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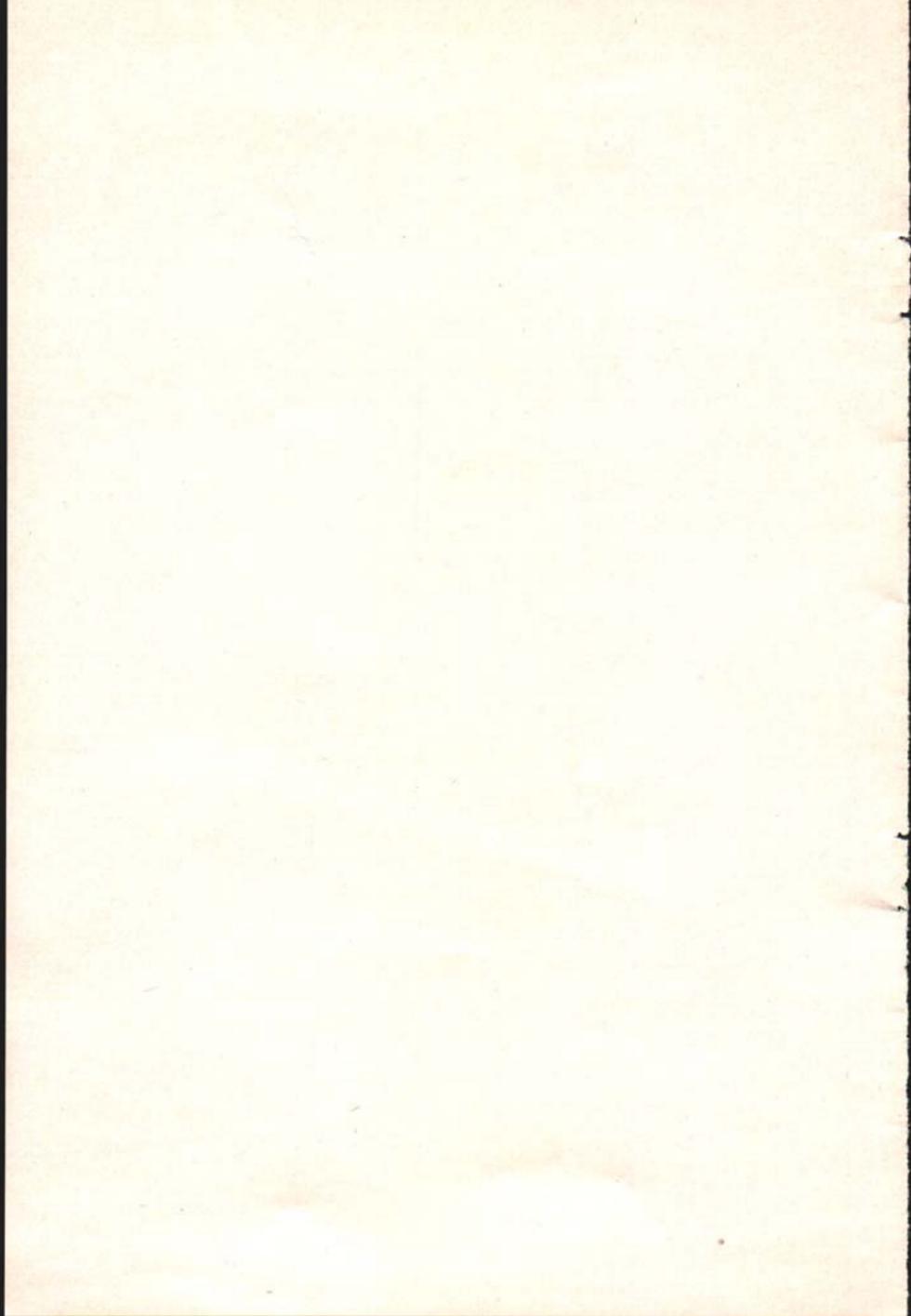
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# PRUNING GRAPES IN MICHIGAN

**Michigan State University**  
Cooperative Extension Service  
East Lansing



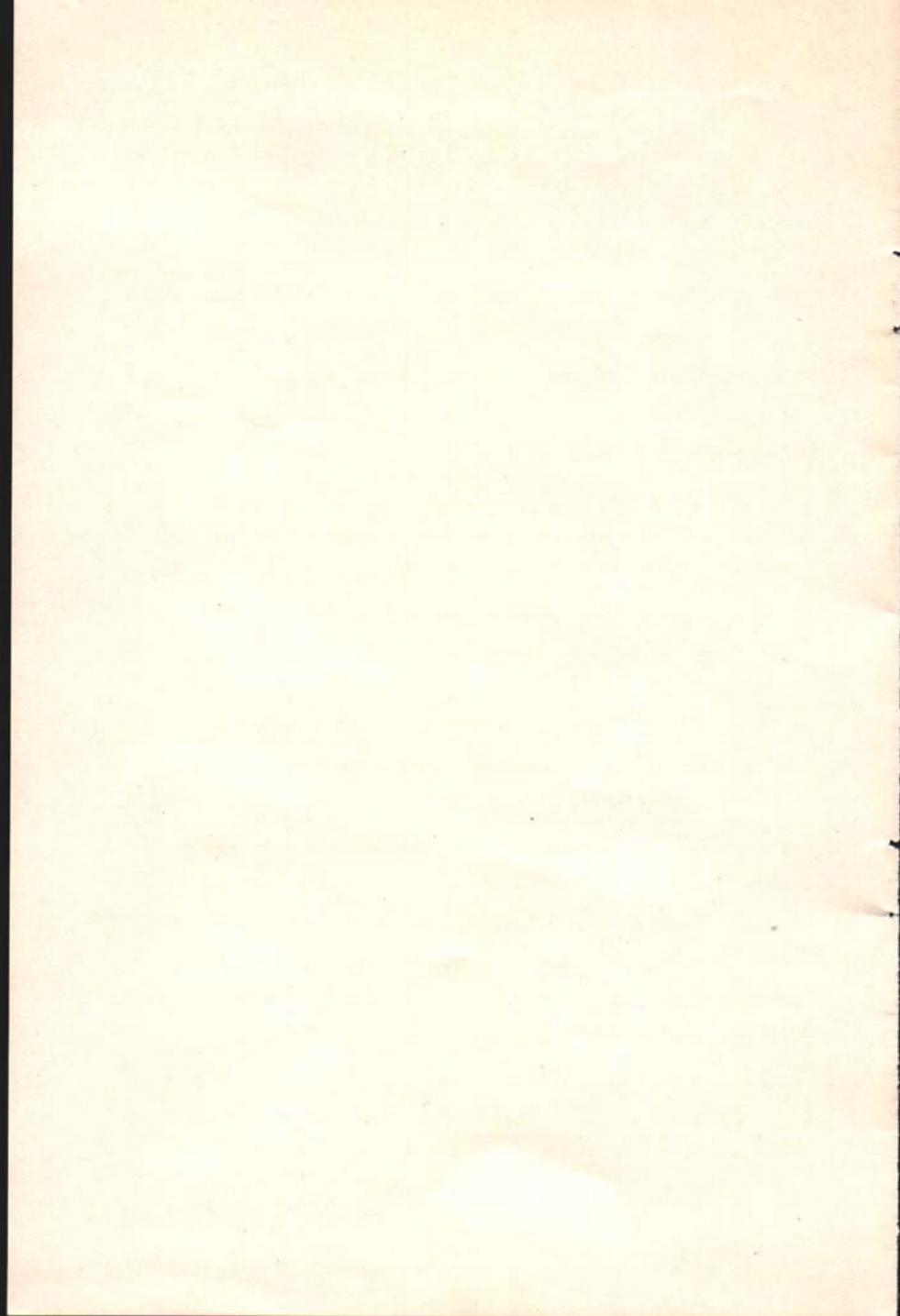


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# Pruning Grapes in Michigan

By R. P. Larsen<sup>1</sup>, H. K. Bell<sup>2</sup>, and Jerry Mandigo<sup>3</sup>

## WHY PRUNE GRAPES?

Pruning has a greater effect on grape production than any other practice. Proper pruning of grapes gives you good vine vigor and high annual yields of top quality fruit. It can actually mean the difference between high yields with a profit, or medium yields with little or no profit.

Many years of experience and research show that Michigan grapes (mainly the Concord variety) need good pruning each year for high fruit yields.

## FRUITING HABIT OF THE GRAPE

To prune grapes properly, you should know certain facts about their fruiting habits.

Grape clusters grow near the base of leafy shoots of this season's growth. These shoots rise from buds on the woody canes of the last season's growth. (See Fig. 1.) After the leaves drop in the fall, the

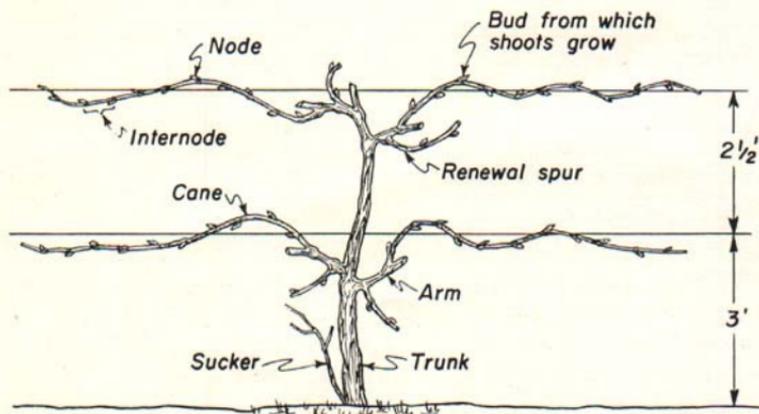


Fig. 1. These are the major parts of a dormant vine. It has been pruned to the four-arm Kniffin system.

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shoots are called canes; they carry the buds for next season's shoots and grape clusters.

### PARTS OF A VINE

*Trunk*—the main body or stem of the vine.

*Arm*—main branches or extensions from the trunk.

*Cane*—dormant shoot grown the past season.

*Shoot*—present season's growth containing leaves and fruit clusters.

*Laterals*—the side branches of a shoot or cane.

*Renewal spur*—a cane cut back to a stub of one or two buds to produce next year's fruiting canes at a desirable location on or near the trunk.

*Nodes*—the joints on shoots or canes where leaves or buds are attached.

*Internodes*—the part of the shoot or cane between the nodes.

*Suckers*—shoots arising from below the ground or near the base of the trunk.

### GRAPE CROP DEPENDS ON VINE VIGOR

The crop produced next year depends on the vigor of the vines' growth this year. In general, the more cane growth that a vine produces this year, the larger the potential yield of fruit next year. Likewise, in any year, the larger the fruit crop, the smaller the amount of growth. Too little pruning causes a heavy crop this year and too little wood for next year. Too much pruning causes a small crop this year with too much wood for next year.

### SELECTION OF FRUITING WOOD OF CONCORD GRAPES

The characteristics of fruiting canes directly affect the yield of a grapevine. Since most Michigan grapes are Concord, they will be discussed first.

A productive Concord grape cane has these features:

1. It starts on or near the trunk.
2. It has nearly the same thickness at the tenth bud as at the fifth.
3. It is about as thick as a lead pencil ( $\frac{1}{4}$  inch) between the fifth and sixth buds; the distance between these buds is 5 to 8 inches.

Canes with longer spaces between buds are better than those with shorter spaces which taper rapidly in width.

If you were to judge a cane by only one feature, width is the most important.

### LOCATION OF FRUITFUL BUDS ON THE CANE

In general, the buds in the middle of an unpruned cane produce more than those near the base or the tip. The first two or three buds from the base of year-old canes are relatively unfruitful. The fourth through the ninth or tenth are usually the most fruitful (Fig. 2). On canes having the best type of wood, the buds are often fruitful out to the fourteenth or fifteenth bud. Such long canes can be trained very well to the umbrella system (see page 12).

Amount of fruit declines toward the tip faster on thin canes than on those at least  $\frac{1}{4}$  inch thick. Thus, if thin canes must be saved for fruiting, prune them shorter (that is, to a smaller number of buds) than thick canes. (See *Pruning "Bull" Wood*, page 12).

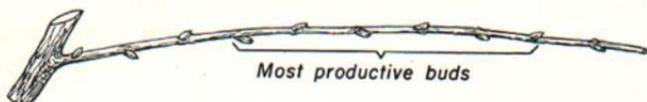


Fig. 2. The shoots which will produce the most fruit on Concord vines usually grow from the fourth to the ninth buds.

### WHEN TO PRUNE

You can prune grapes any time during the dormant season. Pruned vines, however, are injured worse than unpruned vines during very cold weather. It is best to wait until late winter or spring to prune grapes, since there is less danger of cold damage. To finish the job, many growers with large acreages must start pruning after leaves drop in late fall or early winter. In very cold weather, take extra care to avoid breaking canes.

Canes pruned in the spring may "bleed" some, but this "bleeding" of sap has not been found harmful. Finish pruning and tying before buds begin to swell, as they are easily injured then.

Avoid summer pruning (other than removal of suckers). It reduces the leaf surface needed to make food for the vine and its fruit.

### PRUNING TOOLS NEEDED

To prune grapevines, you will need a pair of hand shears (snap cut type are better than the shearing type) and a curved saw with a single cutting edge. Keep your tools well sharpened.

### BALANCED PRUNING

Now that you know about the best wood for fruit production, you must decide how many buds to leave for next summer's crop. This is the most important decision in grape pruning. It will have the greatest influence on the vines' capacity to produce not only a full crop of grapes, but also enough good wood for the next crop.

Remember, the crop produced by a vine this year depends on the vigor of its growth last year. In other words, the amount of growth a vine makes in any year determines how much fruit it can carry the following year. Thus, we know how many buds to leave on a grapevine simply by observing the amount of wood produced last year. We call this "balanced pruning."

Yield increases from a quarter ton to more than 2 tons per acre of Concord grapes have resulted when growers have switched from "unbalanced" to "balanced" pruning. This method was developed in Michigan more than 25 years ago by N. L. Partridge of Michigan State University. It has been used and proved by many growers since then.

The weight of year-old wood removed is the key to balanced pruning. Weigh 1-year prunings from each of several vines. In vineyards of commercial size, don't bother to weigh prunings from every vine. Experienced pruners make fairly accurate estimates of weight after half a day's actual weighing of the brush. Most pruners, however, find it pays to weigh prunings from a few vines once in a while and from day to day to "sharpen" their estimates.

The number of buds left on each vine is related to the weight of 1-year-old wood removed from the vine (Table 1).

*Table 1—Number of buds to leave on Concord grape vines in relation to 1-year-old pruning wood.*

Weight of 1-year prunings	Number of buds to leave for fruiting
Less than 1 pound	Less than 30
1 pound	30
2 pounds	40
3 pounds	50
4 pounds	60
5 pounds	70
6 pounds	80
More than 6 pounds	80 plus

Take a small spring balance, such as a feed scale with a string or metal scoop attached, with you into the vineyard. As you approach a vine, estimate the weight of 1-year-old wood on it. If you estimated 3 pounds, then you would prune the vine to about 50 to 60 buds before weighing. Then, weigh the 1-year-old prunings. If they weigh 2½ pounds, reduce the bud number to 45; if they weigh 3 pounds, the vine should carry 50 buds. After a few hours of pruning, estimating, and weighing, you should become quite accurate in your estimates and be able to work without weighing the prunings from each vine.

### LOCATION OF CANES ON THE VINE

It is often best to choose canes starting close to the main trunk. By doing this, you are able to keep each vine from spreading out and mixing with the next vine. The crop will be carried close to the trunk and the vine will not be building up several years' growth of old, unproductive wood.

However, a good crop depends on the selection of good fruit canes, no matter where they are found on the vine. Pay more attention to choosing productive types of canes than to their location. When you choose canes starting away from the trunk, renewal spurs on or near the trunk will make next year's fruiting canes.

### TRAINING THE GRAPEVINE

A grapevine can be trained into almost any shape. The purpose of training is to get high yields and, at the same time, be able to

carry out vineyard practices easily and economically. Practices to consider are cultivation, spraying, harvesting, pruning, and tying.

### At Planting Time

Cut the vine back to two buds immediately after planting. Strong shoots usually develop from these buds. You will use the best of these shoots for the trunk (Fig. 3).

### Year-Old Plants

After pruning in the spring, tie the largest cane to one of the trellis wires. This will become the trunk. Tie long, vigorous canes to the top wire; cut off weaker canes above the lower wire and tie them there. If vine growth was very weak the first year, cut it back to two buds again.

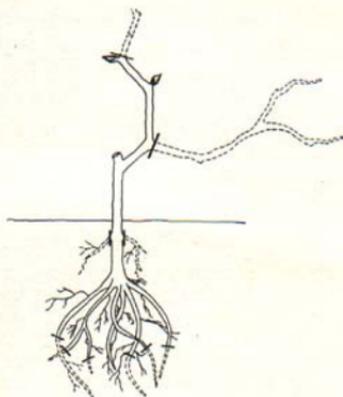


Fig. 3. This newly planted year-old nursery plant has been pruned to two buds.

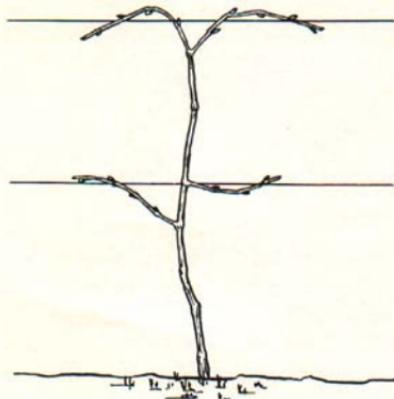


Fig. 4. A 2-year-old vine pruned to the four-arm Kniffin system.

### Two-Year-Old Plants

Good vines will have several canes in the spring of the third growing season. If you are training to the four-arm Kniffin, choose four

of these at proper levels and train one each way from the trunk on both wires (Fig. 4). Cut each of these canes back between the fifth and sixth buds. If training to the umbrella Kniffin, choose two canes of 10 to 12 buds each. (See page 12.)

There are several ways to train grapes. Most Michigan grape growers have found that either the four-arm Kniffin or the umbrella Kniffin is best suited for Michigan vineyards.

#### Four-Arm Kniffin

The single-trunk, four-arm Kniffin is the most widely used system for training American type grapes (Fig. 5). It gives strong support to the vine and the crop, and it allows good exposure to sunlight and air circulation.

It is easy to train vines to the four-arm Kniffin system. Build the grape trellis so the top wire is 5½ feet high and the bottom wire is 3 feet high. Bring the trunk straight up to the top wire. Run the canes both ways from the trunk along both wires (as the name, four-arm Kniffin, implies). If you need more than four canes, it is best to leave the extra ones on the top wire since these usually produce more than those on the lower wire. Leave renewal spurs for the growth of next season's canes.

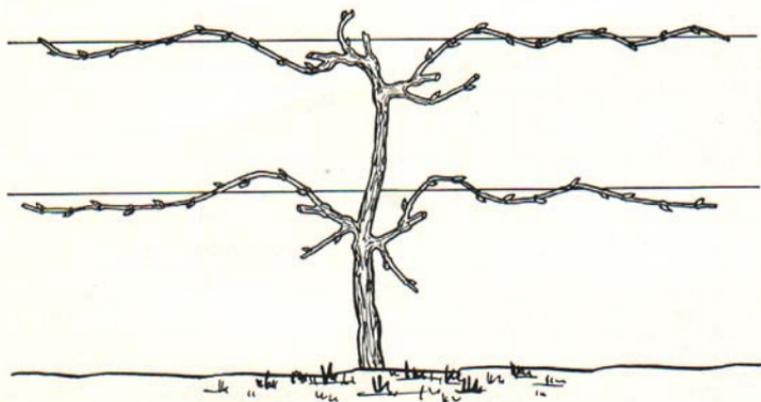


Fig. 5. A mature vine pruned to the four-arm Kniffin system.

## Umbrella Kniffin

This system is a modification of the four-arm Kniffin (Fig. 6). It is good for very productive vineyards where more than four canes must be left at pruning time. The umbrella Kniffin also makes use of the higher yielding upper canes on the vine.

When using the umbrella Kniffin, head the grape trunk 6 to 8 inches below the top wire, with from two to six canes arising from the head of the trunk. Bring the canes over the top wire, bend them

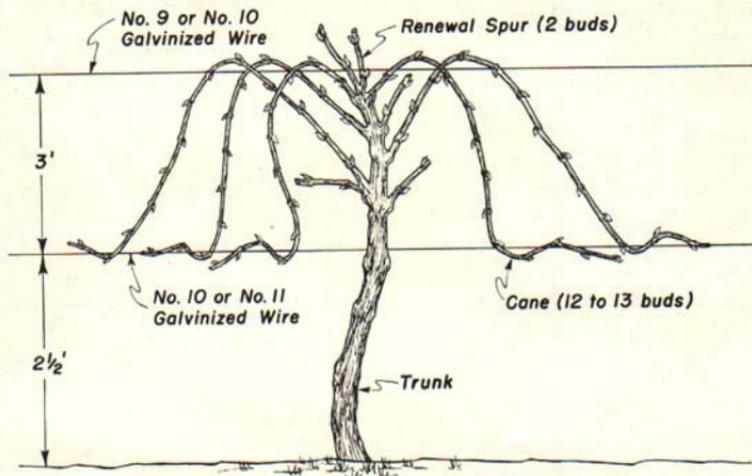


Fig. 6. A mature vine pruned to the umbrella Kniffin system.

rather sharply down to the lower wire, and tie them there. This encourages the basal shoots (shoots growing near the trunk) to grow vigorously so that good, well-located canes will be available for fruiting wood the next year.

## PRUNING "BULL" WOOD

Some growers find that very large, so-called "bull" wood is the only wood available on certain vines. These less fruitful canes are found on very vigorous plants and have large diameters and long distances between buds.

"Bull" wood is usually found in very vigorous vineyards on rather heavy, fertile soils. Vineyards growing on such soils naturally grow more vigorously and can produce heavier crops than vineyards located on lighter soils. Thus, the "bull" wood results not from the vine being too vigorous, but from overpruning.

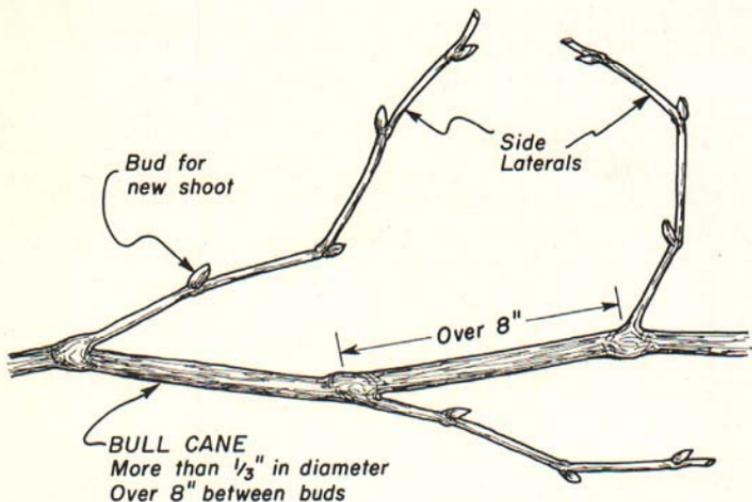


Fig. 7. This portion of "bull cane" shows laterals left for fruiting.

If you use balanced pruning carefully for 2 to 3 years, "bull" wood usually disappears from the vineyard. While the "bull" canes themselves are rather unfruitful, side branches, if they are about  $\frac{1}{4}$ -inch in diameter, will have from three to five productive fruit buds. (See Fig. 7.) Leave these for fruiting if a vine has only "bull" canes.

### RENEWING OLD TRUNKS

Trunks of mature vines need to be renewed once in a while. Many old trunks are crooked, diseased, and partially dead. You can keep a sucker from the roots and cut it off just above the lower wire the first winter. Carry this new trunk to the second wire the following year. As the young vine increases in size and vigor, let it carry more of the vine's crop (Fig. 8). After 3 years, the young vine should be able to carry a full crop. Remove the old trunk then.



Fig. 8. Old vine (on left) is being replaced by vigorous sucker (right).

### REPLACING VINES

One of the reasons for low yields in many vineyards is a poor stand of vines. In a bearing vineyard, replanting with nursery-grown plants seldom works out. This is probably due to too much competition from the older plants. Growers have found it best to replace missing or weak plants by layering. Do this by leaving a long cane near the end of last year's fruiting cane from a nearby vigorous vine (Fig. 9).

Loop this cane near the tip and bury one or two buds to a depth of 4 or 5 inches at the time of tying. If the layered cane is long enough, bring the end back up and tie to the first wire. If it is not long enough, be sure to have two or three live buds extending above ground beyond the point where the cane is buried. This layered cane will usually root well the first year, but leave it attached to the mother or nurse plant 2 or 3 years before cutting it free at ground level. Then it will be strong enough to compete with the older plants around it.

The pruner should always watch ahead to see where a new vine is needed so he won't cut off a cane which could be used for layering.

### TYING THE VINE

Tying the vine to the trellis wires is the last step in the pruning operation. This is done to keep the vine from moving on the trellis

and to keep the canes from tearing loose before growth starts. Don't do this when the weather is very cold, because the brittle canes will break, but finish it before buds begin to swell in the spring.

Tie the trunk to the wires in as upright and straight a manner as possible. This is very important when the vine is young. Tie canes securely. For four-arm Kniffin training, tie each cane twice, once near the base and once near the tip. For umbrella Kniffin, tie the fruiting arm near its tip to the lower wire, and tie the trunk to the lower wire.

Grape twine is most often used for tying grapes, although many other materials are used by some growers.



Fig. 9. Tip layering from vine A produced vine B to replace a missing vine.

### SUCKERING

Suckering is the removal, during the growing season, of shoots which appear on the trunk at or below the surface of the soil. These suckers produce little fruit, grow vigorously, and use up soil nutrients needed by the main part of the vine. Remove these shoots carefully during the first 4 to 5 years of the vine's growth. After that, fewer suckers will appear.

### PRUNING OTHER VARIETIES

Since more than 90 percent of Michigan's grape acreage is planted to the Concord variety, these suggestions are mainly for this variety.

Most of the remaining grape acreage in Michigan is planted to the Niagara, Delaware, and Fredonia varieties.

The Fredonia can be kept in balance by leaving 40 buds for the first pound of 1-year-old prunings and 10 more buds for each pound after that. The Fredonia has yielded best when trained to the umbrella Kniffin system.

No definite pruning scale has been developed for either Niagara or Delaware. By using the Concord scale as a starting point, you can work out your own pruning balance. Remember, if the vine sets a heavy load of grapes (part of which do not mature properly) and the wood growth is weak, you probably saved too many buds at pruning time. If the wood growth is very heavy and the crop is light, it is likely you saved too few buds at pruning time. As with all varieties, these rules hold true only if the crop has not been hurt by frost or other weather conditions.

The Niagara tends to have rather heavy wood and somewhat longer internode spaces than Concord. Niagara has not been a steady good-yielding variety; therefore, make a special attempt to hold a proper balance between plant vigor and the number of buds left to carry next year's crop. Since Niagara is a very tender variety, wait until severe winter weather is over before pruning it. Watch for and take out all winter-killed canes.

Because the Delaware variety has very short internodes, you may underprune unless you count the buds on every arm. Successful Delaware growers prune about as follows, with some changes for soil conditions and vine vigor:

1. Choose the heaviest available wood for next year's crop.
2. Prune to 8 or 10 bud arms on a rather high trellis (top wire at least 5½ feet).
3. Train these short arms to the four-arm Kniffin, preferably.
4. Balance every vine according to its vigor.

### KEEP UP GOOD VINEYARD PRACTICES

Good pruning and training practices will help you get and keep high yields of good quality grapes only if you also use other good practices. You must also give careful attention to soil management, fertilizer use, spraying for disease and insect control, and harvesting.