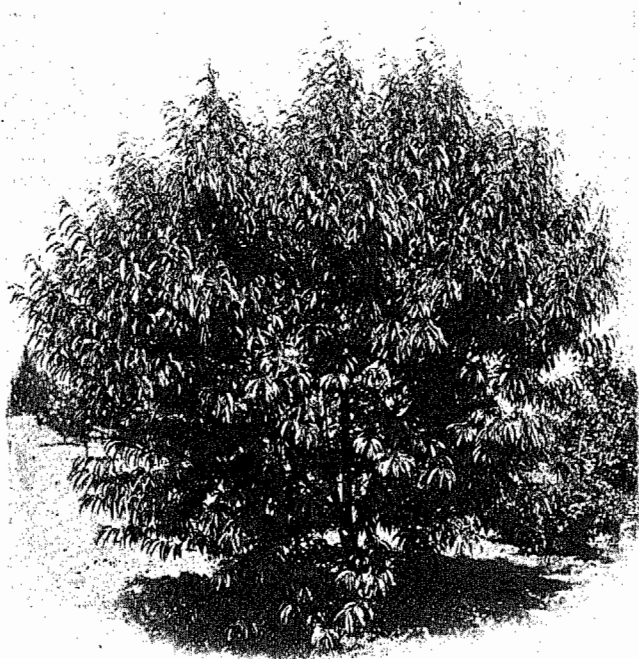


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A WELL-TRAINED PEACH TREE IN FULL LEAF
FIFTH YEAR FROM BUD

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TRAINING AND PRUNING FRUIT
TREES AND VINES

BY

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KNOXVILLE, TENNESSEE

THE AGRICULTURAL EXPERIMENT STATION

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TRAINING AND PRUNING FRUIT TREES AND VINES

INTRODUCTION

This bulletin has been prepared for the purpose of showing how to prune fruit trees and vines. With this object in view, a large part of the space is devoted to pictures, which, it is believed, tell better than words could the way to do the work. Many inquiries reach the Station on this subject, and the great number of neglected trees throughout the State attest the widespread need of information. To the experienced fruit grower, and especially to the commercial orchardist, the bulletin contains little that is new, but the amateur and the beginner may find help in it.



Fig. 1.

GENERAL CONSIDERATIONS

The method to be adopted in training a fruit tree depends upon its fruiting habit and the ideals of the trainer. Plants that bear their fruit on wood produced the previous year, like the peach, or on wood of the current year that shoots from one-year-old wood, like the grape and quince, can be much more severely pruned,

and pruned to a more open form, than such trees as the pear and apple, which produce fruit on spurs of several years' duration.

Pruning is the removal of shoots or branches. Usually it is done while the tree is dormant, but it may be done in the case of orchard trees at any season of the year. The best time is just before growth begins in the spring, or during the first month of the growing season; for at that time the wounds made begin at once to heal by the development of the growing layer between wood and bark. As that is a busy season it is seldom that the fruit grower can do his pruning then. In this climate the winters are mild and no danger is to be apprehended from freezing, and the work of pruning can therefore be done during any warm day throughout the winter. Scars made by cutting away large limbs should be painted as a precaution against decay of the heartwood, but branches of less than an inch in diameter are usually left untreated.



Fig. 2.

In the removal of a branch the cut should be made *parallel to the part which remains*. This will frequently make a larger wound, but the wound



Fig. 3.

will heal more perfectly and quickly, and no stub is left behind. Orchardists generally use pruning shears for branches of one inch and less in diameter. A very useful tool, especially for peach pruning, is the long-handled pruner—a shear with wooden handles about two feet long. It does not admit of as perfect work as a pruning saw, but the peach heals easily, and the work can be much more quickly done with shears than with saws. These shears can be bought of the seedsman for 75 cents per pair. For grape pruning there is nothing better than the German all-steel pruning shears, which cost from 75 cents to \$1.25 per pair, according to size. There are several forms of cheap shears on the market with which good work can be done, but if they are used it is well to buy at least

two pairs, as they are easily broken.

PRUNING VS. TRAINING

There is to be noted a considerable difference between *pruning* and *training*, the former word having the more restricted meaning. Pruning is the work of a single operation, or at most of a single year. Training is the work involved in bringing a tree or vine to its permanent form; it includes, therefore, several prunings, or as many operations as may be necessary to secure the desired form.

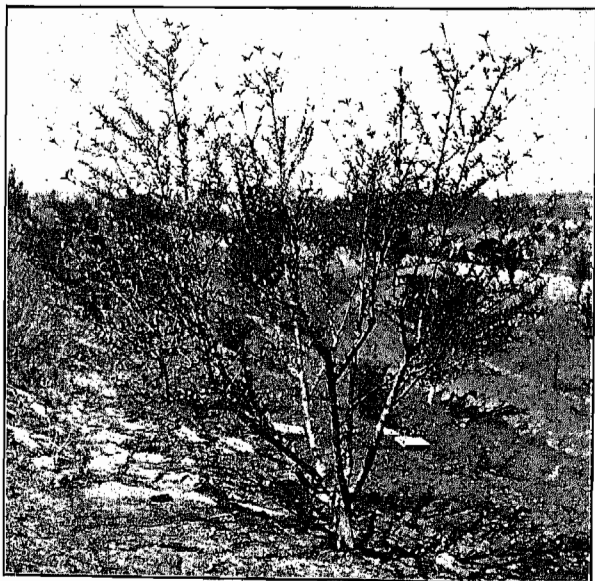


Fig. 4.

The training of an open-headed peach tree, for example, usually requires at least three years from the time it is set in orchard; its pruning is the



Fig. 5.

cutting done upon it at any one time. Unfortunately the two words have been used interchangeably, and this has given rise to some confusion.

Whatever system of training may be decided upon, the object of the grower is always to put the fruit into the best relation to light, so that it shall be full-sized, full-colored, full-flavored. At the same time the strength of the tree and its symmetry are determined by its training. One may have the best possible distribution of light, and yet badly

forked main limbs may make the tree too weak to carry the load of a full fruit crop. And one may have good forks and perfect light adjustment, and the crown may be so one-sided as almost surely to indicate a short life for the tree. These facts suggest the importance of at least an annual pruning from the time the orchard is set; for in all fruit trees the main limbs determine the shape of the tree, and these are formed during the first few years of the orchard's life. If they are carefully spaced in the circumference of the crown, and



Fig. 6.

along the stem, and if they make a perfect union with the trunk, a perfect skeleton is secured on which to build the framework of fruiting branches. Subsequent thinnings will be necessary to obviate the struggle among the branches for light that every tree crown witnesses, so that even in mature fruiting trees the annual pruning may not be safely abandoned.

The grape, peach and quince bear their fruit on one-year-old wood, or on shoots from one-year-old wood, and therefore not only may they be pruned severely, but they admit of more precise training than do the spur-fruits. Both the grape and the peach are apt to overbear, and this fault is largely prevented by heavy pruning, the removal of much of the fruiting wood being practically a thinning of the crop.

Fruiting is an exhaustive process to the tree. The biennial fruiting habit of the apple is largely due to the fact that to produce a heavy crop

requires all the tree's energy, and it has not strength enough while maturing a fruit crop to form fruit buds for the following season. The entire summer is required to make a fruit bud. Hardly have the petals fallen from the cherry and plum trees before the making of the buds for the following year



Fig. 7.

begins; hence, the great importance of keeping the trees always in vigorous condition.

THE PEACH

At the Experiment Station a few blanks in the peach orchard were filled with one-year-old trees this spring. Their pruning is shown in Figs. 1 and 2. The nurseryman endeavors to make his trees as large as possible, size being to the purchaser a sure indication of vigor. But the tree shown in Fig. 1 is too high and is badly forked. Its crown is therefore entirely cut away, and buds along the stem have since developed into shoots that will give a skeleton similar to that of Fig. 3, which picture was taken April 19, and shows the way to make an open-headed tree.

Often a one-year-old peach will make as many as a dozen shoots its first year in orchard, when pruned as shown in Fig. 2. The trunk is made short by pruning—18 inches is ample height. During the first winter the training of the peach tree begins; and notwithstanding the fact that the young trees will each have made many shoots, hardly one in a hundred will have placed them in an ideal position, and the grower can therefore only approximate his ideal. For the peach tree his ideal skeleton may be an inverted tripod, and a very good form it is; but that implies three branches equally distant from one another in the circumference of the crown; a condition rarely met with, though frequently approximated. Each tree will be a separate and distinct problem, and the wise grower will recognize at the outset that individuality is a characteristic of plants, as of men. It will often be best to select four limbs for the skeleton, and occasionally



Fig. 8.

even more than four will be retained. The basis of selection is always the same—that the branches saved to the tree shall be of as nearly equal distance from one another in the circumference of the crown as possible, and that each have a strong union with the trunk. Avoid forks that will split, which are usually forks that form a narrow angle. All the lateral shoots may be cut away the first winter, leaving only the bare skeleton, as was the case with Fig. 3.

The new growth will be the more vigorous for this heavy pruning, and will be disposed all along each arm, giving a wide range of choice in the saving of branches the second winter. Each of the limbs saved is cut back to a length of from 24 to 30 inches. In Fig. 3 two of the three branches shown grew over six feet long, and each was clothed with many shoots. It seemed very severe pruning, but the tree is the better for the heavy surgery. The second winter two or three shoots are left to each limb, being spaced as wide as possible, and each shoot is headed back from one-half to two-thirds. The pruning for the fourth year is shown in Fig. 4, a tree which originally had four main branches and whose annual prunings may be easily seen. Last winter the main shoots were cut back from 12 to 18 inches, and the tree as shown was set very full of fruit when the photo-



Fig. 9.

graph was taken (April 14). The same tree is shown in Fig. 5, when 15 days older. Figs. 7 and 8, and 9 and 10, also illustrate mature trees that set their first full crop of fruit this spring. A careful study of these pictures will show that the tree has been trained to its present open form

by annual pruning, in which many branches were entirely removed and those retained were heavily cut back.

On April 20 there occurred a freeze, fortunately very local in extent, which entirely destroyed the peach crop in the vicinity of Knoxville. This misfortune gave an opportunity to head in the peach trees, bringing their fruiting wood nearer the ground and renewing the crown, as grapevines are renewed. Figs. 5, 7 and 9 show that the early leaves had reached full size when the work was done, and Figs. 6, 8 and 10 give an idea of the severity of the pruning, which is also indicated in Fig. 11. In Fig. 6 the cut was made in two- and three-year-old wood, while in Fig. 10 the pruning

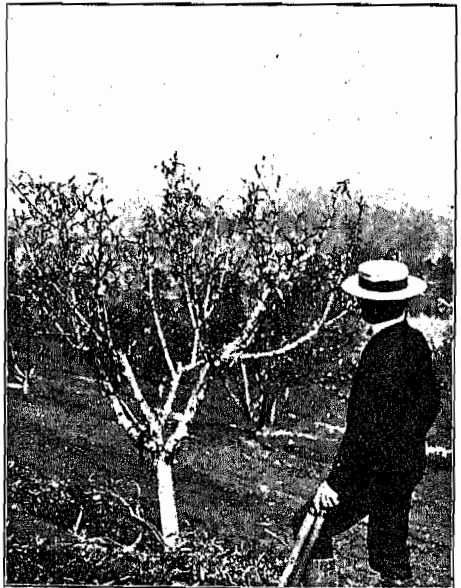


Fig. 10.

was less severe, and Fig. 8 is midway between these two. That the trees have not been harmed, even in the case of the heaviest cutting, may be seen in Fig. 12, which is the same tree shown in Figs. 4, 5 and 6, the photograph reproduced in Fig. 12 having been taken June 10, 40 days after the pruning.

Since the fruit of the peach is borne on one-year-old wood, no crop is lost by heading in a tree after its crop is destroyed by a late spring freeze. The new growth produces fruit buds exactly the same as if the tree had not been headed in. The vigorous shoots which follow severe pruning will usually be less fruitful than the new wood under usual conditions, but enough buds will form to give a good crop.

The advantage of the method is manifest. Even with the close pruning practiced yearly in the experiment orchard, five-year-old peach trees



Fig. 11.

are now from 12 to 15 feet high. The trees that were cut back in April were from 5 to 7 feet high when pruned. On the unpruned trees the fruiting wood is thus in some cases 15 feet and more from the ground, making tall ladders necessary in picking, while in the pruned trees next year's crop may be largely gathered from the ground. The short, heavy growth that results from annual pruning is much stronger, better able to carry a full crop of fruit, and less liable to split in the forks, than unpruned or lightly pruned trees. The practice in the experiment orchard is severe annual pruning, and in addition a heavy cutting back in years when the crop is destroyed by late frosts; and the healthfulness and vigor of the trees warrant the practice.

THE APPLE

In training the apple the object in view is to bring as many small permanent fruiting branches, called spurs, into favorable relation to light as possible. There is the same need for a good skeleton as in the peach, and it is equally important, if not more so, to preserve the symmetry of the crown; but the ultimate purpose is to have all the main limbs supporting as many spurs on their several branches as can be given light and room. An ideal apple tree would be so open that when it is in full leaf

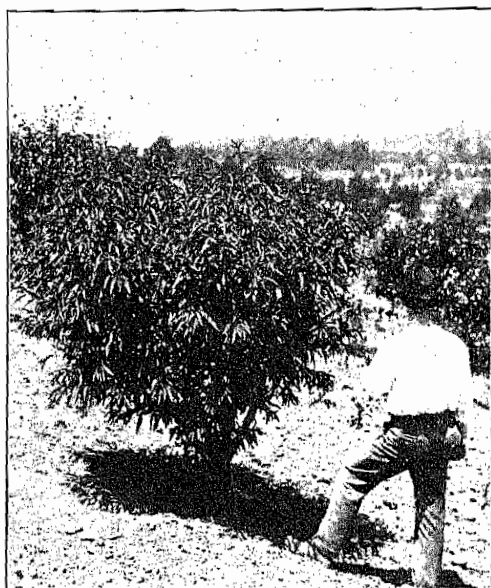


Fig. 12.

the shadow made by its crown would be dotted everywhere with sunshine—light and shade alternating like the squares on a checkerboard. Under such circumstances the fruit spurs on the lower inner branches

would yield fruit of almost as nearly perfect color as those in the top of the tree. But there is danger of sun scald when the crown is too open, so that this ideal condition is only approximated in practice.

Fig. 13 is the picture of a Yates apple tree about a month after it was set in the orchard. It was a vigorous one-year-old, about 4 feet high without branches, and it was cut off 30 inches above ground after planting. It will



Fig. 13.

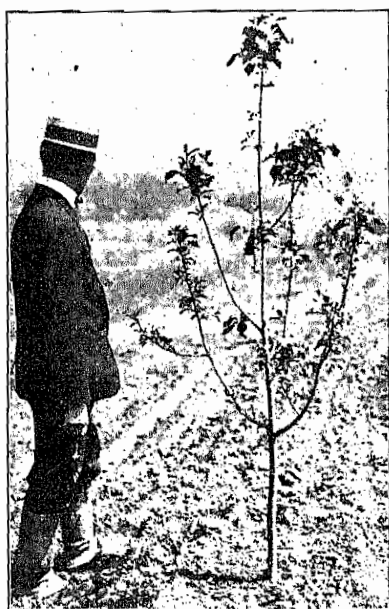


Fig. 14.

be observed that the topmost buds are making the strongest shoots, and this is usual with the apple. Two methods of training may be followed. The tree may be trained to an open head, similar to those of the peach trees illustrated, or it may be trained to a central stem, as shown in Fig. 14. This tree is just beginning its third year in the experiment orchard. Observe that its branches are well distributed along the central stem and in the circumference of the crown, insuring a well-balanced crown and plenty of room for each limb to develop a system of branches. The apple tree in old age comes finally to a rounded or flattish crown, but in youth many

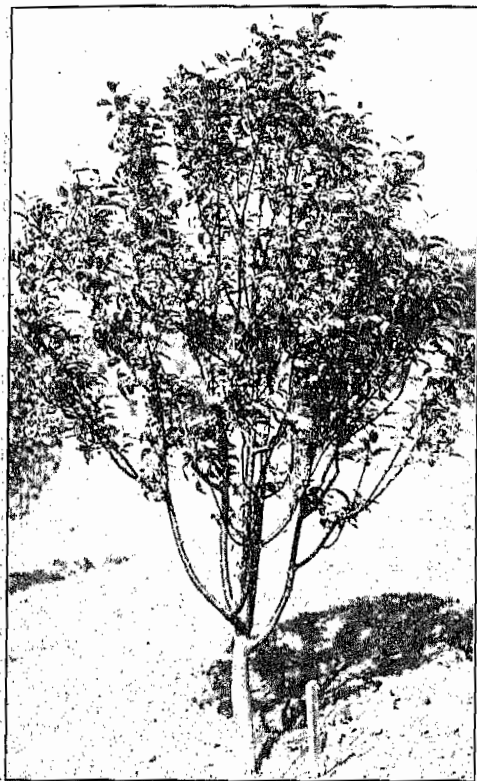


Fig. 15.

varieties are erect in habit, as shown in Fig. 15, and others are of spreading form, like Figs. 16 and 18. The erect grower in its annual pruning should have the greater part of the one-year-old wood cut out, leaving such branches as point outward, in order to secure a more open head. The spreading growers, on the contrary, must be headed back, with a view to making a closer crown than they would normally form. Vigorous young apple trees will make from two to four feet of new growth per year on all the leading branches. If the new wood matures well the terminal bud will make the strongest shoot the following spring, and the buds immediately below it will form good shoots also, leaving a

long stretch of bare branch below them. The unpruned limb is thus too tall and slender to hold up its branches, and breaking or bending, with consequent lack of symmetry, follows.

Each year, from planting until a good crop is produced, the new growth on the apple tree should be thinned out and cut back, so that the tree when old enough to bear is stocky, strong, comparatively short-branched, and symmetrical. In vigorous young trees the new shoots may be headed back from one-third to two-thirds their length, and fully half the shoots

made will often be entirely cut away. No rule can be given. Each tree is to be studied, and the grower should endeavor to make the best possible fruiting machine of every tree in his orchard. He can not do this if he predetermines the exact shape of all his trees. He may waste much time and energy in developing a central stem in an apple tree that wants to form an open head, and the result will never justify the effort. Make of each tree the best form possible in that tree. Help the tree in its development and it will give best returns.



Fig. 16.

The apple, like the peach, does not suffer from late spring pruning. In the annual pruning of the orchard, which was done during the warm days of March, a Jonathan apple was overlooked, and on May 10 it was in full leaf, as shown in Fig. 17. There were many cross branches in its crown, and the leaders showed bare below their points of new growth. The pruning necessitated much cutting away of small branches, and a few limbs that were no longer useful were removed, so that the ground was quite

covered with wood cut out, as shown in Fig. 18; but the tree has grown vigorously and is the equal of any of its winter-pruned fellows.

The experiment orchard was set in the spring of 1900; the apple trees were two years old when planted, and several trees, among them those pictured in Figs. 14, 15 and 16, gave their first bloom this spring.

THE QUINCE, PEAR, PLUM AND CHERRY

The quince is but little grown in Tennessee, but every orchard should contain a few trees. It is best trained to an open crown, as shown in

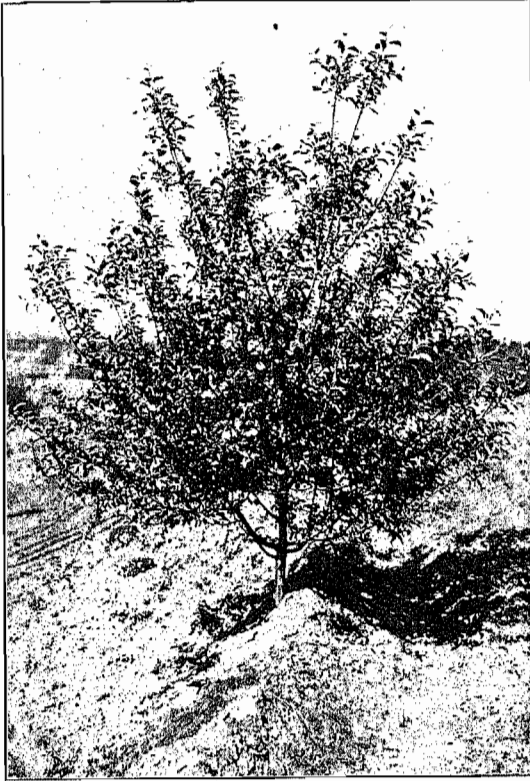


Fig. 17.

Fig. 19, and in the annual pruning the strong new shoots should be headed back about half their length. The quince is a very erratic grower. Oftentimes a new shoot will grow directly through the crown, rubbing against a half dozen limbs. To correct such evils and to maintain symmetry require the watchful care of the grower.

The training of the pear is very similar to that of the apple. Very few pears are spreading in habit, the great majority of them being very erect, like the Keiffer, or of pyramidal form, like the Seckel. The Keiffer requires heavy annual pruning until a big crop

checks its great growth. In the experiment orchard the new growth is headed back from one-third to two-thirds its length, and the topmost bud after pruning always points outward. More than half the new shoots are entirely cut away. Even with this severe pruning the crowns seem very thick. One heavy crop, however, bends all the main limbs outward, and the question of light distribution is thus quickly settled. Dwarf pears require very little pruning, a slight thinning out each year being all that is necessary.

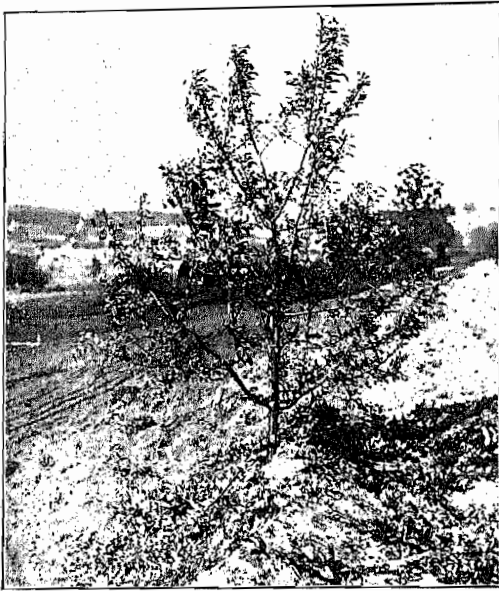


Fig. 18.

The plum and the sour cherries produce fruit on spurs and on new wood, and their training is comparatively simple. The heavy crops of the plum bend their branches outward, and if during the first four years a good skeleton has been formed, whether to central stem or open head, little pruning will be necessary thereafter save to maintain symmetry and to prevent rubbing by crossed branches. Many of the European varieties of plum make long shoots during youth, and these are best cut back so as to

insure a strong limb, able to bear heavy loads when the tree comes into fruiting. The

Japanese plums resemble the peach in their habit of growth and are apt to form an open head with little training. The American plum, of which the Wild Goose is the best-known variety, are like the sour cherries in their tendency to bushiness. Both cherry and plum can be safely left with a thicker crown than almost any other fruit tree; but it is well while they are young to see that their main

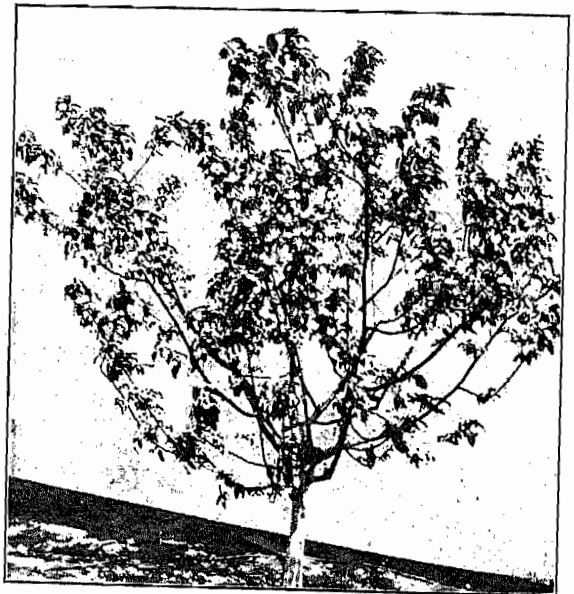


Fig. 19.

limbs are placed well apart, and it is necessary every year to cut out much of the small growth, or crossed branches will be formed that will necessitate heavy surgery later on. The sweet cherries make comparatively few branches, and their training consists principally in heading back the long terminal shoots each year, to make a more compact head than would otherwise be formed.

THE GRAPE

No other fruit lends itself so readily to the pruner's art as the grape, and many well established systems of training have been developed. The simplest of these is the long-arm short-spur system (Fig. 20), and this is the most commonly used. The experiment vineyard is only four years old from cuttings, and the spurs in Fig. 20 were made in the annual pruning last winter. The grape pictures in this bulletin were all made from photographs taken April 19, and all are of Lindley vines. In Fig. 20 the new growth is seen to be from short spurs. In the pruning, which was done in February, all the new growth was cut back, leaving not more than two buds to the spur, and about half the shoots were cut out entirely, so that the spurs are about 10 inches apart on the main canes. In the plant photographed many new shoots formed between spurs, and these should all be rubbed



Fig. 20.

off. The pruning of this vine hereafter will be to cut off the outer shoot on each spur, and reduce the inner shoot to a length of not more than two buds. In very old vines pruned to this system the spurs gradually become long and crooked, and the new growth is weak. To avoid this, care should be taken of the shoots that appear on the main cane from year to year, as these can always be substituted for weak spurs.

The new growth which bears the fruit is tied to the trellis, and may be pinched repeatedly during the summer if large berries are desired. At least three leaves should be allowed to form beyond the outermost bunch before pinching the fruiting cane, and the same law applies to lateral shoots.

In the horizontal cordon system (Fig. 21) the two main canes of the spur system are tied to the lowest wire of the trellis and the new growth is trained up, the shoots being tied as needed to the upper wires. This is a very ornamental system of training and one of the best for small gardens. Careful attention to pinching during the summer

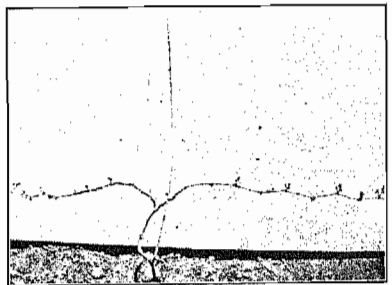


Fig. 21.

is important, as when the shoots are left unchecked they grow far beyond bounds. Three pinchings during the growing season will usually be sufficient to confine the new growth within reasonable space. The winter pruning is exactly the same as in the long-arm short-spur system. Cut off

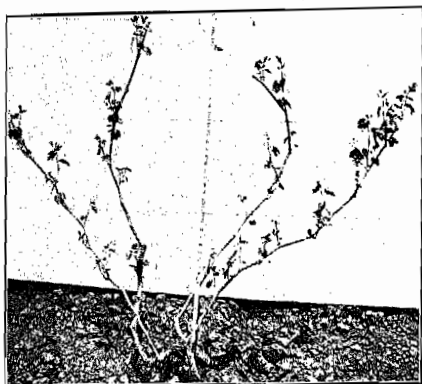


Fig. 22.

the outermost shoot where two shoots have grown from a spur, and cut back the base shoot to two buds, thus forming the spur for the following year.

The renewal system of training (Fig. 22) is especially adapted to regions where winter protection is necessary for the grape. It consists of four long canes of new wood, taken from as near the ground as possible, each cane having from eight to twelve buds. During the summer four of the lowest shoots that

form on the vine are especially encouraged so that they may make a good growth and become the fruiting canes for the next year. In the winter the entire vine, except these four canes, is cut away, and the four canes are headed back to the desired length, with all laterals removed.

The Kniffin system of training is very popular with grape growers, as it requires the simplest form of trellis—a single high wire—and gives very satisfactory results. The main cane is carried without branches to a wire strung from 4 to 6 feet from the ground. As a rule this main cane can be secured the second year after planting in the vineyard. The third year the two topmost buds are allowed to grow, and if the other buds are rubbed off these two will make very strong canes during the season; though it is not necessary to rub out the lower buds, as the topmost shoots have the best chance.

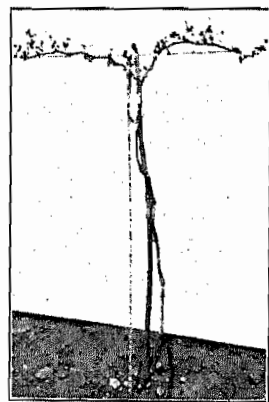


Fig. 23.

In the winter pruning the new canes are headed in, leaving from four to ten buds on each, according to strength. Each of these buds will produce a fruiting shoot (Fig. 23), and as the season progresses these shoots droop by their own weight, checking wood growth and thereby increasing the size of the fruit. The base shoot on each cane should be especially encouraged, as it is to form the fruiting cane for the next year. It will sometimes be necessary to train this base shoot to the wire to secure a strong growth. In the annual pruning all the vine beyond the two base

shoots is cut away, and each of these shoots is headed back as before. Occasionally a base shoot will fail to grow, and in such cases the shoot nearest the base is retained for the bearing cane. This system is one of the simplest, the pruning is quickly done, and the high wire makes cultivation easy.

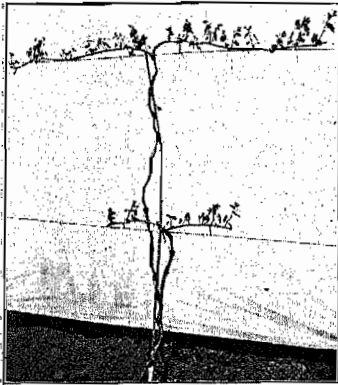


Fig. 24.

In the double Kniffin (Fig. 24) two wires are used, with a main cane to each wire, or two sets of arms may be grown from the main vine. The lower arms are shorter than the upper; otherwise the pruning is exactly the same as in the single Kniffin system. Where high quality is not essential the double Kniffin may be preferred, especially in strong soil, as it yields somewhat larger crops; but the fruit on the lower cane seldom equals that on the upper in appearance or quality.

The Munson system of training (Fig. 25) is considered an improvement on the Kniffin. Two side wires, somewhat higher than the supporting wire, are arranged by fastening plates crosswise on the posts and attaching the side wires at the ends of the plates, from 12 to 15 inches from the supporting wire. The new growth is supported by these side wires, the danger being avoided of breaking the fruiting shoots, which occasionally happens in the Kniffin system. The annual pruning may be that of the Kniffin, or the horizontal cordon, according to preference.

Whatever system of training the grape is adopted, the pruning should be done while the vines are dormant, during the months of December, January and February. It will occasionally happen that unusual warm weather will cause the buds to swell even during the winter months; and bleeding follows pruning after growth begins. Contrary to general belief, grapevines very seldom bleed to death, but it is easy to avoid the loss of vitality by pruning while the vines are quite dormant.

It will often happen, especially in weak growers, like Delaware, that the stem joints are so close as to make spurs crowded on the arms. It is best in such cases to rub off the extra buds at the time of pruning, or else to wait until the new growth is two or three inches long. Either plan avoids bleeding.

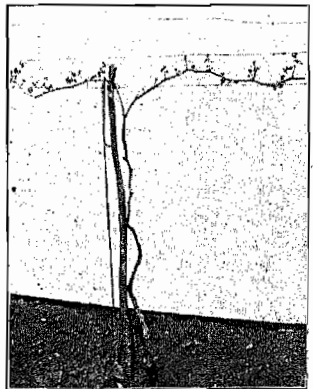


Fig. 25.

In seasons favorable to growth the vines will make a great deal of wood and heavy foliage will so shade the fruit as to prevent full color and

flavor in the ripened fruit. In such cases, especially where spur systems of training are practiced, most of the leaves on the side of the vines toward the morning sun may be removed when the fruit begins to color. The fruit should be shaded from the afternoon sun, which is so intense as sometimes to burn the skin of the grape. No other protection than the foliage need be given.

In the Kniffin and Munson systems it will not infrequently happen that the new shoots will attach themselves to the wires, instead of drooping from them. For best results this should be prevented, and the removal of the tendrils from the first six or eight joints that are formed will be all that is necessary. This will be worth while only when the choicest fruit is desired.

The trellis is important. It should be very strong, for the vine in full fruit weighs heavily upon it. The best fence posts, set 16 feet apart, and well-braced at the ends of the rows, should be used, with strong fence wire.

THINNING THE CROP

Thinning is a very valuable form of pruning, since by this means not only is larger fruit secured, but the vitality of the plant is insured, and more regular crops should result. Young vines have a tendency to overbear, and not infrequently a vineyard is very much injured from this cause. A vine should not be allowed to bear more than a single bunch of grapes its third year, and if this rule is followed it should be strong enough for a full crop the fourth year. In many varieties three or four bunches set on each shoot. Where only the best fruit is wanted two bunches should be selected on each shoot when the berries are first formed and the others cut away.

If the berries are very thick in the cluster the quality and appearance will be greatly improved if from one-third to one-half the berries are cut out. This is work for the amateur gardener, and is rarely profitable, of course, in commercial grape growing.

The peach crop may be thinned by the commercial orchardist, since competition is so great. For profitable results the peach must be thinned before the stone hardens, and 9 inches apart has yielded the largest increase in size, compared with unthinned fruit of the same variety.

There is always more or less danger of a late frost, and this must be considered in connection with thinning operations. After all danger of frost is past there remains but a very short time in which the work can be profitably done. Generally speaking, the thinning of peaches should be completed before the fruit is one-third grown. If the work is begun when the fruit is no larger than a filbert a large force of workers would be needed to thin a full stand in an orchard of forty acres in order to get through in time for best results. This necessitates a heavy outlay at a time when the crop has yet to pass through the dangers of rot, drought, and other troubles, so that very few commercial growers have adopted thinning as a regular practice.

The home fruit grower may well experiment with it. He will find that in a well-trained five-year-old peach tree from two to five hours will

be required for the work of thinning, and to space the fruits 9 inches apart he will remove something over three-fourths of the crop in a full stand. With experience the work is done more quickly, and boys and girls are usually employed to do it. When done early the fruit is much larger, colors better, and is in every way more valuable. The draft on the tree is very much less, so that annual bearing may be expected, and it is the general observation that rot is less common where thinning is habitually practiced.

The apple and pear are quite as much benefited by thinning as the peach, but the apple crop is seldom thinned. It will pay the home grower to thin the apple crop severely, because the tree can be made to produce regular annual crops by this means, instead of the biennial crops which are ordinarily the best that can be expected of it.

SKILL COMES WITH PRACTICE

In all the operations of training and pruning, practice guided by forethought is the best teacher. The horticultural literature contains elaborate instructions for the making of ideal fruit trees, and one sees in European gardens wonderful examples of the trainer's art. The American climate does not favor the espalier training of the European gardener, but neither does it necessitate the entire neglect of trees which is common with us.

When an orchard is trained by pruning the operations of any single year are simple enough; but even in the early stages of growth individual trees develop peculiarities that require careful study before the knife is applied. A safe general rule is to pass through the orchard two or three times, cutting out only such parts the first round as are plainly in need of removal. By the time the first round is completed one will have learned much, and can attack the more difficult problems on the second going over with greater assurance.

THE PRUNING OF NEGLECTED TREES

One of the surest means of stimulating old and neglected trees is by pruning. There are many trees in which the number of dead and dying limbs equals the number of living ones—every one endeavoring to prune itself. Natural pruning is a slow process at best, for the useless branch must first be killed by the competition with its fellows for light and food, and then must be pinched off by the slow growth of new wood around its base. And during the years that are occupied thus insects and diseases find the weakening member very vulnerable, gaining here a foothold against the healthy parts of the tree. The removal of a branch by saw or pruning knife is the work of a moment, and prevents a great waste of energy. It is true that a wise forethought would have anticipated the necessity of cutting out large branches, by the annual removal of such as were evidently making the crown too thick. The several branches which form the crown of a fruit tree are competitors for light and room, just as are the many trees that make a forest. In the forest the trees which for any reason have an advantage over their fellows, as by more rapid growth, or greater vigor, or shade endurance, will ultimately gain the ascendancy over the others and shade them to death. So in the fruit tree, certain branches having the

advantage of position or strength, overcome others. Neglect a tree a few years, and the shaded limbs will be dead, and the lower branches of the living limbs will be greatly weakened. For light is the energy by which the crown of the tree is developed. Obscure the light, and the leaves can do no work, so their supporting branch dies. Compare the size and color of apple leaves of the lower and inner branches with those of the upper and outer branches. Vigor is largely a question of light supply.

Such observations suggest the proper method of pruning neglected trees. First of all, cut out a portion of the crown so that light may be freely admitted. Naturally the branches removed will be the weaker ones, or those which by rubbing or by weak union with the supporting member threaten the vigor of the tree. In determining what limbs to prune out one must keep in mind the symmetry of the crown; and as a usual thing it is better to remove many small branches than a few large ones, for the latter practice not only mars the symmetry of the tree but admits the light in great masses, threatening sun scald of the main limbs.