occasionally a side branch makes an exceptionally vigorous growth, thus tending to unbalance the tree. Such shoots can be held in check by heavy heading back. Promiscuous heading back of all one-year wood, such as was recommended generally two decades ago, is not only wasted effort but is actually detri-

mental to the tree. This type of pruning produces a dense headed, much branched tree which is slow to come into bearing. Furthermore, many of the branches induced by this treatment must be removed later.

The shaping of the young tree is often seriously interfered with when the orchard site is exposed to heavy prevailing summer winds. The constant pressure causes the young tender shoots to change direction of growth and in

extreme cases results in practically no development on the windward and over-development on the leeward side of the tree. Pruning should be confined almost wholly to the leeward side since cutting on the other side only aggravates the difficulty. Some mechanical means for holding the tree parts in their proper positions will greatly aid in giving the tree a desirable form. This treatment is most effective if applied during the early life of the tree. Trees protected by a windbreak on the south and west and those on a north or east slope seldom are misshapen due to the wind.

After the Second Growing Season.—After the second year in the orchard, the pruning treatment needed by the tree is largely a continuation of that described above. Two or three more scaffold branches should be chosen and necessary thinning done among the side branches arising from the scaffold limbs previously selected. By this time some spur-like growths are beginning to appear on the older branches. These should not be removed unless they develop into long branches and then only if they are crowding or interfering with more desirable branches. Water-sprouts or suckers which may have developed on the trunk or main branches should, of course, be removed.

A factor which now begins to assume importance is the maintenance of balance between the various scaffold branches. In general no scaffold branch should have a spread greater than one-fourth the circumference of the tree. Limbs from one scaffold branch should not be allowed to fill the space which belongs to those from a neighboring scaffold branch. Unless this tendency is suppressed by pruning, it will result in the crowding out of the one branch and the over-development of the other. When branches from different scaffold limbs are competing for the same space, the one from the stronger scaffold branch should be eliminated.

After the Third Growing Season.—The third season's pruning differs little from that previously described. Additional scaffold branches as needed are chosen and the necessary thinning continued. In addition, the leader, if it is at all pronounced, may be removed, although with many varieties this will be unnecessary.

The framework of the tree should now be complete and subsequent pruning is largely for corrective purposes—that is, to keep the various parts of the tree growing at approximately equal rates. If any weak crotches appear, par-

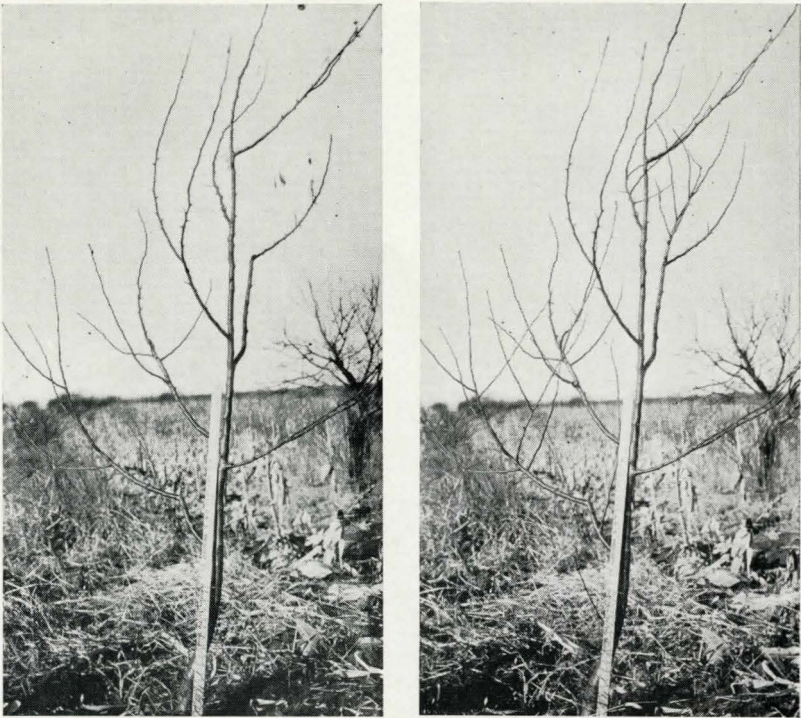


FIG. 2.—A four-year old apple tree before and after pruning. Pruning consists primarily of the removal of surplus branches in the center of the tree. Note the fine distribution of scaffold branches.

ticularly on the main limbs, they should be corrected by either removing or cutting back severely one of the two branches.

At this time the tree is beginning to form those parts which later produce fruit. Spurs, short growths and drooping branches are appearing in the older parts of the tree and they should not be disturbed since they will bear the first fruit. The heavier the cutting done at this time, the later will be the formation of these fruit-bearing parts. Fruit buds are formed most freely where there is plenty of light. With upright growing varieties, like Yellow Transparent and Delicious, the center of the tree is likely to be densely shaded. Such a condition can be remedied somewhat by forcing the scaffold branch leadership into the outward growing branch of a fork by removing the one which grows upright.

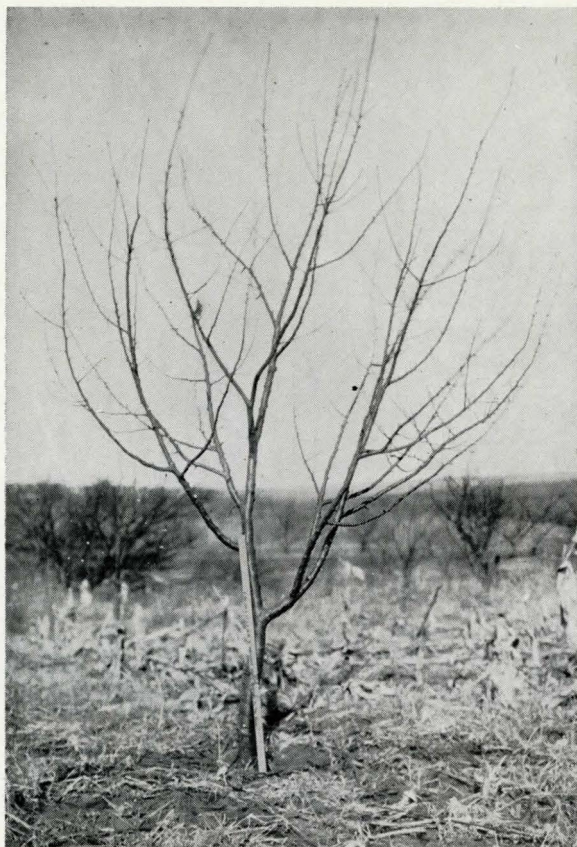


FIG. 3.—A fine specimen of a five-year-old apple tree. Note the preliminary development of spur-like growths on many of the branches. Little pruning beyond water sprout removal is necessary at this stage of development.

PRUNING THE YOUNG NON-BEARING TREE

During the period from four to ten years the pruning needed by the apple tree is determined by the variety in question and also the specific needs of the individual tree. For example, Duchess and Wealthy as a rule will make about the type and amount of growth desired with no pruning whatever. On the other hand Winesap produces a great many water sprouts, Jonathan and Grimes produce small twigs in such abundance that the tree becomes brushy while the Delicious tends to grow so upright and dense that

spur production on the inner parts of the tree is seriously impaired. Naturally water sprouts should always be removed. Also, when the branches are too numerous some of them should be cut away to give the remainder a better chance. The upright growth, typified by the Delicious, is, however, more difficult to handle. The removal of these upright growths, in order to let the light into the tree, simply stimulates the formation of others to take their place. Consequently pruning alone will not entirely remedy this situation. A combination of light, corrective pruning and mechanical spreading of the tree is much more satisfactory. This spreading can be most effectively employed on the leaders of the upper scaffold branches and is brought about by tying them down to stakes or weights.

It is not uncommon to find trees at this age which were neglected during the earlier years. Under such circumstances it is impossible to train all trees to the modified leader shape. In those instances where the tree has a strong leader and good side branches the removal of some of these branches will give a good tree. In other cases, where too many branches were left too close together at planting time, the leader may be very weak. It is folly to attempt to make such trees conform to the modified leader pattern. Here the pruning should consist of the removal of useless parts

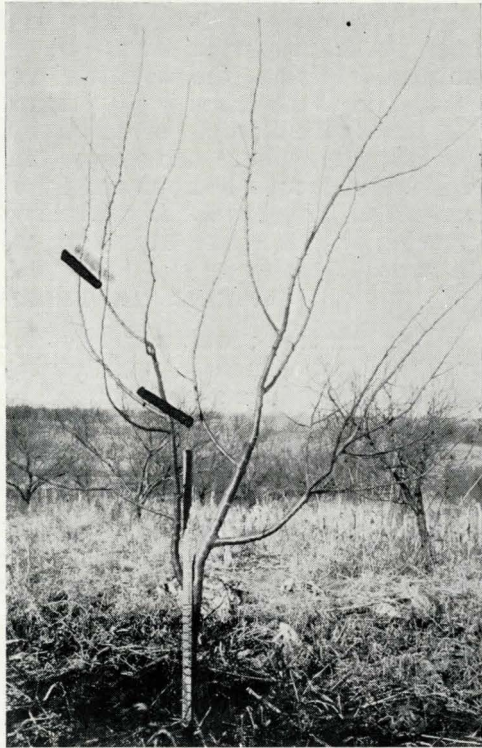


FIG. 4.—A tree in need of some corrective pruning. The branch on the left should be removed at the points indicated to prevent the formation of two leaders with a resultant bad crotch.

such as crossing or interfering branches and water sprouts, and a general thinning out of crowded branches. In still other cases the tree may consist of three or four main branches, none of which is a true leader. To make a modified leader tree out of this type would necessitate the removal of two or even three of these branches. While this might profitably be done with a tree two to four years old, such procedure with trees six to eight years old will materially delay the fruiting period. A much better method in these cases is to retain all these main branches and strengthen weak crotches by proper bracing later. Occasionally, where the leader on a young tree has been broken out it may be replaced by one of the upper scaffold branches. This branch is straightened up and held in place by tying it to a stake extending up through the center of the tree.

PRUNING THE BEARING TREE

After the tree reaches the productive age, the grower is primarily concerned in maintaining it in such a condition that it can produce large crops of high quality fruit. Maximum production over a period of years is possible only on those trees which make good annual length growth throughout the tree. Pruning has its place in the maintenance of these conditions.

The first heavy crop of fruit will materially alter the shape of the tree by causing the branches to spread out. This will improve conditions in the top especially so far as light is concerned, but may result in shading excessively some of the inner lower branches. This results eventually in the weakening of these shaded parts until they produce only small, poorly colored fruits or no fruits at all. Pruning the tree during this period consists largely of the removal of such wood. In the case of upright growing varieties such as Yellow Transparent and Whitney, the spreading is not sufficient to give the light conditions desired. Here the shading is general throughout the inner parts of the tree instead of being confined to the lower branches. This situation can be materially improved by removal of the upright portion of forked branches and the taking out of most of the branches growing toward the center. Such treatment also keeps the tree from becoming so high. With other varieties such as Winsap and Genet, there is a great tendency for the lower branches to droop to the ground. Instead of cutting such branches to the outward growing fork as mentioned above, this one is removed and the upright one left.

As the tree grows older, its vigor naturally decreases especially if heavy crops are produced. This is indicated by shortened annual length growth, by smaller leaves, and by light green foliage. The food supply, particularly moisture and soil nitrates, does not keep pace with the increase in the number of growing points and hence is available to the individual growing point in decreasing amounts. Fruit spurs normally blossom only once in two years. New fruit spurs are formed primarily on two-year wood. Therefore, sufficient length growth must occur annually to permit such development or biennial bearing is bound to result. Pruning will reduce the number of growing points and thus improve this situation. However, this improvement may often be secured more economically by fertilization or cultivation.

Pruning, to relieve the situation just described, will consist of the removal of small branches throughout the top of the tree. A tree just beginning to slow up its growth may be brought back into a satisfactory bearing condition by the removal of a relatively few branches. In other cases a much greater number of branches will need to be cut away. The effect of the removal of any branch is local. Hence, the removal of a dozen small branches distributed throughout the tree top is more effective on the tree as a whole than cutting away a single large branch even though the latter has many more growing points. It is seldom that a branch over one inch in diameter will need to be removed in this connection.

Low tree vigor brought on by loss of foliage from disease infection or insect damage cannot be remedied by pruning, fertilization, or cultivation. In such cases spraying to control apple scab and black rot or to prevent canker worm trouble must be resorted to. Where cedar rust is prevalent the removal of red cedars from the vicinity is the only solution.

Renovation Pruning.—As the tree grows still older the point is reached where the type of pruning just mentioned together with fertilization and cultivation are not sufficient to maintain vegetative vigor to produce regular crops. In such cases, more severe pruning is necessary to obtain the desired results. Severe heading back of the scaffold branches to large side limbs not only will encourage water sprout production in the region of the cut but will also improve light conditions in the lower parts of the tree. The lower branches should also be shortened, thereby inducing water sprouts along the main limbs closer to the trunk. The

following year these sprouts are thinned out and the ones which are left, headed back to induce lateral branching. In three or four years these growths should be fruiting.

Before renovation is undertaken it should be recognized that it is accompanied by certain dangers. The removal of large branches naturally exposes those below to much more direct sunlight with consequent danger from sunscald. Also large wounds, particularly on weakened wood, heal very slowly and are subject to invasion by wood rot fungi or other parasitic organisms. These dangers can be lessened by extending this dehorning process for a period of three or four years and by proper protection of the wounds by paint. Shading the exposed parts or coating them with whitewash helps to prevent sunscald. Water sprouts close to a wound hasten its healing and also furnish shade to exposed branches. Under no circumstances should a tree known to be affected with blister canker be dehorned.

Where trees are too close together renovation pruning is of little value. The dense shading of the lower branches has forced all vegetative growth and fruit production to the top of the tree. Lowering the top by cutting back the upper branches of this kind of a tree does not permanently improve fruitfulness in the lower parts. If some of the trees are removed and renovation pruning practiced on the remainder, desirable results may then be expected.

PRUNING FILLER TREES

With the general adoption of the plan of interplanting filler trees among the permanent ones, the problem arises as to just how such trees should be pruned. This interplanting is usually arranged so that permanents and fillers are in the same row. During the first two or three years the pruning here is little different from that of the permanents except for the fact that scaffold limbs extending at right angles to the row should be encouraged while those extending directly toward adjoining permanent trees should be suppressed. These filler trees should be removed at about twenty years of age. Since the scaffold branches will not become large enough to crowd seriously during this period, a larger number of them may be retained than in the case of permanents. Also it is generally unnecessary to remove the leader.

Practically no further pruning, aside from the removal of water sprouts, will need to be given to the filler tree until it begins to interfere with the growth of the adjoining permanents. As the branch ends begin to touch, the limbs of

the filler tree should be shortened in to permit normal development of its neighbor. After several years of such treatment the filler tree assumes more or less a fan shape with its productive branches either in the top of the tree or extending at right angles to the tree row. Such treatment will prolong the useful period of this tree and at the same time will allow the proper development of the permanent. It has been found that this practice increases the yield of the permanents more than it decreases the production from the fillers. A filler tree handled in this fashion may be allowed to remain until the adjoining permanent trees need all the space.

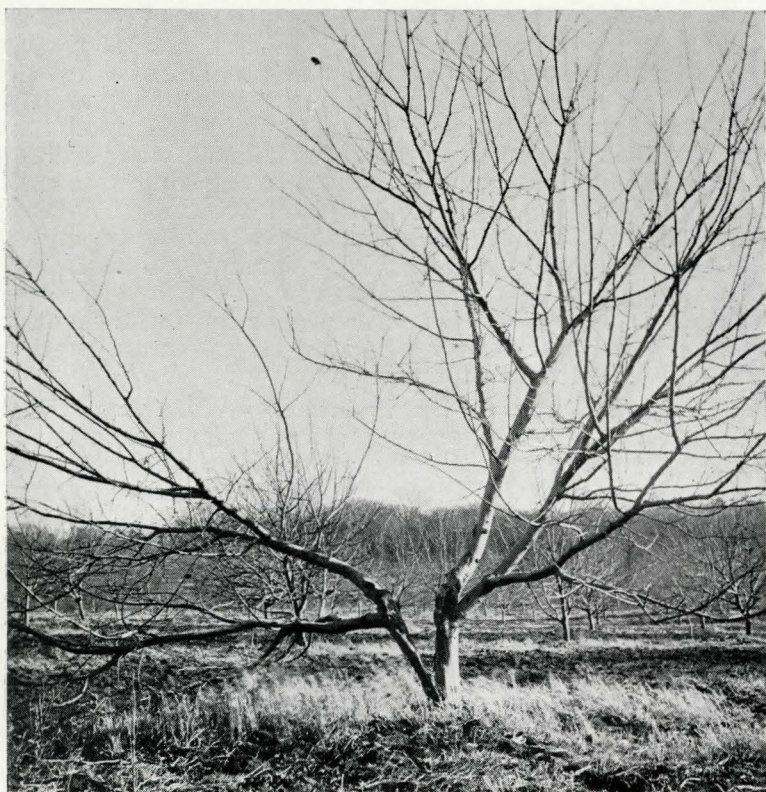


FIG. 5.—Results such as this come from (1) sharp angled crotches and (2) double leader development. This tree is virtually ruined just when it should be most profitable.

GENERAL CONSIDERATIONS

Time to Prune.—Much has been said and written about the proper time to prune trees but no conclusive evidence has been presented to show that one season is preferable to another so far as the fundamental effect on the tree is concerned. Usually the work is done after the main leaf fall and before spring growth begins. During this period, other work is not so pressing. Pruning is more easily and quickly done because the view of the work is not obstructed by the foliage. Possibly the most economical time to remove water sprouts is soon after growth starts. At this time they are tender and may be pulled or rubbed off by hand, whereas later, shears or a knife will be necessary.

Light Annual Prunings Are Best.—The aim of the orchardist is to have as profitable and productive a tree as possible. Fruit bud formation depends upon the maintenance of a certain nutritional balance within the tree. Thus trees producing an excessive amount of new wood set few fruit buds, while on the other hand a tree setting an excessive number of fruit buds makes little growth. The most profitable tree is one which makes a moderate annual length growth and sets a moderate number of buds.

Pruning disturbs the relationship between vegetative vigor and fruit bud formation in proportion to its severity. Therefore, annual light pruning is to be preferred to heavy pruning at less frequent intervals.

Controlling Diseases by Pruning.* — Diseases which spread from cankered areas on the twigs, branches, or trunk of the tree can be eliminated or at least held in check by pruning methods. Where infection is confined to small branches these may be cut off and burned as in the case of apple blotch, fire blight, black knot, and black rot. If, however, the canker is on the trunk or scaffold branch, then only the diseased portion is cut or scraped away unless girdling has already taken place. With diseases such as blister canker and heart rot, which affect the wood throughout the tree, the removal of local surface infections serves primarily to prevent the dissemination of the disease to other trees. The affected individual is not particularly benefited by such treatment.

There is little or no danger of spreading diseases with pruning tools if the pruning is done during the dormant season. During the growing season, however, fire blight particularly will be carried from tree to tree if the cut

* For more detailed information concerning disease control, reference should be made to Nebraska Experiment Station Circular 36.

is made through an infected area. Disinfection of the pruning tools after making each cut is recommended in such cases. The following formula for a disinfectant has been found satisfactory by the California Experiment Station (Calif. Agr. Ext. Circ. 20) :

- 1 pint distilled water (or rain water)
- 3 pints cheapest commercial glycerine
- 8 large tablets ($7\frac{1}{2}$ grains or half gram) cyanide of mercury or $\frac{1}{8}$ ounce of cheapest crystals
- 8 large tablets bichloride of mercury or $\frac{1}{8}$ ounce crystals

Add the water to the glycerine in a clean enameled kettle. Dissolve the cyanide of mercury in this by heating and stirring with a clean wooden stick. Add the bichloride of mercury and stir until dissolved. Three quarts of water may be substituted for the glycerine but this solution is not as satisfactory since it spreads less readily on the tools. This mixture is an internal poison and should be handled accordingly.

Pruning Wounds and Their Treatment.—Nature makes an effort to heal over all wounded areas. If a pruning wound is properly made this process is materially hastened and the danger of wood rot organisms becoming established thereby lessened. Even though the wound is somewhat larger when close to and parallel with the trunk or branch, it will heal more quickly than the smaller wound made by cutting off this same branch an inch or more further out. A rough jagged wound heals slowly.

A wound covered with paint or some special pruning compound is less likely to become infected with wood rot or other parasitic organisms than one left entirely unprotected. This applies particularly to wounds one inch or more in diameter. Small wounds generally need not be painted while extremely large wounds should be kept covered until healing is complete. Ordinary paint, while often used, is not very satisfactory since it scales off readily. A paint containing asphalt will stick better since it contracts or expands with changes in air temperature. However, it must not contain creosote as a solvent or damage to the tree will result. Several pruning compounds or tree paints containing asphalt are on the market.

Pruning Tools.—The most useful pruning tools are the hand shear, the long-handled shear or lopper and the framed, swivel-bladed pruning saw. During the early years of the tree's life the hand shear is the only tool needed but

as the cuts increase in size the lopper and the saw will be found useful. Loppers are especially handy in removing water sprouts and in thinning out branches one inch or less in diameter. The swivel-bladed saw is preferred over the standard type because of the ease with which it can be used in a crotch of any angle. Such a saw becomes very useful when the trees are mature. A saw with a curved blade is also often quite convenient but will not fit into certain sharp crotches. The saw with the wide blade, however, is desirable in the removal of large branches. It is doubtful if the double-edge saw should ever be used in the orchard.

PRUNING THE PEAR

The pear is normally a vigorous grower with a very upright habit. Most varieties are quite susceptible to fire blight, especially if the tree is making a very vigorous vegetative growth. The union between the side branch and the main stem or trunk is quite strong regardless of the crotch angle and seldom does any splitting occur. The breakage of a branch at some distance from its base is quite common. Pruning practices must necessarily take these facts into consideration and will therefore, differ somewhat from those recommended for the apple.

At transplanting the pear tree should be given almost identical treatment to that described for the apple. During the next few years however, much less attention is given to the number and distribution of scaffold branches.

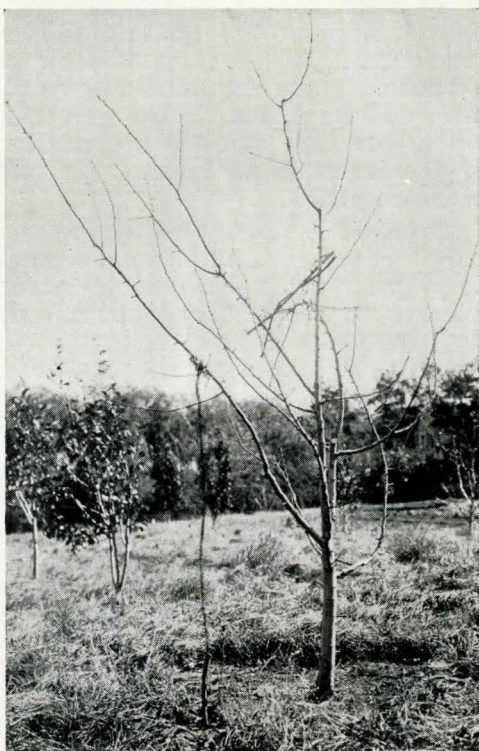


FIG. 6.—A young pear tree indicating methods of mechanical shaping. Branches may either be tied down or held in place by bracing.

A fairly large number of scaffold limbs are desirable so that the removal of one or two due to fire blight infection will not seriously reduce the fruiting surface of the tree. Some thinning out may be necessary in order to keep such branches from being too numerous. Only such heading should be done as is necessary to maintain proper balance between the various side branches and the leader.

On account of the willowy twig character and the upright growth habit it is almost impossible to induce spreading of a pear tree by pruning. However, this species lends itself very readily to mechanical spreading. This operation should be started during the third or fourth year. The scaffold limbs are pulled out and down to some extent and held in place by guy wires, tied to either stakes or weights. By the following year these branches will maintain their new position without the wires and attention then should be directed to other upright growing branches. This practice does not stimulate vegetative growth as does pruning—in fact it often induces earlier fruiting.

With the older pear tree about the only thing that needs to be done is to eliminate water sprouts annually and keep all spur growth from the trunk and bases of the main limbs. Both of these measures lessen the possibility of fire blight becoming established on the main framework of the tree. Broken branches should, of course, be cut back to a good side branch. In the case of very old pear trees, some thinning out may be desirable but care must be used or overstimulation with its danger from fire blight will result.

The dwarf pear tree has in recent years been attaining some popularity. Since it naturally makes a very short growth and comes into fruitfulness quite early, it usually will shape itself. Some thinning out may be necessary to keep the top from becoming too dense and to maintain good balance.

PRUNING THE SOUR CHERRY

It is more difficult to secure a cherry tree approaching the ideal orchard type than is the case with either apples or pears. It is practically impossible to maintain a leader for more than three feet because of the proportionately greater vigor of the side branches. The wood is brittle and splitting and breakage are common. Wounds are slow to heal, especially on weak growing trees. The dangers from sunscald and heart rot are considerably greater than

with the other species. Because of these defects the tree at best is relatively short-lived. Pruning to be at all effective in improving these conditions must be done during the early life of the tree.

Cherries survive the shock of transplanting less readily than most other tree fruits. Therefore pruning at this time assumes even greater importance than with the others. The typical cherry tree has numerous side limbs and a leader only slightly more vigorous than the upper branches. The common mistake made in pruning such a tree is to leave too many of these branches. Another is to leave the scaffold branches too close together with the result that the leader is soon choked out. A much better plan is to so prune the tree that the lowest branch, 18 inches above the ground, is on the southwest side; the next two branches with intervals approximating 6 inches should be on the southeast and northwest. All others are cut away. The northeast side of the tree should be left bare the first year in order to insure the proper development of the leader.

Cherry buds are large and are easily damaged by the handling incident to digging and packing the nursery tree. Consequently only those branches possessing a number of good buds should be selected for the scaffold limbs. After these buds begin growth is the proper time to do any heading back which may be necessary to further balance the tree.

During the next two or three years several additional scaffold branches are selected higher on the trunk, care being given to proper spacing. Usually the leader becomes one of these branches without any further attention. Some thinning will, of course, be needed and in some cases, overly vigorous branches will have to be repressed to keep them from crowding out desirable ones.

As the tree becomes older the small branches in the interior die because of shading. Pruning, after the early shaping has been accomplished, is largely a matter of removing dead or weakened branches, or branches which have become mutilated. Renovation pruning, such as that sometimes used with apples, has no place in cherry orchard management.

PRUNING THE PLUM

Plum varieties differ widely in habit of growth. On the one hand are the upright, sharp-angled sorts such as Waneta, and on the other the low-growing, sprawling sand

cherry type such as Sapa and Opata. Obviously no one type of pruning will apply in all cases. Practically all varieties have the characteristic of sprouting profusely after heavy pruning. This characteristic can be well utilized in the renovation of old trees. Furthermore, the habit of producing an appreciable number of fruit buds on one-year wood requires considerable heading back to prevent breakage. Also, pruning serves as a thinning operation with those varieties that tend to load up heavily.

Pruning practices recommended for young apples apply generally to young plums. More heading back is required, however, to keep the leader and scaffold branches in balance. Also water sprout growth is much more vigorous. These serve no useful purpose in the early life of the tree and should be removed before they injure the desirable branches. The southwest side of the tree should be protected by a low limb or some sunscald injury may occur.

As the tree grows older pruning is useful in preventing over-production and also in preserving the balance between the various parts of the tree. With still older trees pruning is primarily a renovation process. As the fruiting wood becomes weak, such parts are removed and water sprouts allowed to develop into fruiting wood to replace the parts removed. In this fashion the whole top of the plum tree can be replaced in a very short time.

Sand cherry hybrids, such as Sapa and Opata, require special treatment. Naturally these are of the bush type and no amount of pruning will develop them into a tree-like form. The branches grow at right angles to the stem and under heavy loads droop to the ground. Here they soon are shaded out by the younger parts. The older parts are therefore removed in favor of the younger more vigorous wood. Since these varieties produce fruit largely on one-year wood, considerable heading back and thinning is essential.

PRUNING THE PEACH

The peach is pruned more severely than any of the other tree fruits and should be pruned annually. Fruit buds are produced laterally on twigs of the current season's growth and hence considerable annual length growth is essential. To encourage such growth and also to provide proper light conditions throughout the tree top, are the principal functions of pruning. Proper selection of branches likewise assures a framework which will prevent excessive breakage from

heavy loads. The trees are headed low and then both heading back and thinning out are practiced.

At transplanting time, all side branches below 18 inches should be removed and all others cut back to stubs 2 to 3 inches long. The leader should be 3 to 3½ feet long.

After growth begins the shoots from the stubs should be thinned out so that a well balanced top similar to that previously described for the apple, is secured. The remaining branches, which will then make a stronger growth, are later thinned out still more until from five to seven scaffold branches are left. Strong growths are headed back sufficiently to allow equal development of these framework branches. Subsequent growth should be confined to these branches by cutting off any shoots arising from the main trunk. Some thinning out and heading back will also be required, the heading being mainly to outward growing branches.

Bearing trees are pruned usually after frost danger is past—the severity of the pruning depending upon the number of surviving buds. In case of heavy bloom, the removal of even half of the new growth (by thinning and heading back) may not be too severe since such cutting serves mainly as a thinning process. On the other hand if the bloom is light, pruning should be restricted largely to the removal of unproductive wood. If the buds have been entirely killed, heading back into two-year-old wood stimulates the production of vigorous fruiting wood for the next year and also brings the producing parts nearer the root system. In such heading back, the cuts should always be made to a vigorous side branch.

Neglected peach trees can sometimes be satisfactorily renewed by a process known as “dehorning”. In this instance cuts are made through wood several years old. If, however, trees have been weakened by borers or disease, such severe treatment may be fatal. On the other hand, a healthy tree responds to this cutting by producing numerous vigorous shoots or water sprouts. Proper attention to the thinning and heading of these will in a few years give almost an entirely new top to the tree. Needless to say, the crop will be sacrificed for two or three years.

The above suggestions apply more specifically to trees in the extreme southeastern corner of the state. In Ne-

braska generally so much bud killing and even wood killing occurs that little or no pruning beyond the removal of dead wood is necessary. In years when considerable winter killing has taken place the trees should be headed back severely or in extreme cases dehorned.

Distributed in furtherance of cooperative agricultural extension work. Acts of May 8, 1914, and June 30, 1914. Extension Service of The University of Nebraska Agricultural College and U. S. Department of Agriculture cooperating. W. H. Brokaw, Director of Agricultural Extension Service.

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