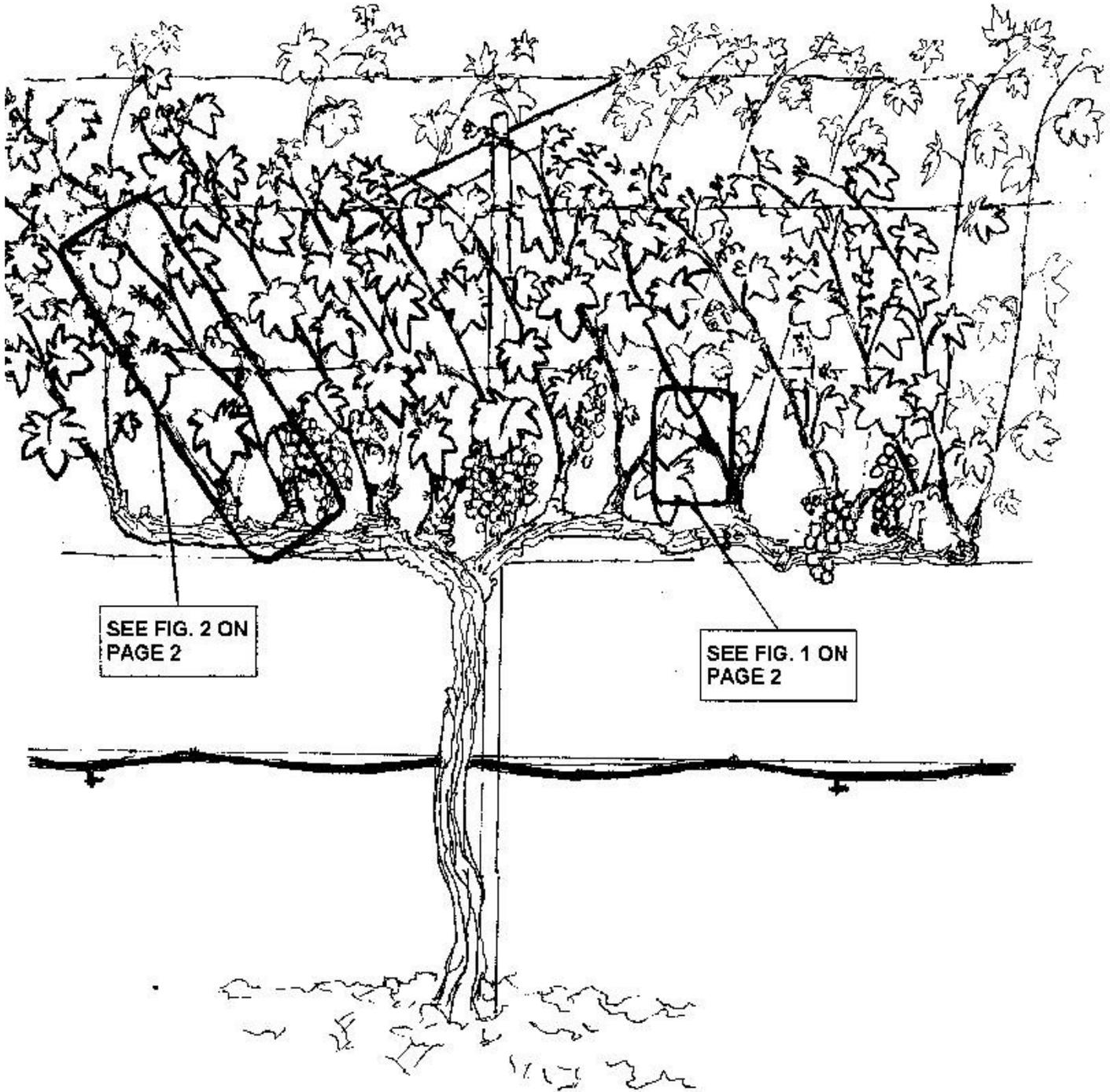




# Environmental Horticulture Notes

EHN 97

## GUIDELINES FOR THE HOME VINEYARD

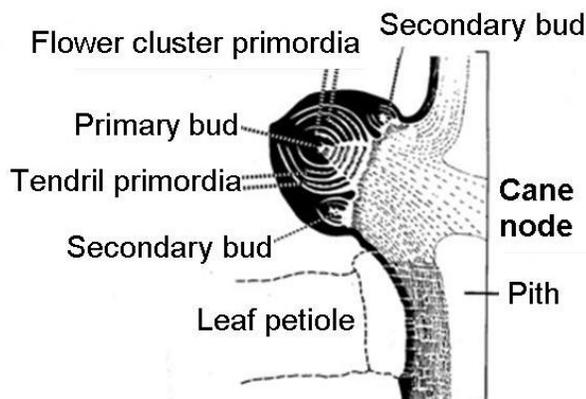
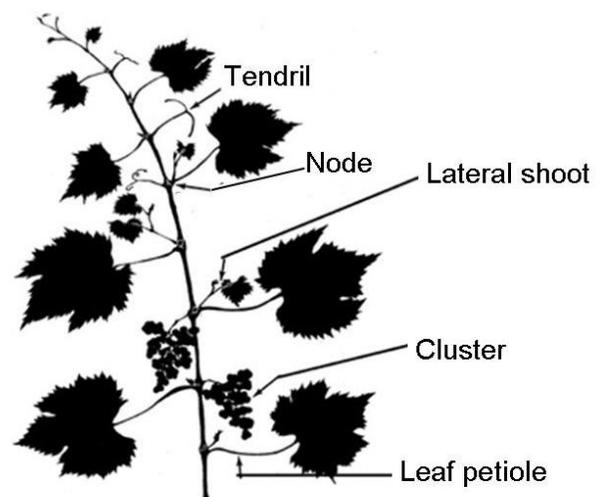


SEE FIG. 2 ON  
PAGE 2

SEE FIG. 1 ON  
PAGE 2

**TERMINOLOGY**

- Arm Older woody growth on cordons on which canes grow and spurs are created; arms are produced by multiple years of spurs
- Berry An individual fruit
- Bud Rounded organ in the node of a cane or shoot; shoots with pre-formed grapes grow from buds
- Cane Mature, woody shoot
- Cluster Grape bunch
- Cordon Permanent branch trained to grow along a wire in spur-pruning and arbor-training methods
- Flower cluster Portion of plant containing the reproductive organs
- Head Upper portion of a trellised, cane-pruned vine consisting of the top of the trunk from which shoots grow
- Lateral shoot Side shoot arising from a bud on the current season's shoot
- Leaf petiole Stem attaching leaf blade to shoot
- Node Enlarged portion of cane or shoot where leaves, clusters, tendrils, buds, and/or lateral shoots grow
- Pith Soft center of the shoot or cane
- Shoot Current season's growth from which grape clusters, tendrils, and lateral shoots grow; when more than half of the shoot becomes woody it is referred to as a cane
- Spur Lower section of a cane, usually with two buds, allowed to remain after pruning
- Tendril Twining and clinging organ used for support
- Trunk Main stem or body of a vine between roots and the head or cordons of the vine

**Figure 1: Grape bud****Figure 2: Grape shoot**

A grape bud forms at each node. Buds usually contain three growing points with partially developed shoots, including rudimentary leaves, tendrils, and grape clusters. In most instances, only the middle or primary bud grows out in the spring.

## **PLANTING AND CARE OF GRAPEVINES**

### **PLANTING SITES**

Plant in full sun if possible, or in an area with at least 6 hours of sun exposure. Decreasing the hours of sun can reduce yields, worsen fruit quality, and increase disease incidence. Construct an arbor or trellis to support the vines. Plant where the soil is at least 2 feet deep, preferably where there is no compacted soil layer below. Grapes prefer well-drained soil.

### **STRUCTURAL SUPPORT**

Grapevines require support, so provide a strong arbor or other trellis structure that will last for many years. If wood posts are used, be sure soil is not touching them by using a concrete tube to raise the top of the concrete above soil level. Use strong wire, 14 or 12 gauge (the lower the number, the thicker the wire).

### **PURCHASING PLANTS**

Select bare-root plants in winter or potted grape plants that are young and fresh-looking. The potted plant should not be root bound. Most plants from nurseries are 1 year old. Because bare-root vines dry out quickly, plant them immediately.

### **PLANTING THE POTTED GRAPE**

Potted grape plants may be put in the ground anytime as long as the plant has developed roots. Dig a hole twice as wide as the plant's container. However, if the soil when moist appears compacted, make the hole up to 3 feet in diameter. Where the plant will sit, make the hole as deep as the soil in the pot, but dig deeper around it, creating a pedestal. Carefully remove the plant, spread any circling roots, and trim off any damaged or broken roots. Plant the grape using the soil that was removed from the original hole. Amendments should not be placed in the planting hole, but compost can be worked into the soil around the hole before planting.

If planting in the dormant season, remove all side shoots, and prune the most vigorous cane to two buds. During the growing season, remove all but the strongest, healthiest shoot to become the trunk.

### **PLANTING BARE ROOT**

Grape plants also come in the bare-root form in January through early February, either heeled in a large box filled with wood shavings or sawdust, or packaged in plastic sleeves filled with mulch-type materials and soil. Before planting, soak the roots in water for about an hour or two because most likely the roots have not been watered since being shipped. At planting time, prune back the most vigorous cane to two buds.

### **STAKING THE VINE**

Attach the new vine to a stake, post, or arbor as it grows the first year; narrow green plastic tape works well. Tying the new shoot will ensure a straight trunk.

### **WATERING THE VINE**

After planting, water deeply. Bare-root grapes may not need watering again for several weeks, but potted grapes planted in summer may require frequent watering initially. Check for moisture with your finger or dig down into the soil. Once established and growing well, water deeply and less frequently, about weekly if flooding or twice weekly if drip-irrigated. Use mulch to reduce soil moisture loss.

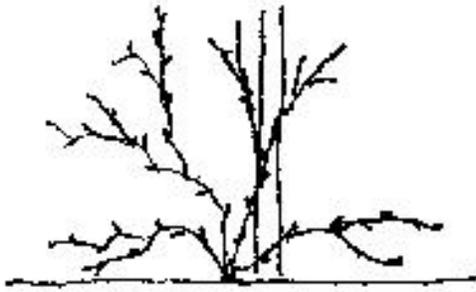
### **FERTILIZER**

No fertilizer is needed at planting time, and very little nitrogen, if any, is usually needed later. Too much nitrogen promotes excessive vegetative growth, which can promote diseases and reduce grape quality. Poor growth or yellowing leaves could indicate the need to fertilize.

### **PRUNING**

Training in the first year is the same for both spur- and cane-pruned vines. If first-year growth is minimal, cut back the vines to only two healthy buds in the winter after the first growing season. Train the most vigorous shoot up the stake to form the trunk, and prune out the weaker of the two shoots. The variety of grape determines the type of pruning (spur or cane) to use starting in the second or third year.

## STARTING A GRAPE VINE...PLANTING TO SECOND SPRING



### First winter after planting

Let the plant grow after planting, allowing it to form several shoots. On highly vigorous vines, you can start training them the first year using instructions in **Second spring after planting** (at right) or **Second summer** (on page 5).

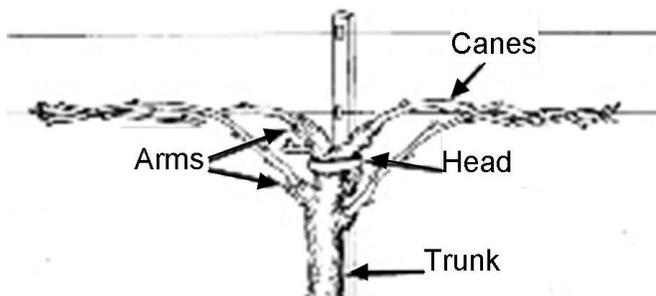


### Second spring after planting

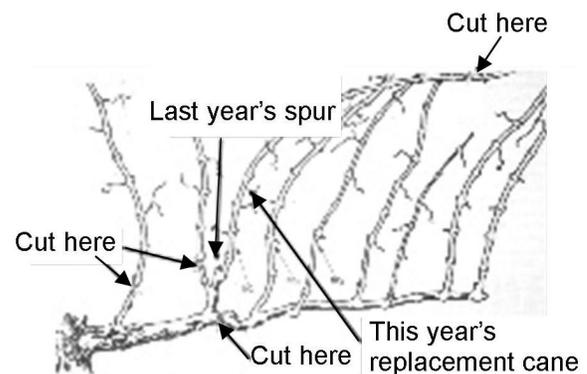
When shoots are a foot long select the most vigorous one to serve as a permanent trunk. Tie to stake loosely. Cut off all other shoots on the trunk below the head. Leave one extra shoot and head it as a back-up. On vigorous vines, if you don't have branching where you want it, cut off the top of the vine above that spot to force shoots to grow.

The following sections will guide you on how to do cane and spur pruning after the second year.

## HEAD TRAINING AND CANE PRUNING

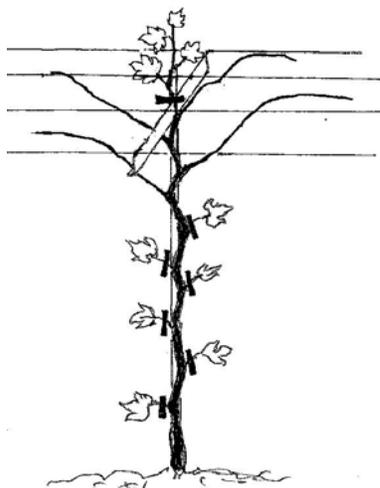


### Head training/cane pruning



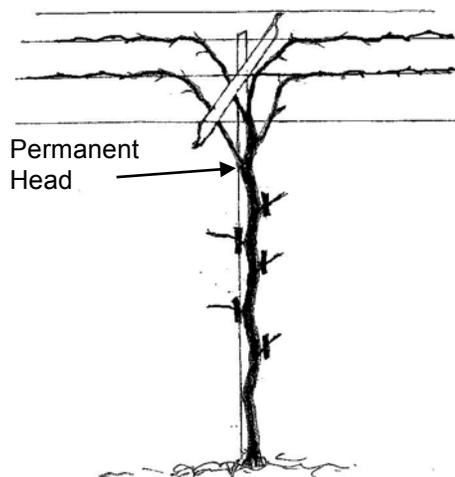
### Cane pruning (dormant season)

- Used for varieties that produce little or no fruit on shoots growing from lower buds of a cane (e.g., Thompson Seedless and Concord).
- Leave four canes per vine, fewer on weak vines and more on very vigorous vines.
- Select canes that received the most sunlight as they tend to be the most fruitful.
- Cut canes to 14 buds long, or about 3 to 4 feet.
- Wrap or tie canes along wire.
- Leave about one spur for every retained cane to produce replacement canes for the next year's growth.



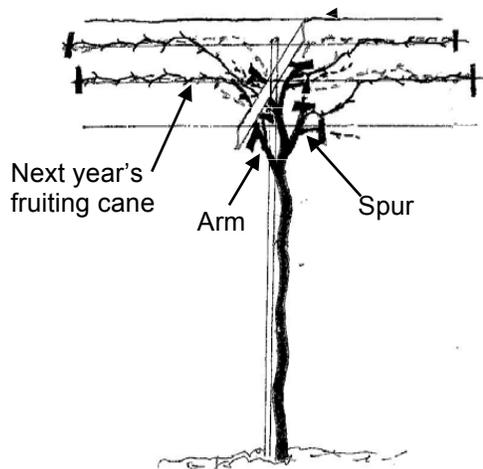
### Second summer

When the main shoot (trunk) grows to several inches above the desired height, cut it back to shoots that are just below the wires. Allow the four strongest shoots closest to the wires to grow and remove any other shoots. Remove side branches below the head, unless they are well placed.



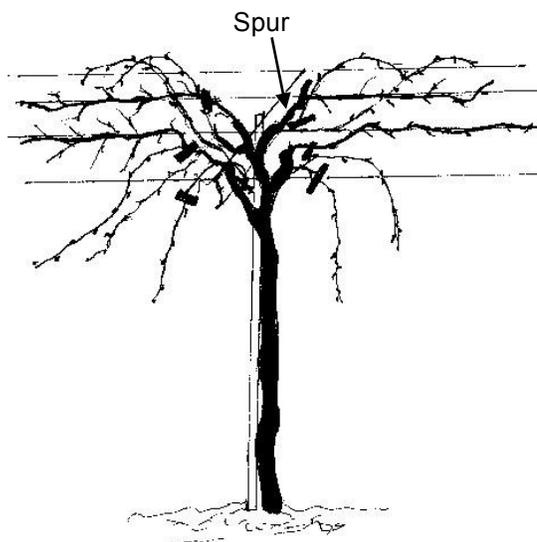
### Second winter

Leave the four canes for fruit in the third year. When cut back the following year, these will form the permanent head from which the fruiting shoots and replacement spurs will grow. They should be bearing in year three!



### Third winter

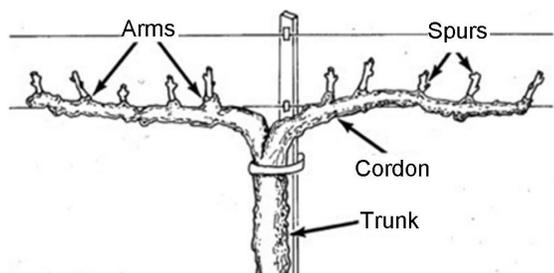
Last year's spurs should have produced long canes. Cut back each cane to 14 buds; shoots that grow from these canes will bear fruit next summer. Select one strong cane on each of the four arms near the trunk and cut each to two buds for spurs for replacement canes; the lower bud is at least  $\frac{1}{4}$  inch above old wood.



### Fourth winter...and after

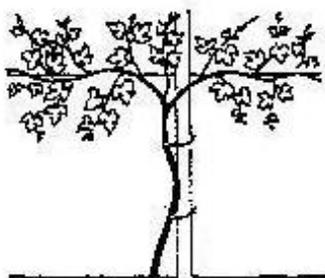
Remove the fruiting canes at their base, or cut back to a strong cane (see **Cane pruning**, page 4). Each spur sent out two shoots; select the more vigorous sun-lit cane as the fruiting cane (up to 14 buds) and prune the lower cane to a two-bud spur. Each of the four arms should have one fruiting cane and one replacement spur. You will have four canes and four spurs total.

## CORDON TRAINING AND SPUR PRUNING



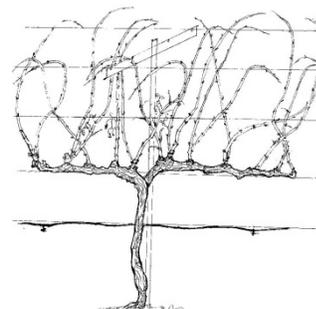
### Bilateral cordon, spur pruning

Use this method for varieties that produce fruit on shoots originating from lower buds (e.g., Flame Seedless).



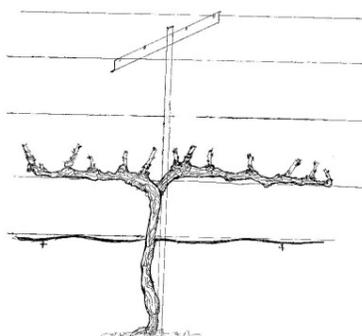
#### Second summer

When the main shoot (trunk) reaches several inches above the wire, cut it back just below the wire. When the top two buds sprout, or if two shoots are already present, train shoots along the wire to form two cordons. Tie each shoot loosely to the wire in a few places. Remove all new growth on the trunk below the cordons.



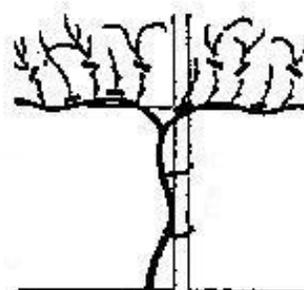
#### Second winter

Cut off all weak shoots from the two main cordons. However, if your vines are vigorous, strong canes may have grown from the cordons; create 1- or 2-bud spurs from these canes, depending on cane diameter.



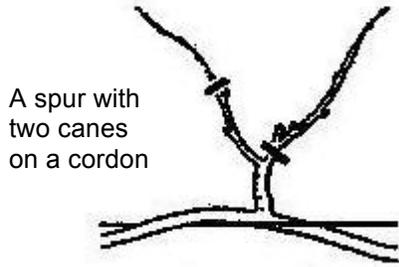
#### Second winter after pruning

Unless your vines are vigorous and produced lots of strong canes, you generally aren't pruning for fruit yet, although some clusters will form in the third summer. The main goal is to develop a strong framework. If your vines produced many strong canes, it should look (after pruning) like the diagram above.

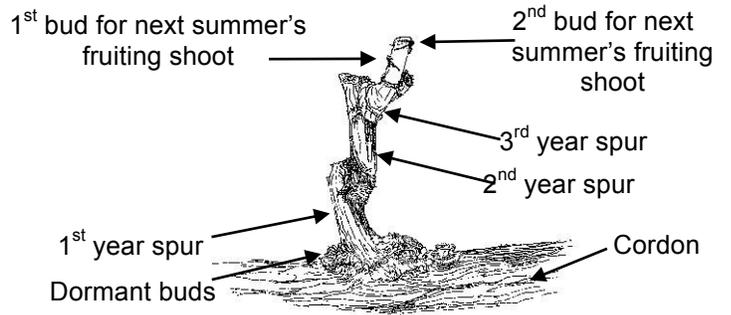


#### Third winter

Now begin pruning for fruit production. First cut out all weak shoots. Create two-bud spurs by selecting 1-year-old upright or semi-upright canes approximately 6 inches apart. Count the first bud as the one that is at least  $\frac{1}{4}$  inch above the cordon. Remove all other canes. Each spur will provide two fruit-bearing shoots during the next growing season.



A spur with two canes on a cordon



**Fourth winter and after**

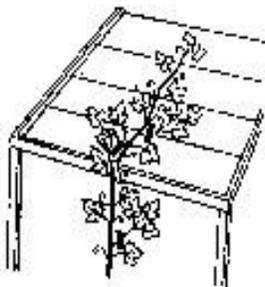
Two canes grew from last winter's spurs and had fruit. Now select the stronger, more upright, and preferably lower of the two canes to be next year's spur. Remove the upper cane. Prune the selected cane to two buds, counting the first bud that is at least 1/4 inch above the cordon or old spur.

**Fourth winter spur**

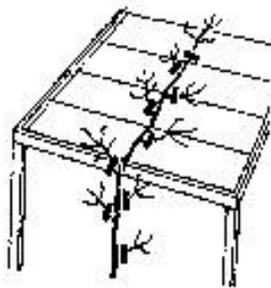
During the next winter and every winter thereafter, repeat this process. Generally, after the third-year spur, the entire stack of spurs will become too tall. Therefore, at the third-year spur pruning, look for potential next year's spurs on the cordon.

**ARBOR PRUNING**

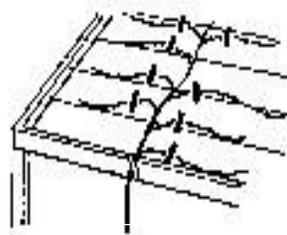
A cane- or spur-pruned vine on an arbor is maintained similar to a cane- or spur-pruned vine on a trellis, except the structure is different. Train the trunk to the height of the arbor, removing any side growths on the trunk. This may take 1 to 2 years. When the vine reaches the top, train the cordon/arm following instructions on the previous pages for spur pruning. For cane pruning, canes and arms arise from the cordon instead of from a head.



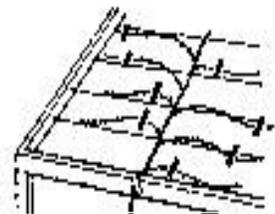
Second summer



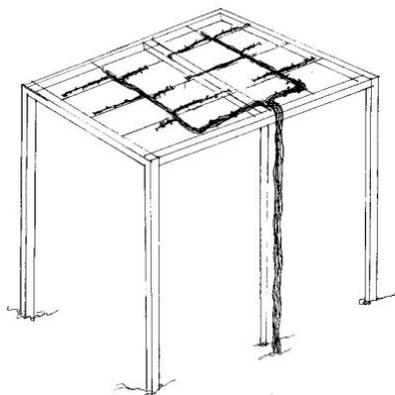
Second winter... and following spring



Spur Pruning



Cane Pruning



Multi-Cordon Method

## PEST MANAGEMENT

When growing grapes, you may encounter powdery mildew, bunch rot, erineum mites, grape leafhoppers, and/or trunk diseases like eutypa.

### **POWDERY MILDEW**

Powdery mildew is the most common disease of grapes. It is caused by a fungus, and it does not require wet or humid weather to spread rapidly. It grows best at temperatures between 70° and 85°F, and the spread is stopped temporarily when the high temperature exceeds 95°F for several hours. American juice varieties such as Concord and its relatives and Niabell are resistant.

UC research has shown that **infections can occur when temperatures reach 70°F for 6 or more hours, 3 days in a row**. In some years, these temperatures may be met just as new shoots emerge, and in some years, as late as early May. Conditions remain favorable through much of the spring, and mildew growth is minimal when high temperatures exceed 95°F.

**Symptoms:** On dormant canes in the winter, infections from the previous season appear as reddish, blotchy areas. On leaves, initial symptoms appear as yellow spots on the upper leaf surface. As spores are produced, the colony has a white, powdery appearance resembling a white dusting on leaves and fruit. Spores are produced in chains that can be seen with a hand lens. The disease creates a web-like russetting and causes berries to remain small, shrivel, crack, and fail to ripen.

**Control:** Plant in full sun where possible. Do not overwater or apply excessive nitrogen fertilizer. Keep grapes carefully pruned and remove non-fruitful shoots in the spring to allow exposure of fruit to sunlight and good airflow through the canopy; this will also help control bunch rot.

Several organic products are available to control powdery mildew: wettable sulfur or dusting sulfur every 7 days, oil (e.g., Neem or Stylet oil) every 10 days, or Kaligreen (potassium bicarbonate) every 7 days. Begin applying in spring when temperatures are favorable, and continue until hot weather sets in. Sulfur and Kaligreen are preventive only, whereas oil is also curative for recent infections. You may want to use wettable sulfur early in the season, and then as foliage thickens, use dusting sulfur for improved coverage; or use oil early and Kaligreen after fruit set in early June, because oil can russet berries. If temperatures remain hot after late June, spraying is less necessary, but mildew can spread if cooler spells persist. When the grapes begin to ripen, they are less susceptible to mildew. If rain occurs, reapply as soon as possible after the foliage dries. Good coverage (thoroughly covering top and bottom of all leaves) is important; however, you can choose to direct sprays to the fruit only. Safer's® Garden Fungicide and similar formulations consist of sulfur combined with surfactants similar to those in dishwashing liquids. Neem oil or light horticultural oil mixed with water, applied regularly, provides effective control for powdery mildew and also grape leafhoppers (see below). Do not spray oil within 15 to 30 days of a sulfur application, depending on the product used.

For additional information, refer to Pest Note #7494, *Powdery Mildew on Fruit and Berries*.

### **BUNCH ROT**

Bunch rot occurs when moisture promotes infection of fruit by a fungus (gray mold) or bacteria and yeasts (sour rot).

**Symptoms:** Infected berries shrivel, leak, and turn brown/black, and eventually most or all of the bunch collapses. Sour rot is also accompanied by fruit flies and a vinegar odor due to fermenting juice.

**Control:** Excellent control of gray mold has been achieved using canopy management. Remove the leaves around clusters on the north or east side when the grapes are the size of peas (usually early June). Leaf removal allows better air circulation around the clusters and, therefore, reduces disease. On cordon-trained vines, remove leaves only from the side of the vine that receives morning sun. Do not remove lateral shoots, which will help prevent sunburn. No spraying for gray mold is necessary if leaf removal is done. Early-season control of powdery mildew may also reduce sour rot.

### **ERINEUM MITES**

Erineum mites are microscopic pests that cause large, puckered spots on leaves.

**Symptoms:** The underside of the leaves are puckered, white, and furry initially, and turn brown in the summer. The problem is cosmetic only and does not reduce fruit production or quality.

**Control:** Where early treatments of sulfur or oil are applied to control powdery mildew, erineum mites are seldom seen. Otherwise, control with insecticidal soap early in the season.

### **GRAPE LEAFHOPPERS**

The leafhopper is a major pest of grapes in the Central Valley and can have several generations in a growing season.

**Symptoms:** One of the first noticeable symptoms is that the tiny pests fly out when foliage is disturbed (not to be confused with whiteflies). Stippling or pale yellow spots are visible on leaves. Sometimes the entire leaf may become pale yellow or white. High populations may lead to leaf drop.

**Control:** Using oil for powdery mildew also controls leafhoppers, but don't use oil within 15 to 30 days of a sulfur application, depending on the product used. Natural enemies, such as beneficial wasps, spiders, and green lacewings, may also provide control.

### **EUTYPA AND OTHER TRUNK DISEASES**

Eutypa is one of several fungi that infect pruning cuts, leading to diseased wood and vine death. Cold, damp conditions promote these fungi. High moisture also spreads the infection, so infections are more frequent when grapevines are pruned early in the dormant season. Disease symptoms commonly appear in vines older than 5 to 10 years even though infection occurs long before that.

**Symptoms:** Eutypa dieback delays shoot emergence in the spring and causes stunted shoots and leaves that are chlorotic, tattered and cupped. Darkened areas (cankers) develop in the vascular, or water-conducting, tissue of the wood. When a eutypa-infected cordon or arm is pruned, in cross-section it often shows a dark, wedge-shaped discoloration, whereas a similar disease, botryosphaeria canker, has irregular shapes on the cut surface. Esca or "measles" is characterized by streaking and spotting in woody vascular tissue, chlorotic and/or dead areas on leaves, and, in green grape varieties, small dark spots visible on berries.

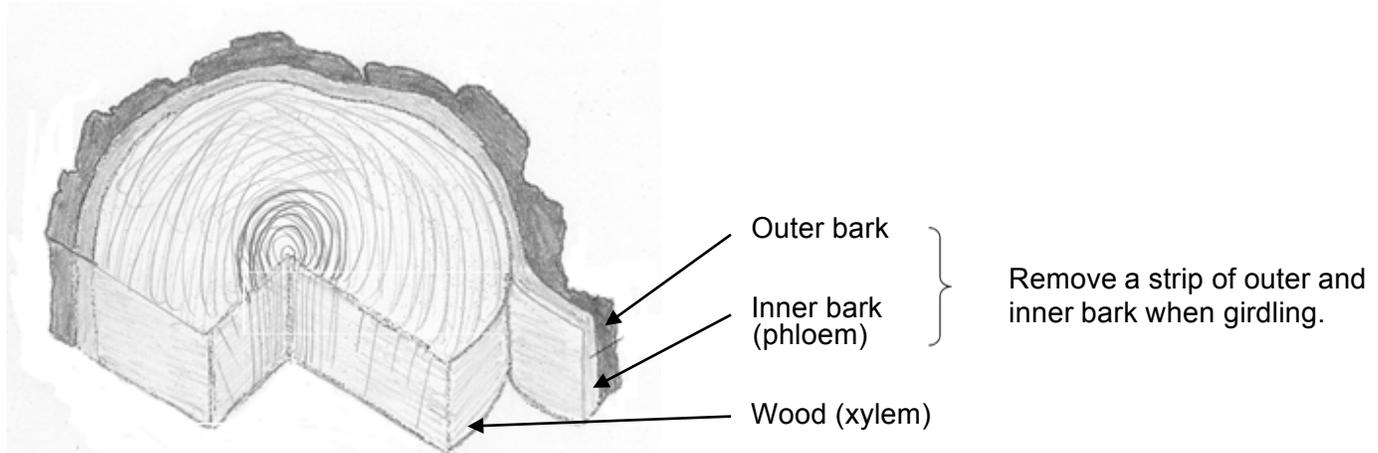
**Control:** Prune only in late winter, even as late as bud break. If large cuts are needed, cut them long initially, flag them, and make the final cut in May.

### **GIRDLING AND CLUSTER THINNING TO INCREASE BERRY SIZE**

In commercial table grape vineyards, vines are routinely girdled each year during fruit set to increase berry size. Girdling can make berries about 10 to 30 percent larger if done correctly and is effective only on seedless varieties.

#### **HOW TO GIRDLE VINES**

Girdle in late May, at 10 to 14 days past full bloom. Girdling removes a strip of inner and outer bark all the way around the trunk. The inner bark, or phloem, is where carbohydrates (sugars and starches) produced by photosynthesizing leaves move to developing organs, including the fruit and roots. Removal of a strip of bark prevents the movement of carbohydrates to the root system, thus making more available for fruit growth until the girdle heals in a few weeks. Remove a strip of bark  $\frac{3}{16}$  to  $\frac{1}{4}$  inch wide down to the wood (illustration page 10). A double-bladed girdling knife makes the job easier. It is essential that all phloem tissue be removed, so press fairly hard. Check for completeness about 20 minutes after the girdle is made; a proper girdle will have the appearance of an all-white, fibrous ring of wood (xylem). Remove any brown portions of the ring; if there is even  $\frac{1}{8}$  inch of phloem tissue left, the girdle's benefits are lost. Be sure not to cut so deeply as to damage the water-conducting xylem and weaken the vine. With a proper cut the ring should just pop out.



## CLUSTER THINNING

Too many clusters of grapes will reduce fruit size and possibly vine vigor. Thinning to one cluster per shoot is the simplest way to ensure that remaining clusters will develop more and larger berries. For best results, excess clusters should be removed during the period from bloom to shortly after fruit set.

Another method of increasing berry size is to cut off the “tail” (bottom  $\frac{1}{4}$  to  $\frac{1}{3}$ ) of each cluster. This should be done after fruit set, when the berries are approximately pea-sized.

## REFERENCES

- UCCE Master Gardeners of Sacramento County. (916) 876-5338 [sacmg.ucanr.edu](http://sacmg.ucanr.edu)
- Fair Oaks Horticulture Center, Workshop and Open Garden schedule: [sacmg.ucanr.edu](http://sacmg.ucanr.edu)
- UC IPM (Statewide Integrated Pest Management Program): [ipm.ucanr.edu](http://ipm.ucanr.edu)
- California Garden Web: [cagardenweb.ucanr.edu](http://cagardenweb.ucanr.edu)
- UC Publications: [anrcatalog.ucanr.edu](http://anrcatalog.ucanr.edu)
  - Pest Note 7494 Powdery Mildew on Fruit and Berries
  - The Home Orchard, UC Publication 3485
  - Grape Pest Management, UC Publication 3343
  - Master Gardener Handbook, UC Publication 3382
- Growing Grapes in the Home Garden: presentation by Chuck Ingels, UCCE Sacramento County Viticulture, Pomology, and Environmental Horticulture Advisor, [sacmg.ucanr.edu/files/263737.pdf](http://sacmg.ucanr.edu/files/263737.pdf)
- Sunset Western Garden Book
- Agricultural Research Service: [www.ars.usda.gov](http://www.ars.usda.gov)

**GRAPE CULTIVARS IN THE FAIR OAKS HORTICULTURE CENTER VINEYARD – 2019**

Variety	Seeds?	Color	Ripens	Suitability for Home Use	Spur or Cane	Berry Size	Comments
Autumn Black	Yes	Black	Sept-Oct	Good	Spur	Large	Mellow, thin-skinned, sweet
Black Emerald	No	Black	August	Excellent	Spur	Medium	Juicy, very tasty, firm; thin skin
Black Monukka	Hollow	Black	early Aug.	Excellent	Cane	Medium	Delicious, popular black grape
Black Rose	Yes	Black	Sept.	OK	Spur	Huge	Thin skin; very sweet, prone to rot
Blush Seedless	No	Red	late Aug.	Very good	Spur	Medium	Tender, crisp skin with meaty flesh
Cabernet Sauvignon	Yes	Blue-Black	late Aug.	OK	Spur	Small	Vigorous, widely grown wine grape variety
Eastern Concord Seedless	No	Purple	mid Sept.	Excellent	Cane	Medium	Juicy, sweet, concord flavor without the seeds
Dawn Seedless	No	Green	July	Very good	Spur	Medium	Good flavor, crisp skin
Fiesta	No	Green	late July	Excellent	Cane	Medium	Tasty greenish-white grape
Flame Seedless	No	Red	July	Excellent	Spur	Medium	Makes good raisins
Italia	Yes	Green	early Aug.	Excellent	Spur	Large	Unique flavor, very good
Merlot	Yes	Blue-Black	August	OK	Spur	Small	Vigorous, widely grown wine grape cultivar; prone to bunch rot
Muscat of Alexandria	Yes	Green	early Aug.	Good	Spur	Large	Great flavor, easily sunburned
Muscat, Diamond	No	Green	July	Excellent	Either	Medium	Great flavor, our most popular grape
Perlette	No	Green	July	Good	Spur	Medium	Nice flavor, prone to bunch rot unless berry thinned
Princess	No	Green	Sept-Oct	Good	Cane	Large	Nice, sweet flavor
Ruby Seedless	No	Red	August	Good	Spur	Medium	Tasty late cultivar, good raisins
Suffolk Red	No	Red	July-Aug	Excellent	Spur	Medium	Sweet, good for desserts and jelly
Summer Royal	No	Red	July	Good	Spur	Medium	Very sweet, fruit set can be poor
Sweet Scarlet	No	Red	August	Good	Cane	Medium	Light, pleasant, muscat flavor
Thomcord	No	Blue-Black	July-Aug	Excellent	Cane	Medium	Thompson Seedless x Concord cross, popular
Thompson Seedless	No	Green	August	Excellent	Cane	Small-Medium	Most popular table and raisin cultivar statewide
Tokay	Yes	Red	Aug-Sept	Very good	Spur	Large	Prone to sunburn, unique flavor

May 2019, Grape Cultivars chart updated. June 2017, revised by UCCE Master Gardeners of Sacramento County Cathy Barkett, Diana Blasingame, Rose Gong, Carole Ludlum, Connie McMillan and Matt VanAirdale. Edited by Judy McClure, UCCE Sacramento County Master Gardener Program Coordinator, and Chuck Ingels, UCCE Sacramento County Pomology, Viticulture and Environmental Horticulture Advisor. July 2012, written by Chuck Ingels and UCCE Sacramento County Master Gardeners. Drawings by UCCE Sacramento County Master Gardener Diana Blasingame, Sunset Western Garden Book, and *Grape Pest Management*, UC Publication 3343.