Circular 772

Pruning

AND TRAINING FRENCH HYBRID

Grapes

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UNIVERSITY OF ILLINOIS · COLLEGE OF AGRICULTURE
EXTENSION SERVICE IN AGRICULTURE AND HOME ECONOMICS

Several varieties of French hybrid grapes have recently been introduced into American vineyards, but little information is available on how to train and prune them. Methods commonly used for the Concord and other familiar grape varieties are not usually successful with these hybrids because the vines differ in growth and requirements for fruit production.

This circular offers the grower an easy-to-follow system for training and pruning his grape vines and explains how production can be improved by adapting these practices to the individual grape varieties. It is based on the author's work with French hybrids in the experimental vineyards at the University of Illinois.

Most of the directions — on training, pruning, and trellis construction — can be followed for grapes of any variety. But where the special varietal characteristics must be considered — for example, in selection of wood for fruit-bearing — the emphasis is on French hybrids and some adjustments will have to be made in order to apply these recommendations to American grape varieties.

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(Drawings by the author)

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PRUNING and TRAINING FRENCH HYBRID GRAPES

By H. C. Barrett, Assistant Professor of Plant Breeding

GOOD YIELDS OF HIGH-QUALITY GRAPES are largely the result of careful pruning and training. Pruning is the key operation; it enables you to shape the vine, improve the quality and size of the grapes, and — most important — keep a balance between the amount of fruit produced and the amount of wood growth on each vine. Training directs the vine as it grows so that at maturity it will be well distributed on the trellis. This makes pruning, harvesting, and other vineyard operations easy and efficient.

How you prune will depend on the capacity and vigor of each vine. If a vine's growing parts are too vigorous, it will probably not be very fruitful. If the vine is weak, it is likely to overbear, weakening the growing shoots, and possibly impairing the vine's capacity to grow good fruit and wood in the future. By pruning you can regulate fruit production so that it is in balance with the vine's wood growth.

You can control development as well as production by pruning and training. When the vine is young, the emphasis is on wood growth. Because the shoots are more vigorous when fewer are left on the vine, only one shoot is allowed to develop at first. It is trained to grow erect, because in this position it will develop quickly in length and grow fewer laterals than if it is not trained upright. These pruning and training practices in the early stages of a vine's development help to form a strong, straight trunk.

As the vine matures, only moderate vigor is desired and the grower's interest is in getting good yields. By selecting the best-placed wood when you prune you can shape the vine on the trellis. By planning the number of buds to be left on the vine each year, you can improve the size and quality of the crop and keep it in balance with the vine's vigor and capacity.

METHODS OF PRUNING AND TRAINING

There are two basic systems of pruning. How you prune will depend on the individual grape variety you grow and which part of its canes can be expected to bear the most fruitful buds.

Cane pruning, commonly used for the Concord and other American varieties, is best suited to vines whose canes are most fruitful at a considerable distance from the base. On these vines, fairly long canes

are left for fruiting wood and only the wood that is retained for renewal is cut back short.

Spur pruning is more successful for most French hybrids since most of these varieties bear their most fruitful buds near the base of the canes. On these vines, all wood is spur-pruned, or cut back to short spurs for both renewal and fruit production.

You may want to grow several different varieties. Each will have to be considered individually in deciding which pruning system to use, and your training system should allow for these differences.

Munson training system

Because it is adaptable to spur or cane pruning and can therefore be used for a number of varieties, the Munson system of training is recommended. It offers these advantages in addition to its versatility:

- As the shoots grow during the summer, they are allowed to droop and do not require summer tying.
- There is easy access from one row to another, and work can be done under and around the vines without climbing through them or over vine parts.
- Pruning is easier: the work is done all on the same level. Harvesting is easier because the clusters hang well-separated between the wires.
- Clusters are all at the same level above the soil. The fruit matures more uniformly and is protected from sunburn by the foliage.
- Access to the underside of the foliage and better air movement aid the control of diseases and insects.
- In home plantings where space is at a premium, raspberries and other partially shade-tolerant crops can be planted between rows. Early-maturing vegetables can be grown under and around the vines.

Pruning tools

The proper tool for pruning is a secateur, or pruning shear. There are two basic types: the hook and blade and the anvil and blade. An anvil and blade secateur has a straight-edged blade that cuts by pressing against a straight metal anvil. A hook and blade type has a curve-edged blade which passes a curved hook in cutting (Fig. 1).

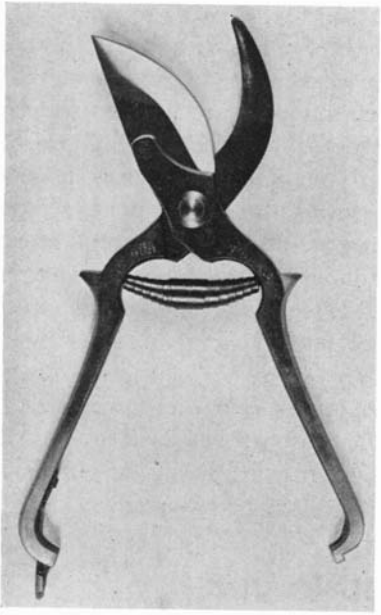
The hook and blade secateur is recommended; it cuts smoothly and can be used for cutting quite close to an arm or trunk. (When a

stub of wood is left by pruning, it endangers the vine's health. Wood-decaying organisms may enter the wound before it heals.) It is usually made of superior-quality steel. A good secateur of this type will have an interchangeable blade that can be removed for sharpening or replacement.

The angle of closure in an anvil and blade secateur changes in use, often failing to make a thorough cut, causing jagged cuts, or leaving a stub of wood. If you do use this type of secateur, be very careful to have it sharpened correctly, so that the proper angle of closure is maintained.

Making a pruning cut

When using a secateur, you will get a better cut if you hold the blade on the bottom side of the plant part that is being removed, and as close to the arm or trunk as possible (see Fig. 2). Make a straight cut, using steady pressure throughout. Do not use a sideways or twist-



A hook and blade secateur. This type is recommended for pruning grape vines because of its superior construction and cutting action. (Fig. 1)

Making a pruning cut. The blade should be held on the bottom side of the plant part that is being removed, and flat against the main arm or trunk. (Fig. 2)

ing motion; this may ruin the secateur. If the part to be cut is too large for your secateur, don't force it; use a pruning saw or lopping shear instead.

When to prune

Pruning is done during the winter, while the plant is dormant. The later in the dormant season that you prune, the later new growth will begin in spring. Temperatures as low as —10° to —15° F., which can be expected in the latitude of Urbana, may result in injury to the wood and buds of most grape varieties. In cold weather the frozen wood is brittle and easily broken; therefore it is advisable not to prune until late winter or early spring. If you are in a locality where spring frosts may come late enough to injure new shoots, it is advantageous to delay pruning so that growth will not begin until the danger of frosts is over.

When pruning is done late in the dormant season, the canes may "bleed" or drip sap from the cut ends. This is not, according to any evidence, harmful to the vine.

Summer pruning, or pruning while the vine is in a green (herbaceous) or growing state, can severely weaken its development. The green parts of the plant, such as leaves, manufacture its food supply. When they are removed, some of the food that is needed for growth is also removed. If pruning is done early enough in the growing season, some of the food reserve built up during the past growing season and stored over the winter is still present, and the apparent effect may be the same as that of dormant pruning. But as growth progresses during the summer, using up the food reserve, the weakening effect of summer pruning on the vine's vigor and capacity becomes more apparent.

If any disbudding, removal of watersprouts, or suckering is needed, complete it early enough in the growing season that it will not injure the vine. Under no circumstances should growing shoots be cut back (topping) or any other green parts of the plant be removed.

TRAINING A YOUNG VINE

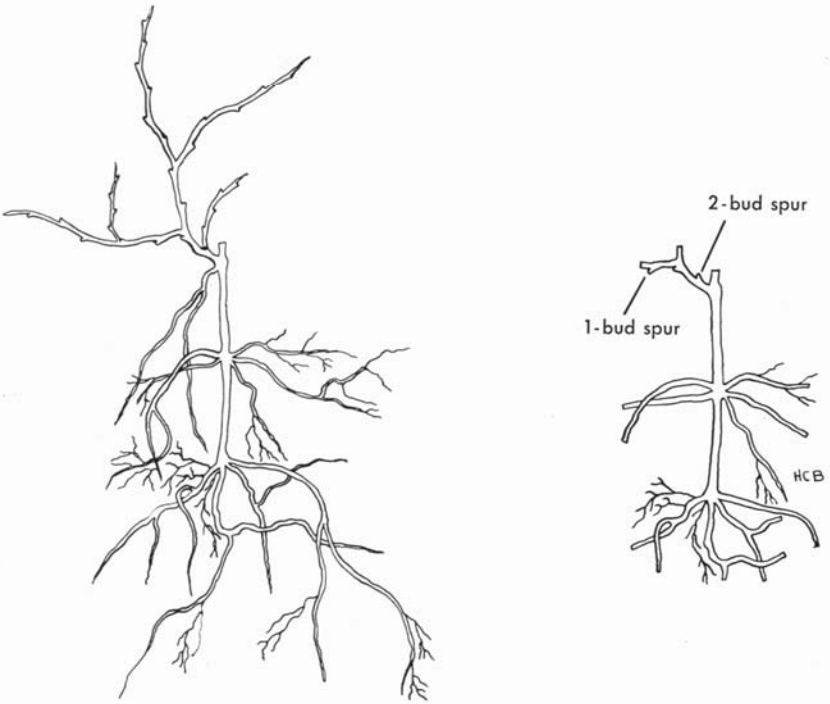
The following section describes the care of a young vine from planting to the end of its second summer of growth according to the Munson system of training. It is advisable to complete the trellis

before you plant so that you can begin training the vine on the wire immediately. (Directions for building a Munson trellis begin on page 20.) If just the lower wire is fastened in position, you may begin training the vine on it. But if the trellis is not ready for the first summer's training, use a stout wooden stake.

Planting

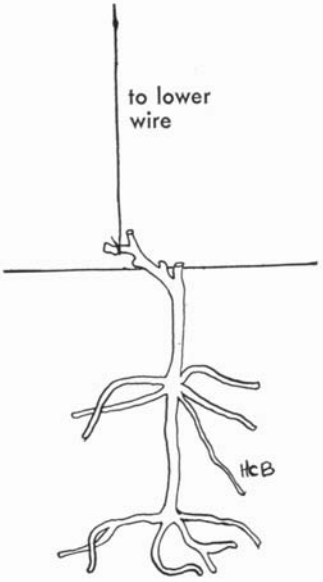
Select a well-rooted one-year-old vine (Fig. 3) for planting. Cut off all broken or damaged root ends, and shorten the remaining roots to 3 to 5 inches. All growth on the top should be removed except two canes.

Cut the best cane (with plump, upright buds) back to 2 buds, and cut the other back to 1, leaving a short stub. Then rub off the bud on the 1-bud spur.



Pruning for planting. Choose a well-rooted one-year-old vine for planting. Cut back the roots and remove the top growth except a 2-bud spur and a 1-bud spur. (Fig. 3)

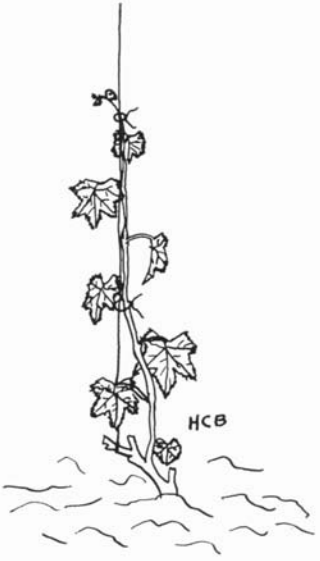
Plant the vine so that the lower bud on the 2-bud spur is even with the surface of the soil (Fig. 4). Tie a piece of twine to the 1-bud spur, run it vertically, and tie it securely to the lower trellis wire. If you are using a stake, drive it into the ground less than 2 inches from the 2-bud spur; let it extend at least 4½ feet above the soil. If the pruned vine does not have a 1-bud spur, the twine may be fastened to the 2-bud spur. Use a loose bowline knot; this will allow the trunk to grow in diameter without girdling.



Plant the vine with the lower bud on the 2-bud spur level with the soil surface. Tie a piece of twine to the 1-bud spur, attach it to the lower trellis wire, and rub off the single bud. (Fig. 4)

First summer — training

Usually both buds on the 2-bud spur start to grow. Remove the weaker one and any shoots that develop below it before they have grown more than 1 or 2 inches.

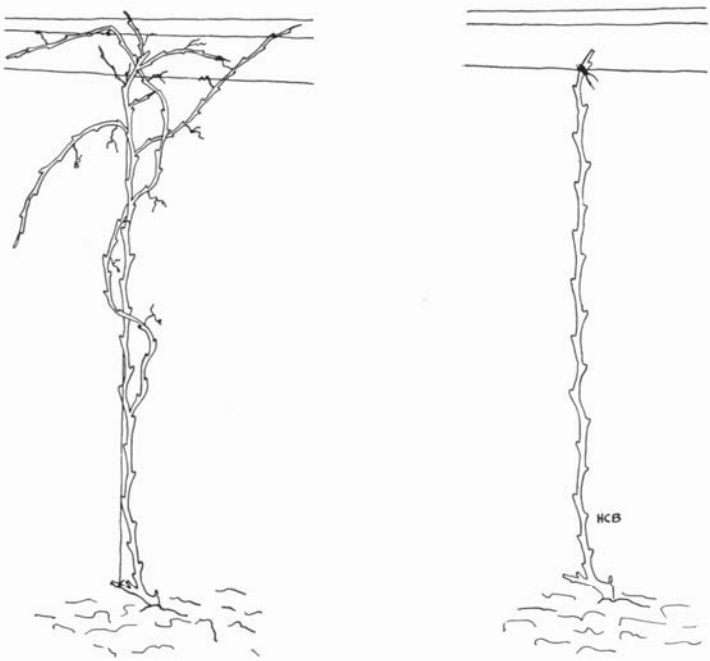


Train the shoot by twisting it around the twine as it grows, and tie it loosely every 8 to 10 inches. (Fig. 5)

As the shoot grows, twist it loosely around the twine and tie it loosely every 8 or 10 inches with soft jute twine (Fig. 5). Tie it loosely enough to prevent girdling, and handle it carefully as young growth is easily broken or injured. If the shoot reaches the wire during the summer, tie it loosely and pinch the growing tip just above the wire.

First winter — pruning

If the shoot matures well during the first year, it will reach the wire or slightly beyond it by the end of the growing season and form a cane with good wood and buds. If it does not reach the wire,



Pruning the first winter. Cut back the well-matured cane to the first bud above the wire, and fasten it securely. Remove all laterals. (Fig. 6)

or if it is not well-matured, cut it back to 2 buds and repeat the first summer's training. (These vines will be treated from now on as if they were one year younger.)

Cut back the well-matured canes to the first bud above the wire, tie securely, and then rub off the bud. In tying, use a secure square knot, but first wrap the twine around the wire twice to prevent the wind from sliding the cane along the wire (Fig. 6).

Second summer — training

When the shoots begin to grow, disbud all but the upper four.[1] Figure 7 shows a vine before and after disbudding at the beginning of the second summer. Cut out any suckers that appear and remove any flower clusters on the shoots. If the shoots develop very rapidly,

[1] If this disbudding is not done completely, you may have to disbud again later in the summer.

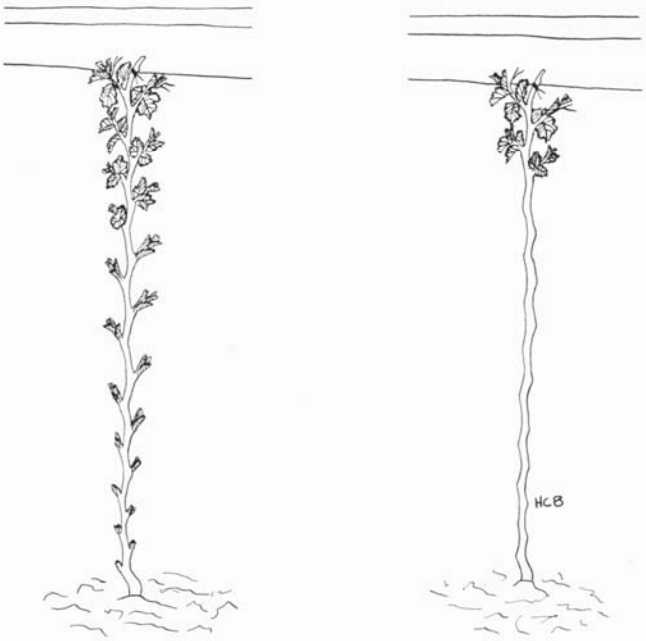
or if they are in danger of being broken by wind, pinch the growing tips when the shoots are about 18 inches long.

Second winter — pruning

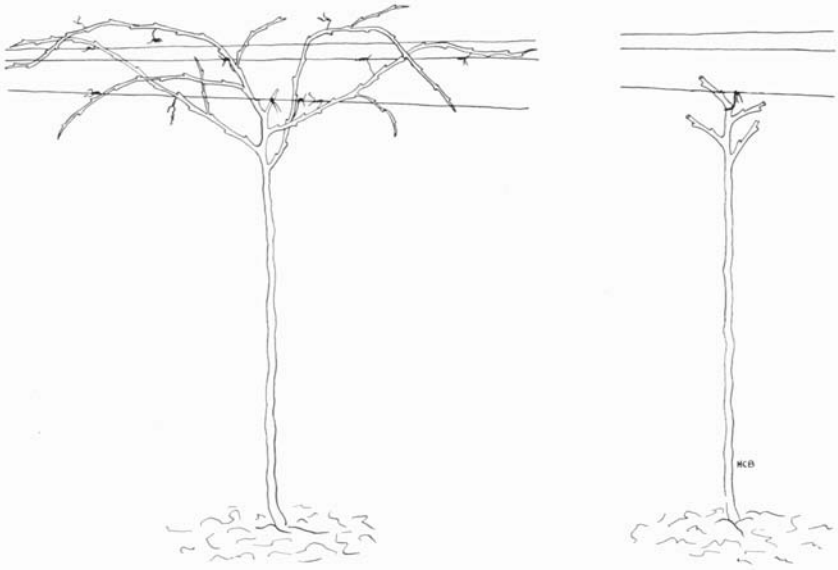
At the end of the growing season the vine should have a strong, straight trunk bearing four well-matured canes. Cut each cane back to 2 buds unless they are exceptionally vigorous; then you may leave 3 or 4 buds (Fig. 8).

Third summer — training

The shape and strength of the vine is maintained during the third summer by removing all watersprouts or shoots below the bottom spur and by cutting out any suckers that appear. Do not pinch unless there are strong winds that could break the shoots. Allow only one medium-sized flower cluster to remain on each spur. Overloading a vine this young will seriously injure its vigor and capacity, delaying the production of good crops in the future.



Disbudding. Early in the second summer, disbud all shoots except the upper four. (Fig. 7)



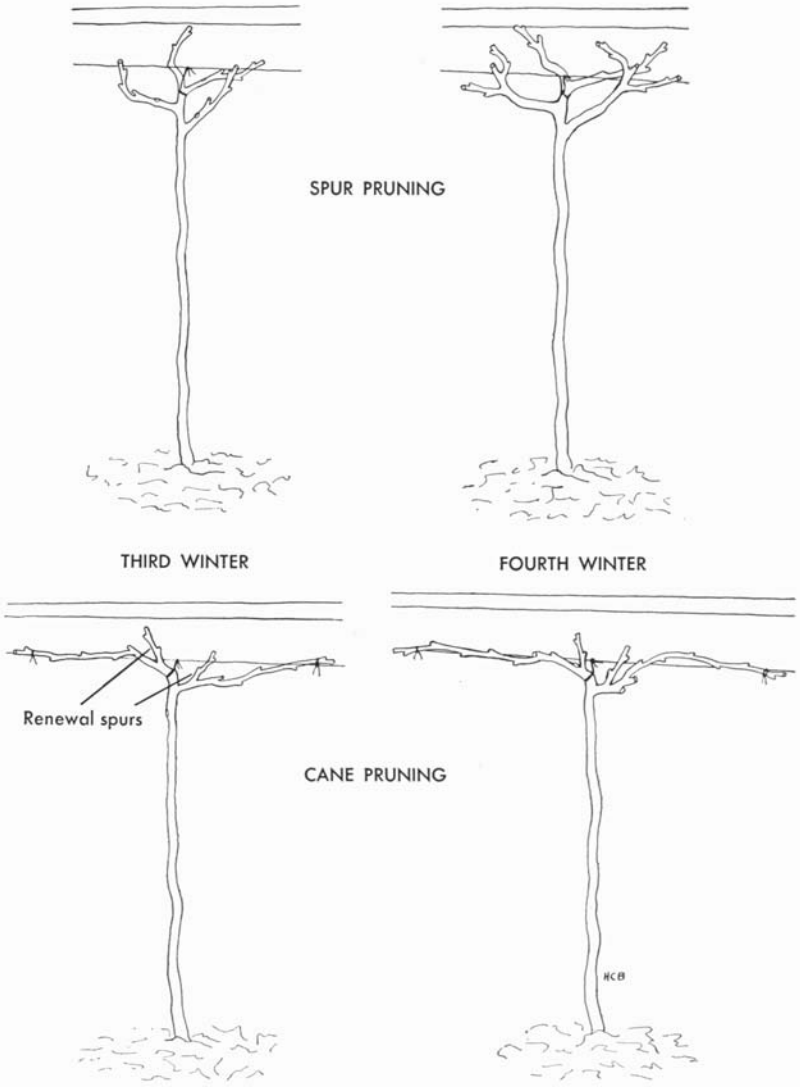
Pruning the second winter. The vine should have four well-matured canes at the end of the growing season. Each is cut back to 2 or more buds, according to its vigor. (Fig. 8)

COMPLETING THE HEAD

After the third growing season, the vines will be pruned and directed toward their mature shape. As the head is completed, they will be treated differently according to the system of pruning to be used. Figures 10 and 11 show mature Munson-trained vines before and after they are spur- and cane-pruned.

Cane-pruned and spur-pruned vines differ in two respects: (1) the arrangement of the arms and (2) the function of the spurs. On spur-pruned vines, the arms extend out from the trunk in an oval-shaped or elliptical ring. On cane-pruned vines, there are two short arms that extend out in the plane of the trellis.

In spur pruning the canes selected are all cut back to spurs. These are used for both renewal (growing shoots for the next year's spurs) and fruit production. In cane pruning only renewal wood is cut back to spurs; the fruit is borne on longer canes chosen specifically for production.



Forming the head of a vine. On a spur-pruned vine (top left) the best-placed canes — close to the trunk in an oval-shaped ring — are cut back to 2 buds each. These serve as renewal and fruiting wood. On cane-pruned vines, the spurs are used only for renewal and the fruiting canes are pruned less severely. Cut back the two best-placed canes — extending out in the plane of the trellis to form a fan shape — to 2 buds each. Then choose two canes of good quality and cut them back to about 4 or 5 buds each, depending on their size and vigor (bottom left). The fourth winter's pruning is done the same way, but you should allow for the increased size and vigor of the vines (top and bottom, right).

(Fig. 9)

Completing the head on spur-pruned vines

Select canes that are spaced in an oval-shaped ring around the trunk and in as nearly a horizontal plane as possible. Only 4 or 5 canes may be in a favorable position. Cut back these canes to 2 or more buds, according to their vigor and size (Fig. 9). If they are not well placed, you may need to leave longer spurs to keep the head in a horizontal plane. Cluster thinning may be used during the summer to prevent overbearing on this longer wood.

Ordinarily spur-pruned vines are trained so that the arms encircle the trunk and are at an equal distance from it. The elongated ring recommended here allows better distribution of the vine parts. The canes are chosen in the same plane as the trellis so that there will be less interference with cultivation or danger of damage by implements.

Tie the trunk to the center wire. Do not prune or pinch, except to remove growth that appears below the head. During the winter repeat the third year's pruning but balance the number of buds and spurs with the vine's greater size and vigor (Fig. 9).

Completing the head on cane-pruned vines

The head of the vine is formed by two main arms. These originate in the renewal spurs. Careful placement of the renewal spurs is particularly important, for the vine can easily get out of shape.

Choose two well-matured canes that extend away from the head in the plane of the trellis. Cut them back to 2 buds each. These will serve as renewal spurs. For fruiting canes select two or more canes of good quality and cut them back to several buds each (Fig. 9). Usually 4 or 5 buds are enough for each cane. You can decide by the size and vigor of the canes and of the whole vine.

Tie the main trunk and end of each cane to the lower wire. During the summer remove any excess growth below the head, and prune during the fourth winter as during the third, except that you may allow more buds according to the vine's greater size and vigor (Fig. 9).

PRUNING A MATURE VINE

Once the head of the vine is completed and it attains its mature shape, only careful pruning will be needed to keep it in that form and to regulate and distribute fruit production. Figures 10 and 11 show mature vines trained to the Munson system as they appear before and

after spur or cane pruning. An orderly scheme of operations can help you to improve your efficiency and prevent mistakes:

Cane pruning

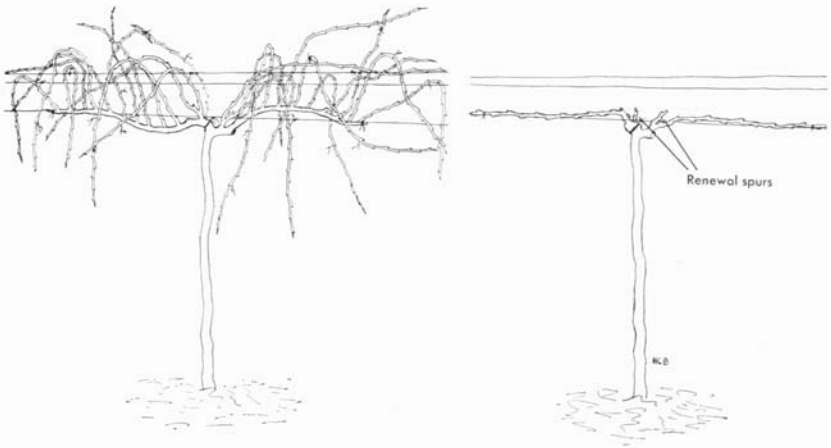
1. Select the best-placed canes for renewal and cut them back to 2 buds each.
2. Select the best-quality canes for fruiting.
3. Decide how many buds the whole vine should bear.
4. Cut back the fruiting canes according to their vigor and size, and that of the vine.
5. Remove the rest of the wood.
6. Tie the vine to the trellis wire.

Spur pruning

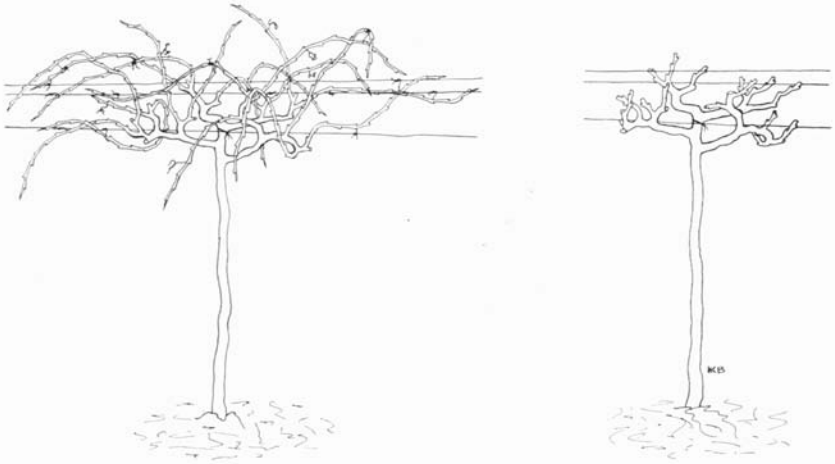
1. Select the best-placed, most fruitful canes.
2. Decide how many buds the whole vine should bear.
3. Cut enough canes back to 2-bud spurs.
4. Remove the rest of the wood.
5. Tie the vine to the trellis wire.

Selecting wood for renewal

Cane-pruned vines can easily get out of shape unless the canes selected for renewal spurs are well placed. Choose the best-placed canes, extending out from the head in the plane of the trellis, and cut back to spurs with 2 buds each. These canes should be as close to the trunk as possible (see Fig. 10.)



Cane-pruning a mature vine. Cane-pruned vines may lose their shape unless renewal spurs are carefully selected. Cut back the best-placed canes to 2 buds each. Then cut back the fruiting canes according to their vigor and size, but also consider the size and vigor of the whole vine. (Fig. 10)



Spur-pruning a mature vine. Spur-pruned vines should be kept in an elongated ring close to the trunk. Each year the best wood is cut back to 2 buds each. If the canes are very vigorous, you may leave slightly longer spurs with 3 or 4 buds, but the total number of buds should be in balance with the vigor of the vine. (Fig. 11)

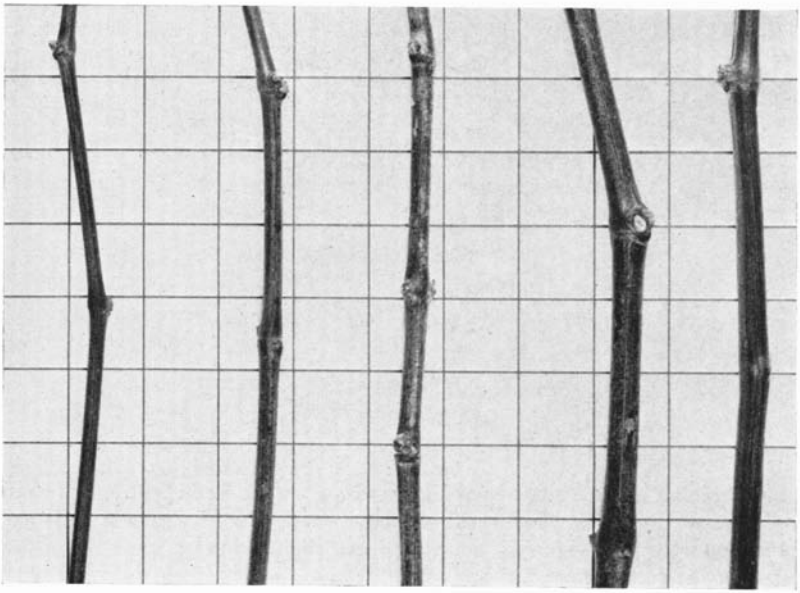
Spur-pruned vines do not lose their shape as quickly as cane-pruned vines because the wood retained is relatively short, but if renewal wood is not carefully chosen, the vine may become poorly shaped after a few years and it will be almost impossible to correct. Select canes that are close to the trunk and in the desired elliptical ring-shape, as in Figure 11. In general they should be cut back to 2 buds each, but if they are very vigorous, leave 3 or 4 buds. The total number of spurs and buds is determined by the vigor of the whole vine.

Selecting fruiting wood

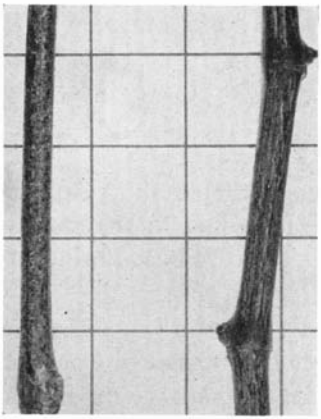
Because of differences among the grape varieties, the rules for selecting fruiting wood should be modified according to the variety you grow. The most important features to note are the following, in approximate order of importance:

Cane diameter is about ⅜ inch for the most fruitful canes of most French hybrids. (This is at least ⅛ inch larger than a fruitful Concord cane.) Choose a cane that measures slightly larger than ⅜ inch, rather than one smaller, if a choice must be made (Fig. 12A).

Internode length should be considered with cane diameter. For most French hybrids, internodes are shorter than for the American

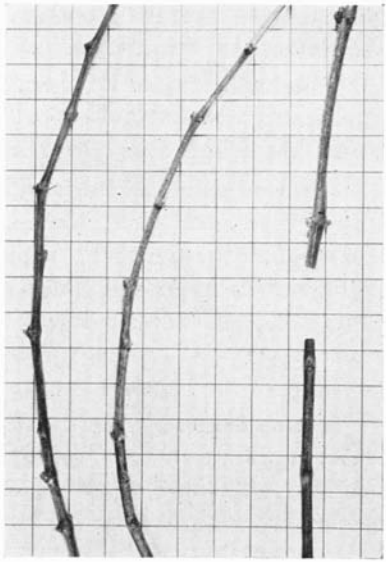


A. These canes show varying degrees of maturity and quality. The two on the left would be undesirable for fruiting wood because the diameters are too small (less than ¼ inch) and the buds are small and sharp-pointed. The center cane is not of the best quality, but it could be used. The two canes on the right are optimum for cane diameter, internode length, and buds. Large, plump, rounded buds like these indicate a high capacity for fruit production.

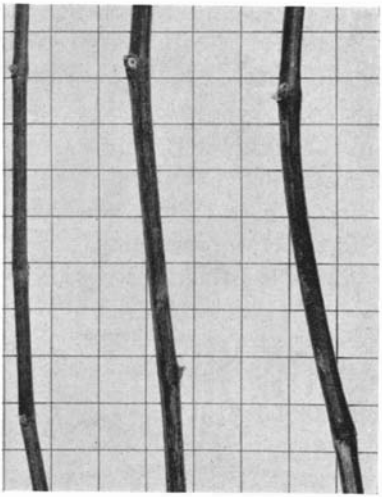


B. "Bumpy" or mottled bark (left) shows immaturity and such canes will probably not produce fruit clusters. Reticulate bark with irregular striations (right) indicates secondary growth made late in the season. The buds on these canes are small and compressed. These are unfruitful canes that should not be saved.

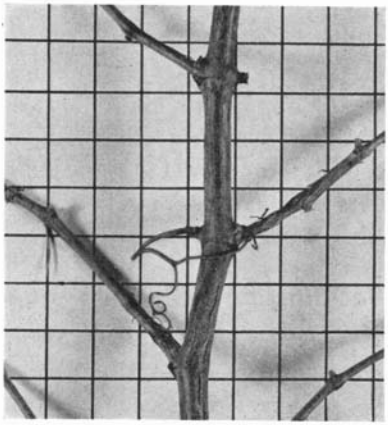
Selecting fruiting wood. These canes were photographed against a 1-inch grid. (Figs. 12A-12E)



C. These canes show several degrees of taper that are undesirable for fruiting wood. The two on the left are too extremely tapered; the cane diameter is satisfactory near the base but much too small toward the end. The cane on the right, in two sections, is an example of reverse taper. (A center section of 18 inches has been removed.) Note that the upper section is larger in diameter than the basal part of the cane. All of these canes are likely to be unfruitful.



D. Watersprouts, or canes that originate from old wood, are undesirable as fruiting wood. The long internodes, sharp-pointed buds, and nodes with very little enlargement all point to low productivity.



E. "Bull" canes of this type that show extra-vigorous growth are not fruitful. The buds are small and compressed by the laterals, making them more subject to injury or destruction at low temperatures.

varieties. An average length of 3 to 5 inches is desirable, assuming the cane is also about ⅜ inch in diameter (Fig. 12A).

Cane color should be typical for the variety. Wood that has a dull appearance, or a flaky, reticulated surface is not of the proper maturity, and will probably not be fruitful (Fig. 12B).

Size and shape of buds will vary among varieties, but usually the fruitful buds are large, plump, and rounded (Fig. 12A). The bud scales should be tight and firmly attached. Avoid buds that are small and pointed, large and flattened, or compressed as on "bull" canes (Fig. 12E). If fuzzy or downy material that is present under the bud scales is very noticeable, the buds may have been injured by rough handling of the canes. These are likely to be unfruitful.

Degree of taper from the base of a cane to its tip may vary among varieties, but usually a rapid taper indicates undesirable wood for fruiting. A "reverse taper" in which the cane becomes thicker instead of narrowing away from the base is often caused by early unfavorable conditions followed by rapid growth; these canes are usually unfruitful. Figure 12C shows several degrees of taper.

The location of canes in relation to the head need only be considered if you have to choose between canes that are equal in other respects. Then a cane originating on a short arm, or close to the trunk, will probably be more fruitful than one farther from the trunk.

Certain other characteristics may indicate wood that is less desirable for fruiting:

1. Canes originating from old wood (Fig. 12D).
2. Little or no enlargement at the nodes (Fig. 12D).
3. A large number of laterals or laterals large in diameter as on "bull" canes (Fig. 12E).

If you find that your choice is limited by the quality of the canes, choose one or two good laterals for fruiting wood and remove the rest of the main cane. In deciding whether a cane has too many laterals, consider the varietal characteristics; for example, Seibel 13053 normally has many laterals, while even vigorous canes of Seyve-Villard 12-375 have very few.

Deciding how much to prune

The basic principle for pruning is: *each vine is an individual and must be pruned as an individual.*

An exact number of buds cannot be named as the correct amount

to leave on a vine, because it will vary with the variety and even between vines of the same variety. It has been roughly estimated that 30 to 60 buds can be left on Concord vines. The French hybrids should probably have only half as many, from 15 to 30 buds on each vine.[1]

The best guide for determining how many buds to leave for fruiting is a measure of the past year's growth. Count the number of buds left last year and examine the canes that grew from those buds for diameter, length, and quality.

If the canes are at or near the best size and quality for fruiting wood, leave the same number of buds.

If the canes are small, too many buds were left last year; reduce the number in this year's pruning.

If the canes are larger than optimum, or show the excessive vigor of "bull" canes, leave more buds than were previously left on the vine.

If you are not sure how many buds to retain, it is better to prune more severely than to underprune; leave fewer buds, especially if the vine is a weak grower. But if the vine has been very vigorous, retain more buds.

Apparent vigor is not always a true indication of capacity under certain conditions. For example, young blossoms may be destroyed by late frost, insects, or disease. When this happens, the shoots have increased vigor, but not because the vine was underpruned. It would be a mistake to leave more buds in this case.

Keep in mind the size of the crop produced the previous year, and always balance the number of buds on each cane or spur with the vigor of the cane selected for fruiting.

Tying the vines

After dormant pruning, the vines are tied to the trellis wires. This should not be done while the wood is frozen; it will be brittle and easily broken. But they should be tied before growth starts, because the swollen buds and young shoots are easily damaged in handling.

[1] A better approximation of the number of buds to leave on Concord vines has been made on the basis of the weight of prunings removed:

1 pound of prunings.....30 buds
2-2½ pounds.....40 buds
3-3½ pounds.....50 buds
4-4½ pounds.....60 buds

At present, there are no comparable data for any of the French hybrid varieties.

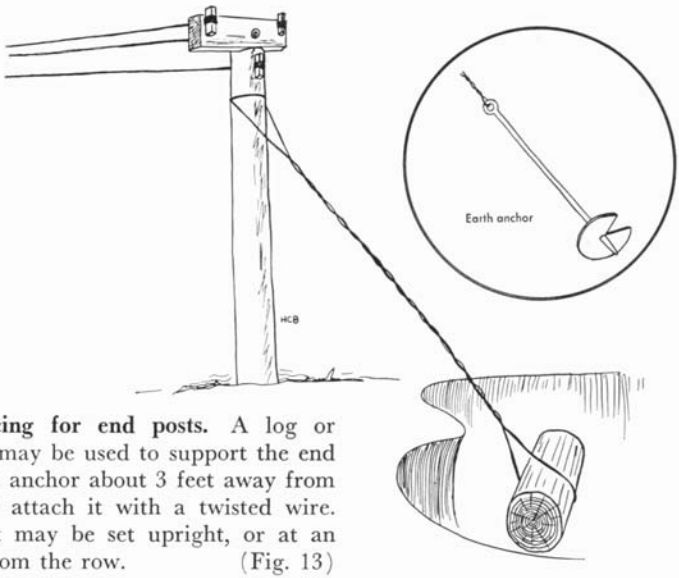
Tie the trunk securely to the lower wire with soft jute twine. No other tying is needed for spur-pruned vines, but on cane-pruned vines tie the cane ends firmly to the lower wire just below the end bud. Tie them again near the center, but very loosely to prevent girdling. (You may twist the cane once around the wire before fastening the end instead of the center tie, but this can make it difficult to remove prunings later.) When tying the trunk, be sure to wrap the twine around the wire before attaching the vine to prevent the vine from slipping along the wire.

BUILDING A MUNSON TRELLIS

Posts

Decay-resistant wood or wood treated with a wood preservative should be used for the trellis. Cedar posts treated with creosote under pressure, for example, are very satisfactory.

End posts should be at least 5 inches in diameter at the small end and at least 9 feet (preferably 10 feet) long. Set them 3 to 4 feet into the ground. Line posts should be 7 to 8 feet long and at least 4 inches in diameter at the small end. Set them 2 to 2½ feet into the ground about 24 feet apart in the row. This will allow three vines to be spaced 8 feet apart between them.



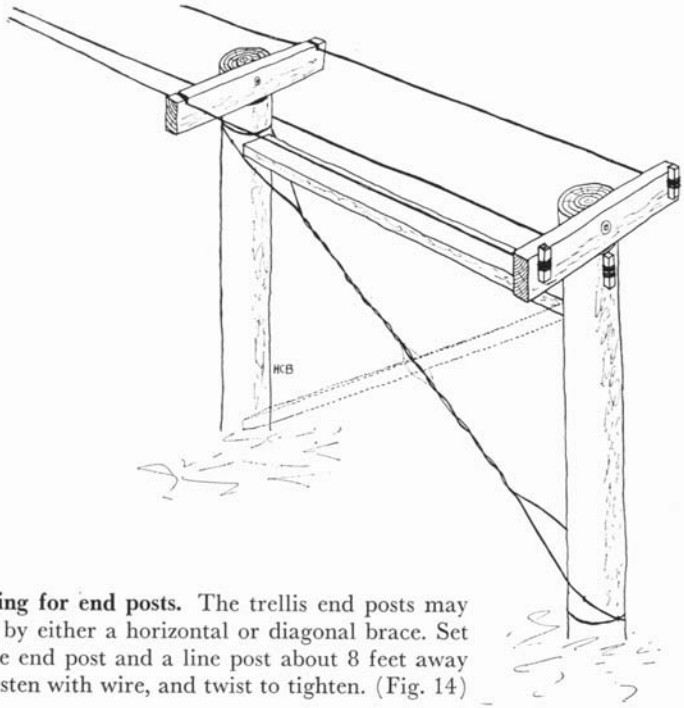
Exterior bracing for end posts. A log or earth anchor may be used to support the end posts. Set the anchor about 3 feet away from the post, and attach it with a twisted wire. The end post may be set upright, or at an angle away from the row. (Fig. 13)

Bracing end posts

The end posts should be braced before the wires are put on. Exterior bracing is more permanent than interior bracing and easier to construct. But interior bracing does not interfere with cultivation or run the same risk of being caught on machinery.

Exterior bracing. The end post may be set upright, or at an angle away from the trellis. Bury a rock, earth anchor, or log about 3 feet away from the end post in the plane of the trellis. Wrap a galvanized steel wire, at least No. 9 gage, around the end post 1 foot from the top, staple it to the post to keep it secure, and then fasten to the imbedded object. Splice the wire securely and then twist to tighten with a metal bar or object (Fig. 13).

Interior bracing. Set a rail or 2-by-4 of decay-resistant or treated wood in a horizontal or diagonal position between the end post and a line post about 8 feet away. Tie it diagonally, running a wire around the bottom of the end post and around the line post about a foot from the top. Twist the wire until tight (Fig. 14).



Interior bracing for end posts. The trellis end posts may be supported by either a horizontal or diagonal brace. Set it between the end post and a line post about 8 feet away in the row, fasten with wire, and twist to tighten. (Fig. 14)

Cross arms

Use 2-foot lengths of 2-by-4 wood for the cross arms. Ordinary Douglas fir treated with a wood preservative, or some durable decay-resistant wood is suitable.

Bore a hole in the middle of the 4-inch side large enough to insert a ⅜- or ½-inch bolt. Make a saw cut or groove 1½ inches from each end of the 2-inch side; it should be 1 inch deep, perpendicular to the length of the arm, and wide enough to allow a No. 9 gage wire to pass through. Fasten the cross arm to the post with a bolt. The arm should be at right angles with the row, and the top should be even with the top of the post.

Cross arms for the end posts are the same except that instead of a saw cut or groove, a hole is bored 1½ inches from each end; it should be ¼ inch in diameter and centered between the top and bottom of the cross arm. Bolt these cross arms on the outsides of the end posts, so that the pull of the vines will be against the posts.

Wiring

On the Munson trellis three wires are run parallel with the row. No. 9 gage galvanized steel wire is best for this purpose; if this is not practicable, No. 11 gage may be substituted, but only for the two upper wires.

Run the center or lower wire through holes in the posts, or staple it to the windward side 8 inches from the top of the cross arm. The upper wires are run through the saw cut or groove near the top of the cross arms. They may be stapled but if this is done, be sure that the wire is held loosely enough to slide freely. The upper wires should be about 21 inches apart, on the same level above ground, and with the lower wire centered beneath them.

Wire tighteners are used to make seasonal adjustments in the tension of the trellis wires. If this is not done, the contraction of the wire in winter will tend to break it or pull at the end posts, and in summer the wire will expand, allowing the vines to sag toward the ground. Carry the lower wire through a small hole in the end post to attach to the tightener; the upper wires are drawn through the holes in the cross arm. All holes should be parallel with the row.

Several devices may be used for tightening (Fig. 15):

A hardwood block, 1½ inches square and about 8 inches long. Bore a ¼-inch hole in the center. Fasten the wire through the hole, wrap it around the block, and tighten with a wrench.

A ½-inch bar, about 12 inches long. Bend it into an L-shape and drill a hole in the center an inch from the end. Fasten the wire as on a hardwood block.

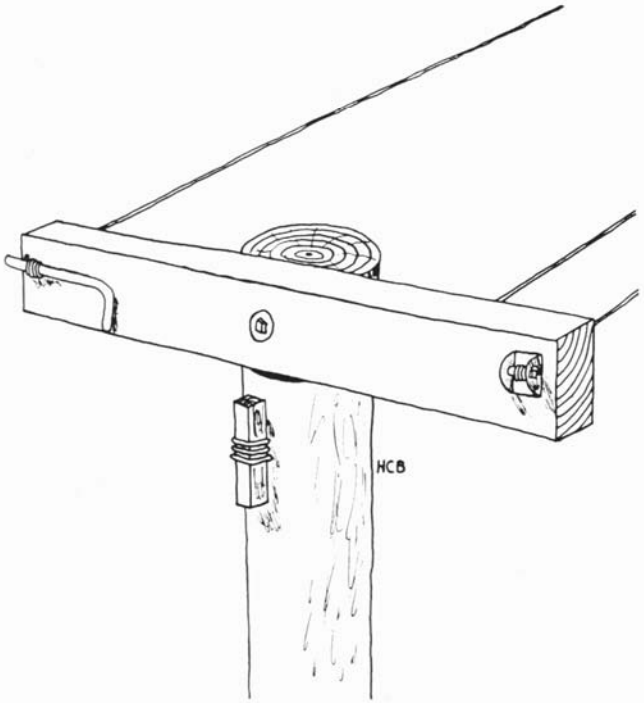
A small iron reel with a ratchet. Fasten the wire to the reel and wind with a wrench. The ratchet will keep the wire from unwinding.

Buying wire by the pound

Wire is usually sold by the pound, commonly in 100-pound rolls. If you know how many linear feet of wire you need for the trellis, you can determine how many pounds to purchase by dividing with one of the following figures:

No. 9 gage wire — about 15 to 17 feet per pound.

No. 11 gage wire — about 25 to 27 feet per pound.



Wire tighteners. To adjust the tension of the trellis wires, draw the wire through the cross arm of the end post and attach to an L-shaped iron bar (left), a hardwood block (center), or an iron reel with a ratchet (right). The wires should be loosened in the fall and tightened in the spring. (Fig. 15)

Pruning Terms

Pruning — the removal of excess parts of a vine above ground — canes, shoots, and leaves.

Training — the direction or form given to a young vine as it grows, usually by attaching it to a mechanical support.

Thinning — the removal of flower clusters, immature fruit clusters, or their parts.

Pinching — the removal of the growing tip of a shoot by pinching between thumb and finger.

Disbudding — the removal of swollen buds or young shoots less than 1 inch long.

Capacity — the degree of a vine's ability to produce fruit and wood.

Vigor — the rate of growth of a vine part.

Trunk — the main body or stem of a vine.

Arms — the main branches or extensions of the trunk.

Head — the part of the trunk, usually at the top, from which branches or arms grow.

Shoots — the new green growth that develops from buds during the growing season and matures to form canes.

Canes — matured dormant shoots that have lost their leaves and green color.

Laterals — the side branches of a shoot or cane.

Node — the joint or swelling on a shoot or cane where buds and leaves are found.

Internode — the portion of a shoot or cane between two nodes.

Bud — the slightly enlarged portion in the node region of a cane from which shoots grow.

Spur — the basal portion of a cane after it is cut back to a length of 1 to 4 buds. (The basal bud near the point where the cane joins an arm is not counted.)

Renewal spur — a spur that produces shoots for the next year's fruiting canes or spurs.

Fruiting wood — canes or spurs that are selected for their size and quality and cut back to bear the current year's crop.

Old wood — wood on any part of a vine older than one year.

Watersprouts — shoots growing from buds on old wood, usually from the trunk.

Suckers — shoots growing from below the surface of the soil.

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