



## Training Table Grapes Vineyards

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Developing a strong and well-formed vine framework and root system is the most important objective in vineyard establishment. This is especially important in table grape production because of the additional hand operations and the need for uniform and high fruit quality.

Many of the basic vine training procedures are similar whether the vineyard is intended for table, raisin, or wine grape production. However, trellising and cultural practices unique to table grapes and growth characteristics peculiar to certain table grape varieties require some special training methods.

### First Year

No training is attempted in the first year in most San Joaquin Valley vineyards. The vines are allowed to grow unhindered for maximum leaf area and root system development. The vines are then pruned back at the end of the growing season, during dormancy. Remove all shoots except one that is strong and well placed. Cut this shoot back to two buds ([Figure 1](#)).

Vines are occasionally and successfully trained up the stake during the first year. This is more true of drip irrigated vineyards and those in the Coachella Valley. The steady moisture supply of drip irrigation and Coachella's long growing season make this practice more feasible. This should only be done where extremely good,

uniform growth can be anticipated and where the training is well supervised. The shoots and clusters must be judiciously thinned the second year in order to produce a modest crop proportional to the vines' capacity.

Obviously, the main purpose of first year training is to generate some earlier income. However, other considerations to weigh include the less uniform training up the stake due to differences in individual vine vigor. Bud break and shoot development along the new cordon branches may be erratic due to the still limited root system and vine size.

Usually the vines are fertilized quite heavily and irrigated late in the season to obtain maximum growth. This may result in immature wood and poor reserves in the vine. Such vines may die-back during the winter and/or show poor bud break.

Also, a higher total labor input to complete the training might be expected because of more individual vine differences during first year training up the stake.

### Second Year -- Developing the trunk

Direct all the growth up the stake in a single shoot for the permanent trunk. The remainder of the framework will come from lateral branching near its top.

It may be necessary to hoe or shovel some soil away from each vine before growth begins. This fully exposes the crown to facilitate suckering of shoots at or below the normal soil surface.

Numerous shoots will emerge from each vine in the spring, providing an adequate selection for training and requiring "suckering" or shoot removal of the extras. Shoot selection and removal is best delayed until the longest ones have grown to at least 8 to 12 inches. This operation can begin earlier (shoots 6 to 8 inches long) if a large acreage must be covered. However, there is more risk in accidentally removing wanted shoots at this more tender stage.

Some growers prefer to wait until the shoots are 12 to 18 inches long. This enables one to select and tie the main shoot for training and to remove all others in one operation. However, this may be impractical in large acreages.

Shoots more than 18 inches in length become increasingly woody at their bases and more difficult to break out by hand. Thus, hand shears must be used to remove shoots if there is too much delay in training.

Two or three of the more vigorous, upright growing shoots are retained in this first task ([Figure 2](#)). Select those which are in position to be easily tied over to the stake. The best positioned shoot can usually be tied to the stake without breaking it out once it is at least 12 inches long. The extra one or two shoots will serve as spares. However, once the main shoot is 12 to 18 inches long and is securely tied, break out the spare shoots ([Figure 3](#)).

Tie up the main shoot periodically -- about every 10 days -- to prevent breakage and to assure a straight trunk. Most growers prefer to tie the vines up the north or east side of the stakes. The top 1/3 of cordon-trained vines should always be brought over the wire attachment side of the stake. The cordons will then be in position to be attached directly to the wire and not bent around the stake over to the wire.

Lateral shoots arising from the bottom 2 to 2-1/2 feet of the main shoot should also be removed as they develop during the tying operation.

**Bilateral cordon training.** This system is used for spur-pruned varieties. The cordon branches are trained on a wire about 20 inches below the crossarm -- approximately 44 inches above ground level using 7 foot stakes with 20 inches in the ground.

Cordons are formed from 2 lateral shoots at the top of the main shoot. The main shoot (trunk) is topped when it has grown 18 inches beyond the lower (cordon) wire ([Figure C-4](#)). Normally, the space between nodes has reached its full potential at this distance behind the shoot tip. However, topping should be delayed with vigorous Flame Seedless vines until there is at least 24 inches of growth beyond the cordon wire. The exceptionally long internodes can still be elongating within this distance from the shoot tip.

Make the cut so that the top lateral shoot is about 2 to 3 inches below the wire. This assures that the cordons will branch several inches below and into a gradual bend up to the wire. Some growers prefer to cut through a node at or just below the cordon wire. This kills the bud,

but leaves a dead internode at the top to tie firmly to the stake, using twine with a clove hitch tie. Always make sure that the top of the vine is tied to the same side of the stake as the wire attachment.

Always top the vine to produce the lateral shoots for uniform cordons. If the main shoot growing up the stake is merely tied down to one side for a cordon, the opposite cordon must come from a smaller lateral shoot. This results in a permanently stronger side and weaker side on cordon trained vines.

Once the two top lateral shoots are selected for the cordons and tied to the wire, all the remaining lateral shoots down the trunk are removed ([Figure C-5](#)).

Continue to tie the two remaining lateral shoots as they develop along the wire to keep them straight ([Figure C-6](#)). If the lateral shoots are vigorous enough to grow past midway to the next vine by July 1, they can be tipped at this point. This stimulates more lateral shoot growth along the permanent portion of the branch canes. Weaker vines can be left to grow along the wire without tipping. No further training is then necessary for the remainder of the growing season except keeping loose growth supported on the wire.

Excessive vine vigor and late fall growth can be a problem at this stage of vine development, especially with cordon training. It contributes to excessively long internodes and erratic bud break -- a common problem in Flame Seedless. Poor wood maturity and winter kill can cause vine die-back and poor bud break -- a characteristic of Ruby Seedless. Avoiding nitrogen fertilization and late fall irrigation in

fertile soils will help minimize these problems in susceptible varieties.

**Head Training.** This system is used for cane-pruned vines such as Thompson Seedless, Superior Seedless, and sometimes Calmeria.

The main shoot is topped when it has grown 18 inches beyond the desired head height ([Figure H-4](#)). Head height will depend on trellis design.

Single crossarm systems use a 3 to 4 foot crossarm with 4 or 5 wires. The fruiting canes are tied to the center 2 or 3 wires. The outer wires serve as foliage support.

Head the vines so that the top lateral shoot is about 8 inches below the crossarm. Tie the top of the main shoot securely. Lateral shoots developing from the bottom 2/3 of the trunk are removed, leaving about 5 lateral shoots on the top ([Figure H-5](#)). Wrap the lateral shoot growth loosely onto the wire as it develops to keep it supported ([Figure H-6](#)). It is best if the head of a mature vine can be maintained within a distance of 6 to 18 inches from the single crossarm. The fruiting canes can then be easily wrapped onto the wires, and the shoots for next year's canes mostly develop in full sunlight. Sunlight exposure of shoots contributes to the fruitfulness of their developing buds. These well-exposed shoots can then be selected as "sun canes" during pruning for the following year's crop.

Low-headed vines have two main problems: difficulty in maintaining vine shape and more shading of potential canes. Low-headed vines must depend on longer arms extending from below. The arms are often difficult to re-establish once removed by pruners. One or two

arms may ultimately dominate or all the arms may be eliminated by pruners. Fruiting canes arising from low heads will have developed in a more crowded and shaded environment and thus have a lower potential for fruitfulness and percent bud break.

Double crossarm systems use a top, longer crossarm with three wires for foliage support and a lower, shorter crossarm with two wires for the fruiting canes. The advantage is that all the fruit develops under the canopy's shade. Unfortunately, it forces one to head the vines below the lower crossarm and thus far below the top of the vine canopy. More of the shoot growth for fruiting canes is subsequently shaded, reducing bud fruitfulness. This can be a serious problem in highly vigorous Thompson Seedless vines.

Vines should be headed at or just below the lower crossarm. This assures that the shoots will reach full sunlight within as short a distance as possible, improving their potential for bud fruitfulness. Make the cut so that the top shoot will be no farther than four inches below the crossarm. Leave 4 to 5 lateral shoots at the top and remove the remaining lower shoots ([Figure H-5](#)). The head of mature vines should be maintained within a 2 to 14 inch distance from the lower crossarm.

### **Third Year**

Avoid overcropping during vine training. It can lead to permanently weakened vines and uneven spur development. This is controlled by proper pruning, shoot thinning, and cluster thinning.

**Bilateral cordon training.** At the end of the growing season, during dormancy, the two branch canes are cut back to where they are at least 3/8 inch in diameter ([Figure C-7](#)). Smaller canes may produce erratic bud break and shoot growth and may overcrop. Some varieties such as Emperor have a tendency to push end buds only if weak cordon branches are left too long. Cutting-back cordons to where they are of adequate diameter will improve bud break and shoot growth uniformity. The remaining length of cordon can be extended the following year.

Some growers prefer to delay any cordon development of weaker vines for one additional year. They cut the branch canes all the way back to the stake and develop the cordon in one step the following year rather than in two steps over two years.

Always prune to a bottom bud on the ends of branch canes if they are to be extended the next year. The shoot from this bud grows from the underside of the cane in the direction of the cordon. It makes a straight and easy-to-tie cordon extension.

Poor bud break can be a particular problem in young vines in the Coachella Valley. Only the ends of the canes may push, leaving blank areas in the center. Highly vigorous vines are most susceptible. It may be desirable to bring cordons out in two steps if this problem is anticipated. This helps force buds within the shorter cordon sections each year.

Prune the ends of full cordons so that there is an 8 to 12 inch space between the vines. This distance prevents the intermingling of shoots and clusters of adjoining vines.

Wrap the branch canes 1 to 1-1/2 times around the wire after pruning and tie with vinyl tape at enough points to keep them secure and straight.

Spurs are not normally left on the first-year cordons. These spurs would come from lateral shoots which are often uneven in development and spacing along the branch canes. By cutting all the laterals off (referred to as "slickpruned"), the main (axillary) buds at each node will push more evenly. "Slick pruning" also limits the number of shoots to thin out next spring.

Exceptions are vines of extreme vigor. Leave 1-bud spurs where the branch canes are over 5/8 inch in diameter. This helps avoid blank areas along the branch canes where buds get "buried" in the growth of large diameter wood.

Shoot thinning ("crown suckering") in the following spring follows those pruning procedures ([Figure C-8](#)). This removes excess crop, provides for permanent spacing of spur positions, and removes unwanted growing points in future years. The shoots should be thinned when 8 to 10 inches long so that their bases will break out easily. This removes the base buds which would provide future unwanted growing points.

Remove all shoots arising from the main trunk to just above the bend of the branch canes. This leaves an open, deshooted area about 8 inches wide where the cordons separate. Retain single upright growing shoots where permanent spur positions are desired -- normally spaced at 4 to 6 inch intervals. Remove all extra shoots from the underside of the branch canes. Each fully extended branch cane should have 7 or 8 shoots remaining. Typically these shoots will come

from alternating nodes on the upper side of the branch canes. However, it may be necessary to leave a shoot at each node on vigorous vines with exceptionally long internodes such as Flame Seedless or Emperor. Sometimes it is necessary to leave a few extra fruitful shoots to obtain the desired cluster number. This has been experienced with very vigorous Flame Seedless.

Thin the clusters to 1 per shoot. However, weak shoots should carry no crop; two clusters are sometimes left on exceptionally vigorous shoots where cropping capacity is warranted.

Head training, cane pruning (Thompson Seedless). Prune back to 2 or 3 canes (10-12 nodes) on vigorous to exceptionally vigorous vines. Select two or three well-placed renewal spurs of two nodes each ([Figure H-7](#)).

Leave only one short cane plus three spurs on low to moderately vigorous vines and no canes and three to four spurs on weak vines.

Leaving more fruiting wood will require more cluster thinning if table grapes are made. Third-leaf vines are much more fruitful than mature vines. This is because the canes and spurs are of lateral shoots with high light exposure which originated from the main shoot during training. These lateral shoot canes are highly fruitful from the first through fifteenth node, typically averaging 1.2 to 1.3 clusters per node.

Thus, a vine with two 12-node canes and three 2-node spurs (30 nodes total) normally produces 35 to 40 clusters. This is a more than adequate cluster count for a vigorous 3rd-leaf vine. A total of three canes may be justified where extreme vigor has produced trunks of 1 1/4 inch

diameter or more and canes of 5/8 to 3/4 inch diameter. Four canes can produce as many as 60 to 80 clusters -- far exceeding the capacity of most vines to produce fruit of normal size and maturity.

Many growers prefer to sell their third-leaf crop as raisins or wine. Even so, grape maturity and berry size tends to be lower than with mature vines. The decision to make table grapes must include careful cluster thinning and preferably cane girdling.

All shoots arising from the lower 2/3 of the trunk are removed in the spring. Wait until the shoots are 8 to 10 inches in length so that their bases will break out. This eliminates future growing points.

#### **Fourth Year**

Bilateral cordon training, spur pruning. Make the final selection for spur positions on all fully extended cordons ([Figure C-9](#)). Space spurs at 4 to 6 inches for a total of 7 to 8 spurs on each cordon branch.

Prune spurs to 1 or 2 nodes as dictated by variety. Spurs left on the side or underside of the cordon to fill in blank areas should be pruned with a bud oriented for vertical growth. Provide for an 8 to 12 inch spacing between the cordon

ends of adjoining vines. Remove all canes located in the "crotch" where the trunk divides, leaving a 6 to 8 inch spur-free area. Extend all cordons as necessary with canes of at least 3/8 inch diameter.

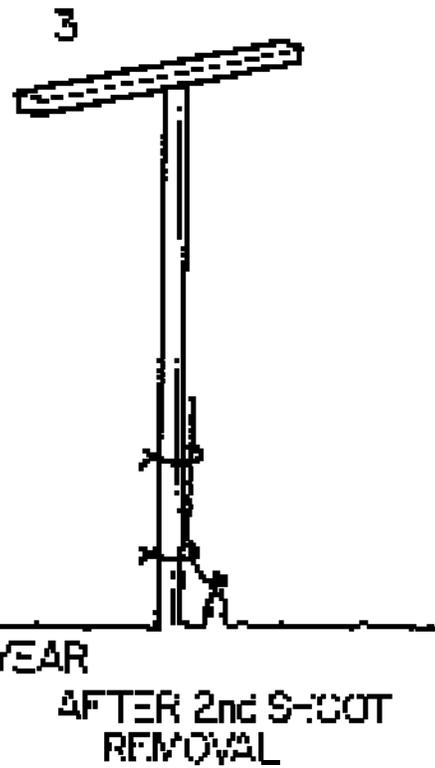
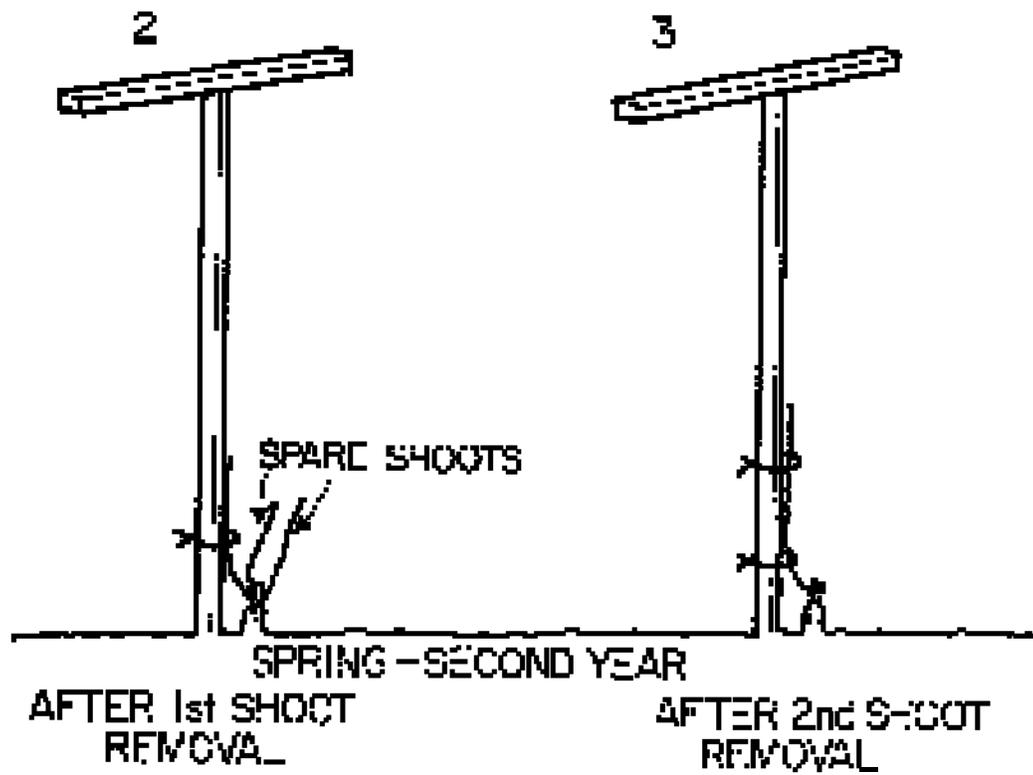
Head training, cane pruning. Prune back to 4 to 5 well-placed 12-15 node canes on vigorous to exceptionally vigorous vines ([Figure H-8](#)). Leave only 2 to 3 canes on low to moderately vigorous vines and none to one cane on weak vines. Leave four to five renewal spurs if they are well positioned to provide canes for the following year.

#### **Tying Materials**

Use twine or vinyl tape to tie the main shoot as it is trained up the stake. Vinyl tape is recommended to tie the cordon branches. Tape stretches and does not girdle. Twine must be tied loose enough to prevent cane girdling and may have to be cut loose and retied for next season's growth. Coated wire ties such as Twist-Ems® should not be used. They can easily girdle a rapidly expanding cane if not tied loosely and not removed after one growing season.

The cordons will grow into the wire to be mostly self-supportive in four years.

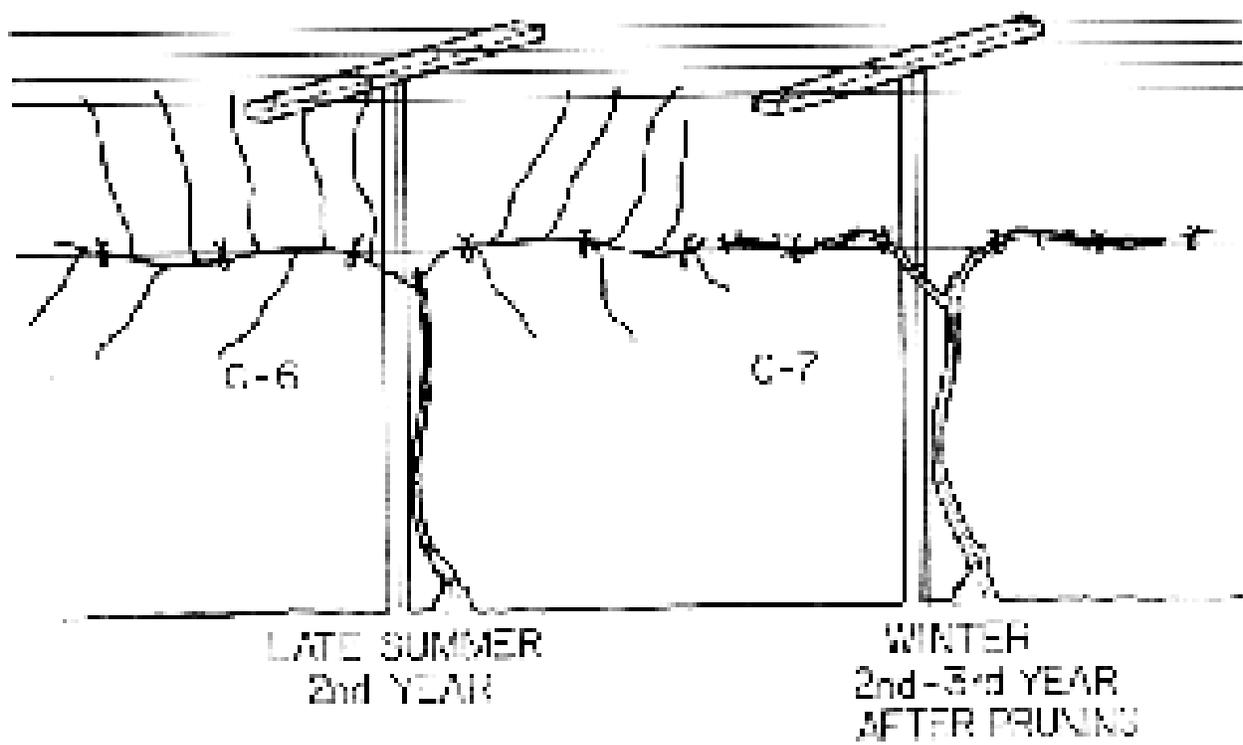
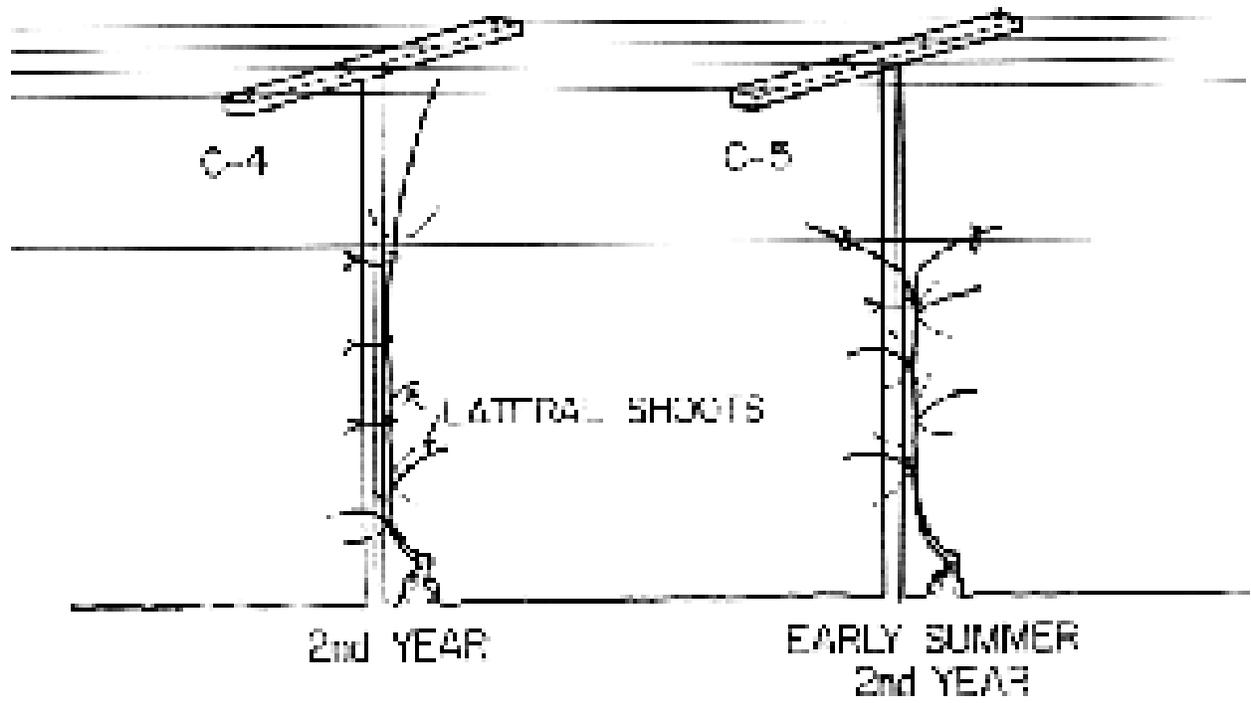
# DEVELOPING THE TRUNK



SPRING - SECOND YEAR  
AFTER 1st SHOOT  
REMOVAL

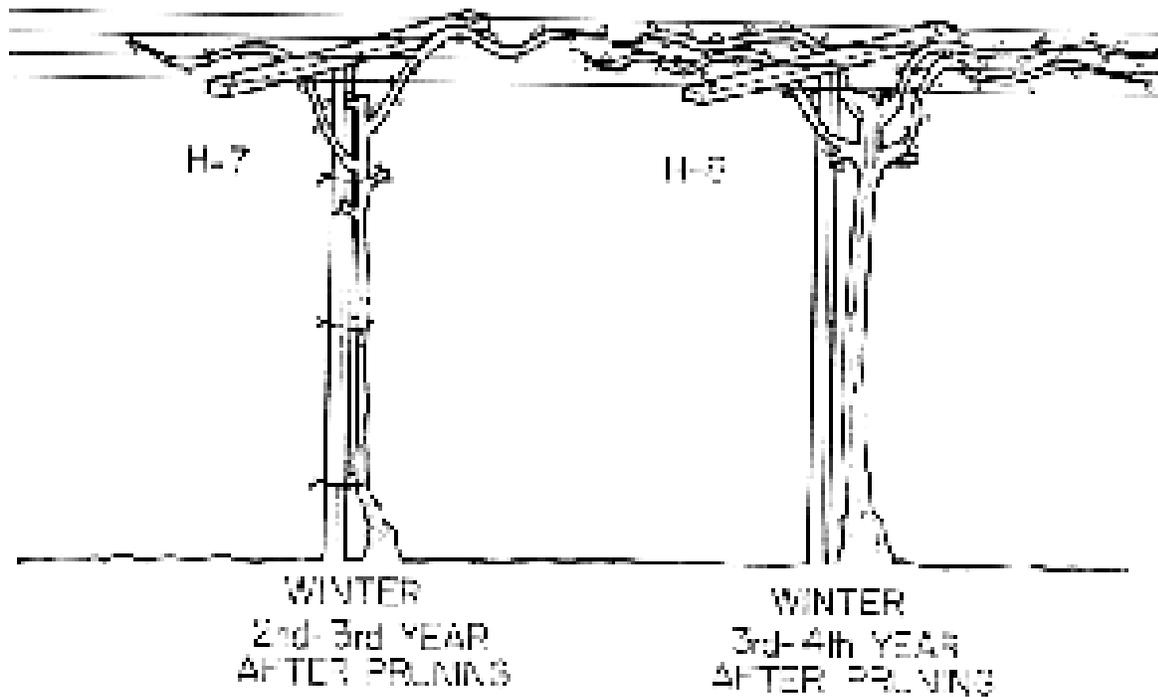
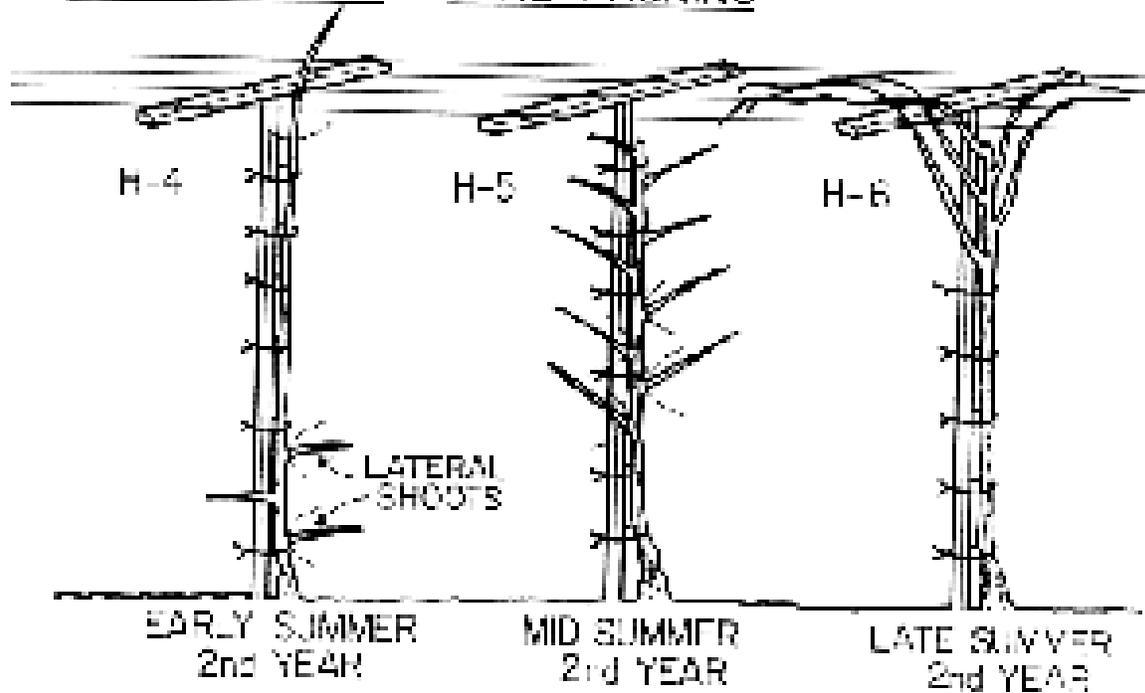
AFTER 2nd SHOOT  
REMOVAL

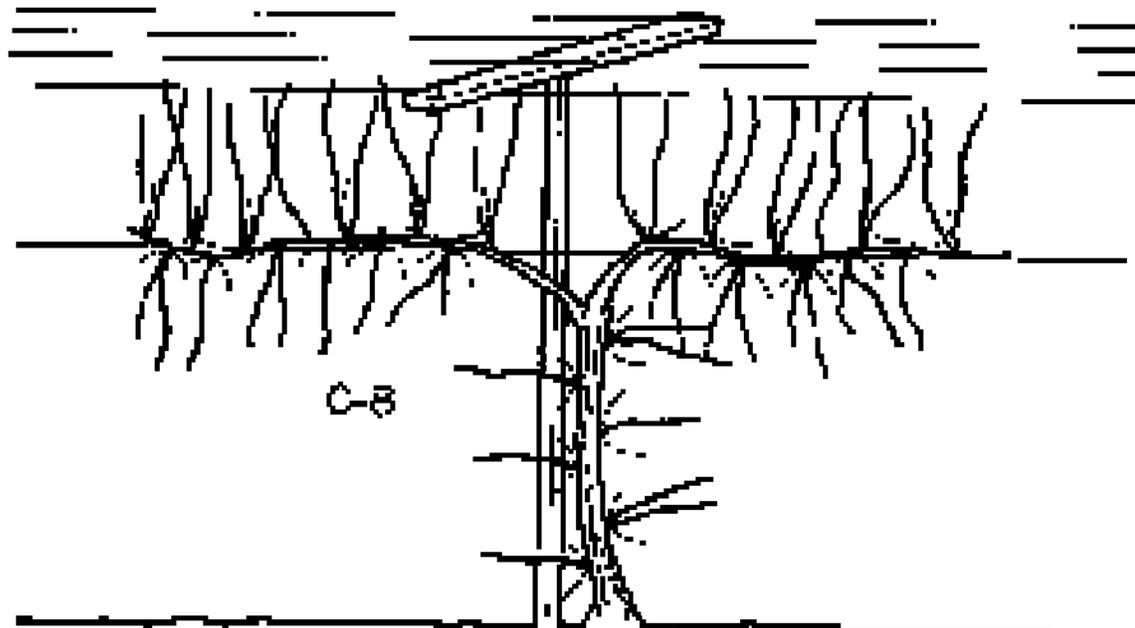
CORDON TRAINING - SPUR PRUNING



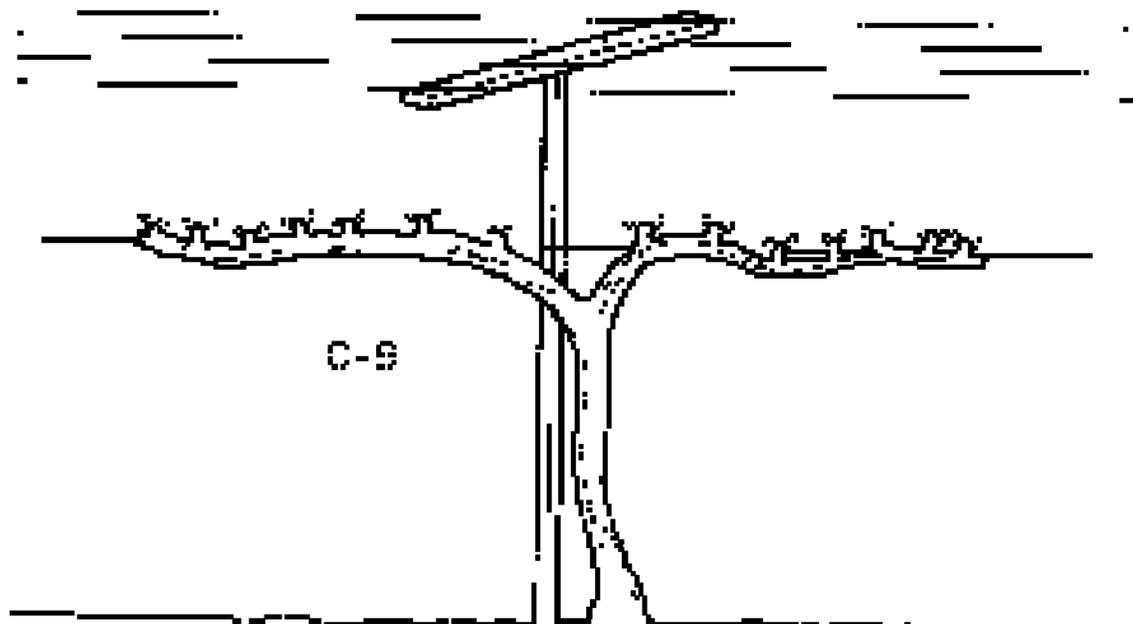
HEAD TRAINING

CANE PRUNING





SPRING  
3rd YEAR  
DESHOOTING



WINTER  
3rd-4th YEAR  
AFTER PRUNING