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Growing garden grapes

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GROWING GARDEN GRAPES

The versatility of the grape has made it a long-time favorite small fruit. Today, it is relished as fresh fruit or juice, and is widely used in jams, jellies, dessert recipes, baked goods (as raisins) and delectable home-made wines. The berries may be white (greenish-yellow), red, blue, purple or black. Each type possesses distinct aroma, flavor, texture and other qualities that make it unique for wine-making, table or processing use. Grapes contain a good assortment of vitamins and minerals, though they are not outstanding for any one nutrient. Grapevines come in many forms and can be quite ornamental in garden settings.

GRAPE IS A LONG-TERM CROP

The grapevine is a long-lived woody perennial plant, and takes several years after planting to produce fruit. Normally vines do not reach full maturity and fruit production for about 6 years. Under ideal conditions, vines have borne fruit for as long as 100 years.

Outside the few small and clearly defined fruit-growing areas in Canada, grape growing may not be successful. The vine may not be able to consistently produce mature fruit and wood within the short growing season. The major limiting factor, however, is the severity of the winter. Most varieties are unable to withstand extremely cold winters (below -25°C) without protection, and many show some damage at temperatures of -15°C . One severe winter can easily set back or completely destroy an apparently successful vine that has flourished for several years. However, you can take many steps to improve your chances for reasonable production in marginal areas.

Site

Before planting, carefully consider the choice of a permanent planting site. Since grapes occupy the same site for many years, choose a location that provides as much heat as possible and least interferes with other garden activities. Sheltered home surroundings with southern exposures are usually warmest. The difference between good- and poor-quality grapes, or between success and failure, may be as little as half a degree in the average temperature over the growing season. North-south rows allow better exposure of foliage to sunlight, particularly when light is limited during the early morning or late afternoon. Sloping areas generally have higher night-time temperatures and are less likely to freeze, but avoid low areas at the bottom of slopes since cold air will settle there and injure the vines. To minimize soil erosion on steep slopes, set rows to run across the slope.

Soil

Grapes grow well in a wide variety of soils provided drainage is satisfactory. Grapevines are very sensitive to poor drainage which restricts root growth and impairs the root's ability to extract nutrients from the soil.

A good garden soil is one containing a generous supply of organic matter such as well-rotted manure, decomposed compost or peat moss, since these improve the physical texture and provide valuable plant nutrients. In sandy soils, organic matter improves water holding capacity and prevents excessive loss of nutrients through leaching; in clay soils it improves drainage and aeration.

Choice of cultivars

There are many cultivars or varieties of grapes. It is important to select cultivars that are known to perform well in your area. For example, late-maturing cultivars are not suitable in areas where the growing season is short. Depending on personal preferences, most grape cultivars can be used for making wine, juice and jellies, or as table grapes. However, some cultivars such as Foch and Seyval are primarily wine types, while others such as Seneca and the seedless Himrod are excellent as dessert or table grapes.

Cultivars that have been developed from the native North American species *Vitis labrusca* and its crosses tend to have large leaves, a drooping growth habit, and berries with slip-skins and pronounced fruity flavors. Concord (blue), Niagara (white) and Agawam (red) are quite popular in southern Ontario. Earlier fruiting varieties that may perform better in shorter growing seasons or colder climates include the blue-black Fredonia and Van Buren and the white Ontario and Himrod.

French hybrids were produced by crossing the European grape (*Vitis vinifera*) with one or more of the native American species, especially *Vitis rupestris* and *Vitis lincecumii*. Primarily wine grapes, they are more compact in growth habit, highly fruitful, and very suitable for home gardens. Their flavor is more like that of the European grape, without the pronounced fruity labrusca flavor typical of American varieties. Foch (blue) and Aurore (white) mature their fruit very early in the season, while Seyval (white) and De Chaunac (blue) are very productive mid-season cultivars.

European or vinifera types require mild climates and long growing seasons. Even at favorable sites, expect some winter injury in most years. Bury part or all of the vine to provide additional protection from severe winter temperatures. Riesling and Chardonnay (both white), Gamay (blue) and Pinot Noir (black) are examples of vinifera grapes.

Grapevines are self-fruitful and do not require other cultivars for cross-pollination. Most North American and hybrid cultivars are grown on their own root, but the European (vinifera) cultivars must be grafted onto a rootstock. Some hybrids are also available as grafted vines. Whenever possible, buy planting stock from a specialized nursery or retail outlet close to the planting site.

Planting

The best time to plant grapes is early spring, as soon as the soil can be suitably worked. Fall plantings are less successful in colder climates, and more care must be taken to ensure that vines are protected with mounds of soil before winter sets in.

The choice of planting stock is important; cheap plants are often a poor investment. It is best to deal directly with a reputable nursery, order early and

either specify delivery time or pick the vines up at the nursery for immediate planting.

Handle young plants carefully to prevent drying out before planting. They should be kept moist in transit. On arrival, immediately unwrap the plants and soak the roots in water for several minutes. Plants should be 'heeled in' if they arrive too early or before the garden site is ready. To 'heel in' plants, dig a hole or trench about 30 cm deep in a well-drained and shady location, insert the plants close together and firm the soil well around the roots with the tops exposed. If adequately watered, you can keep plants like this for several days. However, you should make every effort to set plants in their permanent locations before bud growth starts.

Soil preparation before planting is important to the success of newly planted vines. The soil should be well worked. Do not add fresh manure or straw. Make the planting holes large enough to accommodate the root system. Prune dead or broken portions of the root system and trim long roots to facilitate planting (Figure 1);



Figure 1 One-year-old grapevine. Trim roots before planting and cut back top, as shown.

additional root pruning is not necessary. Set self-rooted vines at about the same depth as they grew in the nursery. Plant grafted vines with the graft union several centimetres above the soil surface to prevent scion rooting. Firm the topsoil well around the roots to ensure good soil-root contact. This allows soil water to reach the roots and promotes the formation of root hairs through which the plant absorbs nutrients from the soil. Many transplanting failures are due to insufficient or improper firming of the soil. Leave a slight depression around the base of each plant to facilitate watering during the first year.

Before or immediately after planting, cut back vines to a single cane of two or three buds (Figure 1). This forces growth into the lower shoots and prevents the vine from drying out before growth starts. However, if it is difficult to determine the condition of the dormant vine, five or six buds can be left. When growth starts, allow only the most vigorous or desirable ones to develop. An additional one-bud stub may be left for tying the supporting twine (see "Training"), thus avoiding girdling of the cane or trunk as it increases in diameter.

CULTIVATION AND CARE

Fertilizer

Grapes need an adequate and balanced supply of nutrients which may be supplied from organic matter or inorganic fertilizers. The nutrients required depend on the type of soil, the cultural care given and the age of the plant. Most good garden soils contain an adequate supply of organic matter for newly planted vines. Many gardeners routinely fertilize their gardens each spring, making additional fertilization during the growing season unnecessary. More problems arise out of overfeeding than underfeeding, so use fertilizers sparingly.

When fertilizing becomes necessary in later years, organic matter or fertilizers should be applied early in the spring as the buds start to grow. Well-rotted manure or compost, liberally used, generally gives excellent results. If a fertilizer is used, apply about 0.5 kg of a general garden fertilizer such as 10-10-10, 7-7-7 or 10-6-4 to each vine early in the spring. Use a fertilizer high in potash (K) for mature, producing vines. Do not use fertilizers with a high nitrogen (N) content, particularly if applied after early- to mid-summer; nitrogen stimulates late-season growth which will not harden off before winter.

Water

Newly planted vines must be protected from drying out. Too little moisture stunts plants and delays maturity. In times of drought, water vines thoroughly to keep the plants growing (especially during the early years).

Weeds

Weeds and established lawn grasses compete with grapevines for available water and nutrients. During the early part of the growing season, this competition is undesirable. Work the top of the soil well around each vine, starting early in the spring and continuing until early- or mid-summer. Shallow cultivation prevents damage to the vine roots. By allowing weeds to grow after mid-summer, the competition for water and nutrients helps to harden off the vines for the winter and improves the vine's ability to withstand cold temperatures. As an alternative to weed growth which tends to look untidy, annual ryegrass can be sown in mid-summer. Mow weeds and grasses to a height of 15 cm or less in late summer during grape ripening and harvest. If vines are growing poorly, weed and grass growth is not recommended since additional competition will further restrict vine growth.

Chemical weed killers are not usually recommended for home plantings of grapes. They are difficult to apply in a small garden that has other crops, some of which may be susceptible to herbicides. Grapes are very susceptible to injury by 2,4-D and related herbicides widely used to control broad-leaved weeds such as dandelion and clover in lawns. Even spray or vapor drifts originating some distance away may injure vines. Plants may exhibit symptoms of injury for 2-3 years after exposure. Symptoms of 2,4-D injury are often confused with disease injuries — the leaves become misshapen with closely packed thick, prominent, yellowed veins, fruit may mature late or not at all and wood may not harden properly for winter survival. If injury is not too severe, normal growth may resume the following year.

As an alternative to herbicides, weeds can be suppressed by using a mulch of straw, grass clippings, wood bark, or other materials 5-10 cm deep around each plant. Mulches also help keep moisture in the soil, protect the roots from fluctuations in soil temperature and slowly return organic matter and nutrients to the soil as they decompose. Add to the mulch periodically and occasionally cultivate it to keep it aerated. Because of the grape's sensitivity to 2,4-D, do not use grass clippings from the first two or three cuts following application of this herbicide.

Pests and diseases

Good garden practices keep plants healthy and more resistant to insects and diseases. Plants that lose their leaves to insects or diseases during the growing season are unable to mature either fruit or wood.

Leafhopper, berry moth and flea beetle are common insect pests of grapes. The rose chafer, an insect found in many areas across Canada especially on sandy soils, uses the grape as a host, destroying leaves, flower clusters and newly set fruit. The grape phylloxera causes galls, or swellings, to form on the lower leaf surface of many cultivars and root galls may occur on susceptible varieties. European or vinifera cultivars are particularly susceptible to phylloxera root galls which can be fatal to the vine, making it essential to use resistant rootstocks.

The foliage and fruit are also subject to fungal diseases, particularly the mildews, which are most likely to occur during wet seasons or in poorly drained, low-lying areas. Bunch rot is also common under these conditions. Ensure the foliage canopy is open for adequate air circulation to reduce the incidence of many fungal diseases.

Generally, insects and diseases of grapes are easily controlled with appropriate garden sprays or dusts. Follow the directions on the label. Spray during the cooler part of the day to minimize plant damage.

Birds can be a major pest of grapes. Since maturing fruits do not need much direct sunlight to develop color, you can reduce bird damage by tying a paper or film bag over each bunch of grapes. Cut a few small holes in the bag to release moisture and provide adequate air circulation. Alternatively, the vines can be covered entirely with nets.

PRUNING AND TRAINING

Proper pruning and training of grapevines is perhaps the most neglected and least understood aspect of growing garden grapes. Successful fruit production or pleasing ornamental effect depend on your understanding the growth and fruiting habits of the vine.

In its natural habitat, the grapevine is a vigorous plant that develops into an immense woody vine, often climbing to the tops of tall trees with the aid of its tendrils. Under these conditions, however, the vine is primarily vegetative and bears little fruit. By supporting the vine and restricting the vegetative growth by pruning, you can increase fruit yield and improve maturity of both fruit and wood.

The grape bud is complex, containing three or more growing points. Normally, only the main growing point develops into a fruitful leafy shoot. The second growing point may develop if the main point is damaged (through winter injury, for example), but fruit yield will depend on the cultivar. The third growing point, which is entirely vegetative and can withstand colder winter temperatures, rarely develops unless the first two growing points are both damaged.

For good fruit production, prune grapevines annually to remove excess growth and maintain an adequate number of fruitful buds. Training, to maximize exposure of the foliage to sunlight, will ensure good fruit production in the current year as well as start new fruit buds for the following growing season. Proper pruning and training also facilitate cultivation, control of insects and diseases, and winter care.

Pruning

Prune any time during the winter while the vine is dormant. In colder regions, wait until late winter or early spring, after the most severe winter weather has passed, so that the degree of pruning can be adjusted according to the extent of winter bud damage. Late-spring pruning may result in some 'bleeding' of the vine, but this does little or no harm.

Shoots produced in the previous growing season are called canes. Canes, retained at pruning, carry a number of buds which develop into new shoots that

produce flower or fruit clusters near their bases. Shoots arising from wood older than 1 year are usually unproductive, depending on the cultivar. The basal one or two buds of North American cultivars are rarely fruitful so their fruiting canes must carry at least five or six buds.

Training

Although many training systems are practised, the four-arm Kniffin system (Figure 2) is popular in areas where winter protection is not essential. It is quite satisfactory for most varieties, easy to manage and well adapted to the home garden. It will serve as a good example to demonstrate the principles of pruning and training.

To make the trellis, use durable wood posts, such as cedar, preferably pressure-treated with preservative (unpeeled posts may harbor pests in the bark that will shorten the life of the post; creosote from railway ties may injure the plants). Set the posts at 10-12 m intervals in rows about 3 m apart. Brace the end posts for greater stability. Tightly string two 9-gauge wires along post rows at about 0.6-0.8 m and 1.5-1.7 m above the ground.

Plant the vines 1.5-2.5 m apart, depending upon varietal vigor, directly under the wires.

During the first 2 years of vine establishment, train the most vigorous shoot to grow up to the top wire. This shoot will become the main or primary trunk. Support this shoot in an upright position by twisting it loosely around a string fastened to the one-bud spur retained at planting time (see "Planting") and pulled up tightly to the top wire (Figure 2A). If the cane is too short to reach the top wire the following spring, cut it off just above the last good bud, tie a string below this bud and draw the cane up tight and straight towards the top wire (Figure 2B₁). Train a vigorous shoot originating below the tie up to the top wire by twisting around the supporting string. When the cane is long enough to reach the top wire, cut it off just above the wire and tie the cane tightly to the top wire. Until this stage is reached, remove all side shoots at pruning time (Figure 2B₂).

The framework of the vine consists of the main trunk and four arms. Once the trunk reaches the top wire, form the arms by retaining two canes on each side of the trunk and about 5-10 cm below the wires. Remove all other canes (Figure 2C), and cut back the four arm canes to four or five buds. If the vine is weak, each arm may be cut back to two buds.

Since flowering and fruit production drain most of the vine's resources, it is essential to remove all flower clusters as soon as they develop during the first 2 or 3 years, until the four arms are established. Until the vine reaches maturity (about 6 years after planting), allow only one-third to one-half of the crop to develop by removing or thinning flower clusters or fruit to maintain vine vigor. If the vine is weak, remove all flowers and fruit during this period. Once fruit production commences, you must maintain a proper balance between vegetative growth and fruit production.

At pruning, select one new cane on each of the arms close to the main trunk. Cut these back to five to eight buds depending on the vigor of the vine (Figure 2D). Remove all other canes. Near the base of each of the main arms, leave a one- or

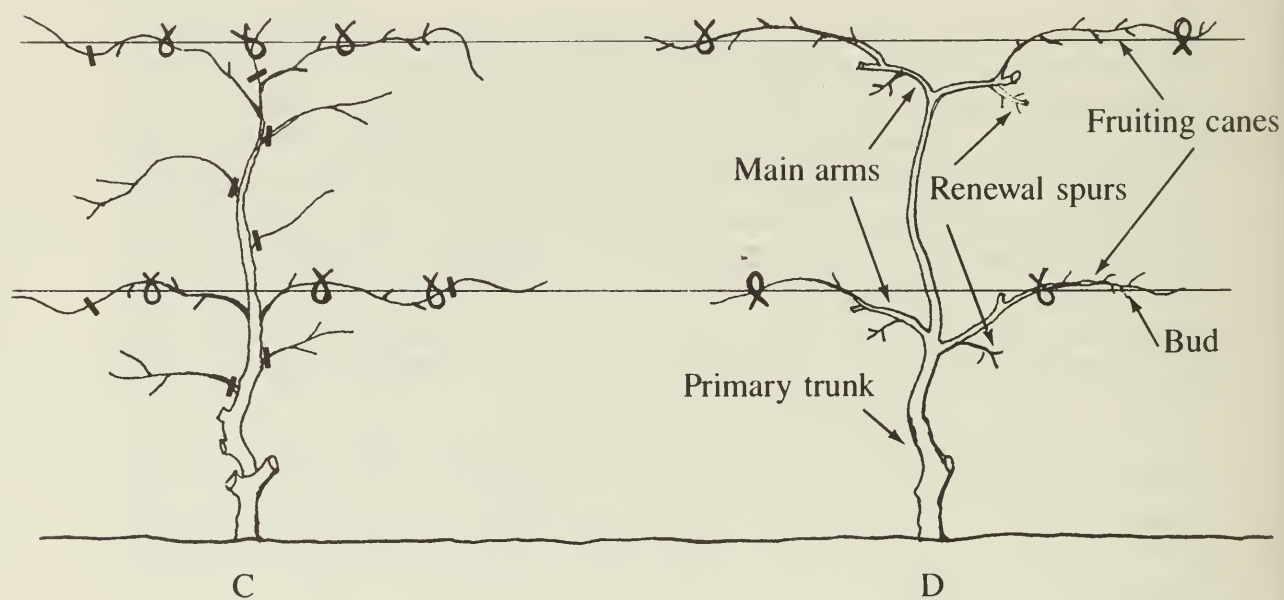
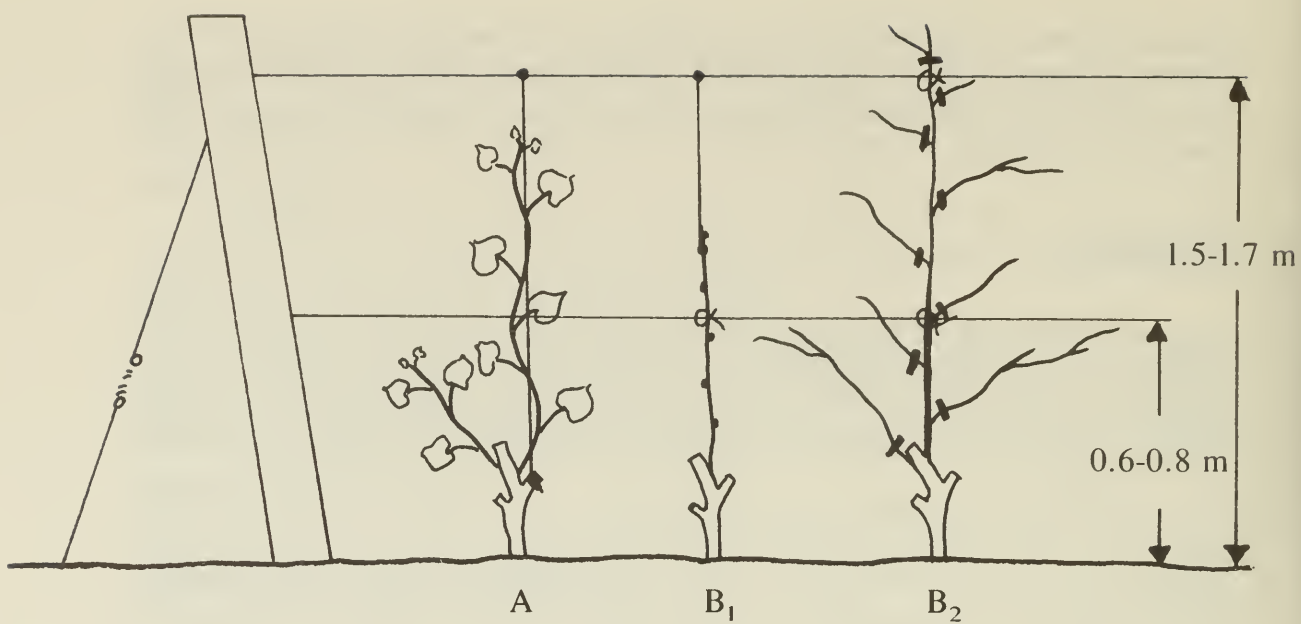


Figure 2 The Kniffin system, using four arms

two-bud renewal spur (Figure 2D) to provide fruiting canes close to the main trunk for the following growing season. Except for the number of buds retained, prune vines this way in subsequent years.

‘Balance prune’ mature plants by retaining a certain number of buds according to the growth of the vine in the previous growing season. Usually about 25-30 buds are retained for the first 0.5 kg of canes removed and an additional 5-10 buds are retained for each additional 0.5 kg. Remember that the basal buds of North American cultivars are not fruitful, so canes retained should have at least five buds. Hybrid cultivars, on the other hand, tend to be very productive, with fruitful shoots originating from old wood, so a full crop may be produced from a much smaller number of ‘count’ buds.

A mature plant may yield up to 10 kg or more of fruit, particularly if the vine is well maintained. The size of the fruit cluster is different for each variety and ranges in weight from 50-60 g up to 1 kg.

After several years, the arms tend to become very woody and the fruiting canes develop further and further away from the main trunk. Allow new shoots to develop close to the main trunk to form replacement arms. The main trunk should also be renewed about every 10 years by training a shoot from near the ground as for a newly planted vine. When the new shoot reaches the top wire and starts to form arms, remove the old trunk at pruning time.

Commercial growers often use the six-arm Kniffin system to increase fruit production. The trellis has three wires, spaced at about 0.6, 1.1 and 1.6 m above ground.

In areas where winter temperatures may fall below -30°C, the training systems shown in Figure 3 are preferred. Annual pruning is similar to the Kniffin system, except that the main trunk is kept below the bottom wire. This makes it easy to lay vines on the ground in late fall and cover them with soil, as is done to protect climbing rose bushes in winter. Snow cover also acts as a good insulator. In the spring when the danger of severe frost is over, but before the buds start to grow, remove the soil and tie the canes to the trellis. As the trunk and arms get older and less flexible, they will need to be replaced by renewal shoots. Vines trained to the systems shown in Figure 3 can be planted closer together than in the Kniffin system. Distances between vines may be as little as 1 m for upright growing cultivars.

Always cover grafted vines with soil in late fall to a height of several centimetres above the graft union. In the event of a severe winter killing the top of the vine, the soil will protect some buds of the top or scion. The soil must be removed from around the graft union for the summer to prevent scion rooting.

Grapevines can be espaliered on walls and fences, or trained to grow as focal points and ornamental accents. They are also valuable as shade or screen in the home landscape. Plant vines grown for these reasons about 1.2 m apart. When trained to structures such as arbors, prune the vines less severely to leave long canes branching out to cover the arbor (Figure 4). The quality of fruit from ornamental plants is not as good as that from vines grown mainly for their fruit. Where there is little interest in actual fruit production, it is better to choose a very hardy cultivar.

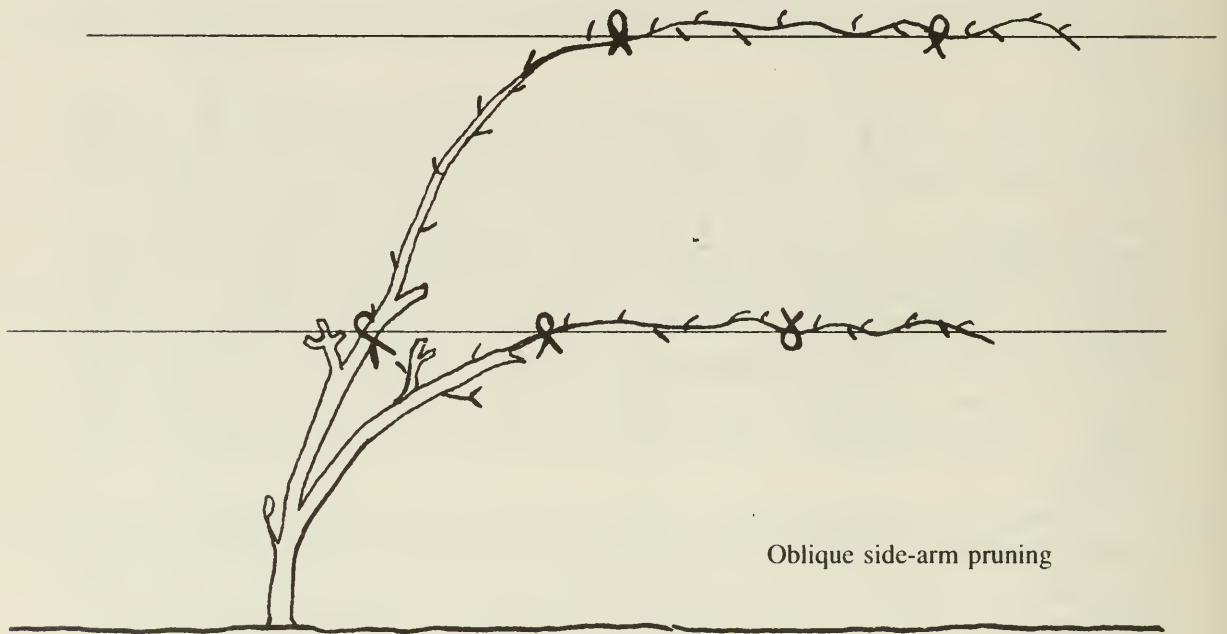
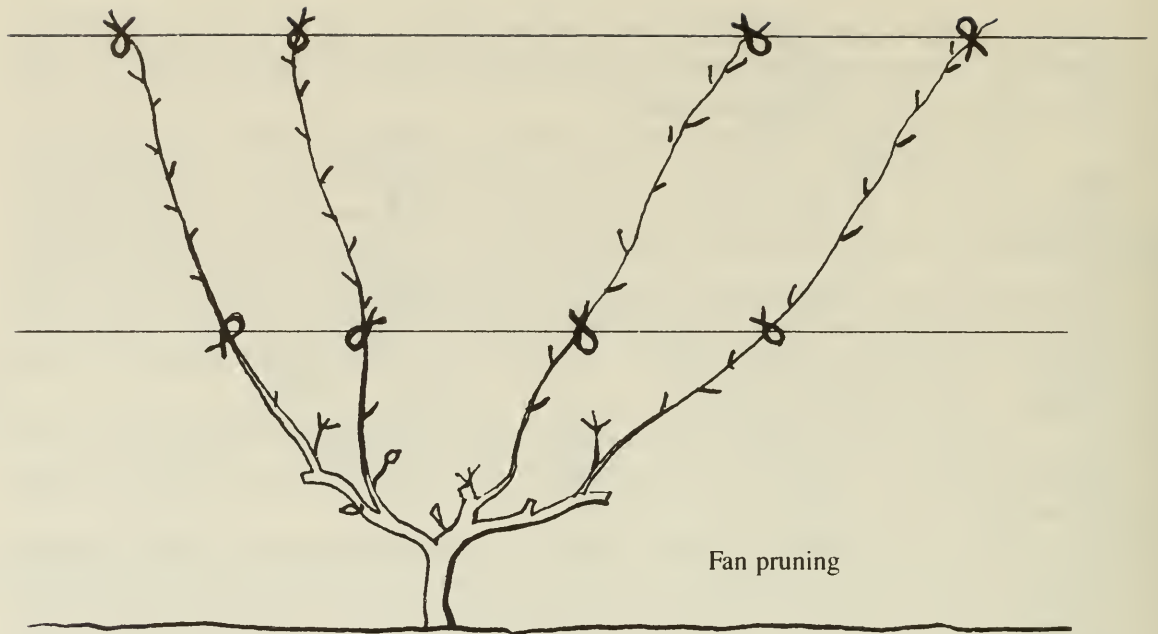


Figure 3 Two alternate pruning methods

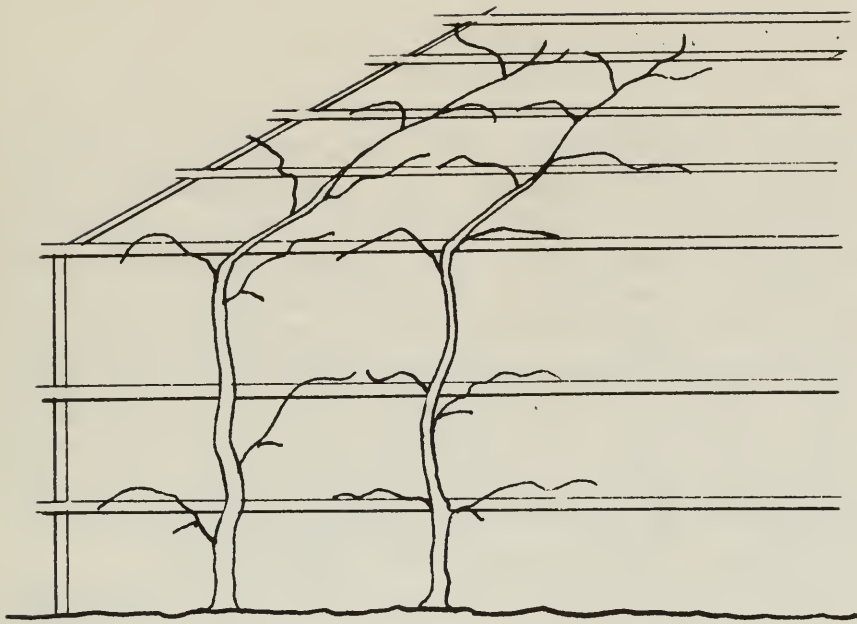


Figure 4 Training grapevines on an arbor

Improving maturity and fruit quality

Even with the earliest varieties, do not expect fruit to mature properly every year. Favorable temperatures with plenty of sunshine during ripening naturally improve grape quality. There are, however, several measures which may hasten maturity and improve the size of the grapes.

Thin out some fruit and remove diseased, blemished or abnormally small or misshapen berries to allow the leaves to provide more sugars to the remaining fruits. The French hybrids respond well to flower or fruit cluster removal since these cultivars tend to overcrop. The best time to adjust the crop load on French hybrids by removing clusters is just before they bloom. Summer pruning is not normally recommended, although removing weak or overcrowded shoots may reduce or eliminate unnecessary shading during the growing season.

Girdling is an old practice still in common use in some areas. When performed correctly, it can improve the size and appearance of fruit. Remove a narrow ring of bark about 0.5 cm wide from the cane immediately below the fruit cluster shortly after fruit set. Carbohydrates (sugars) and other organic nutrients will accumulate above the girdle and be used more effectively by the developing fruit than by the rest of the vine. However, girdling will weaken the vine if overdone, since the part of the vine below the girdle may be starved of necessary nutrients. This technique should be restricted to only a few selected clusters each year.

HARVESTING

As grapes ripen, they become sweeter, less acid and acquire the aroma, flavor and fruit color characteristic of the grape variety. Sugar content is by itself an excellent indicator of fruit maturity and quality. Since most varieties change color and reach full size several days before they are ready for picking, these characteristics are unreliable indicators of maturity. Instead, grapes should be harvested when both color and flavor are satisfactory. The dark-colored varieties tend to change color rapidly to their characteristic blue, black or purple as they mature, while the light-colored varieties acquire a translucent whitish or yellowish tinge.

For table use and winemaking, harvest the grapes when both color and flavor reach their peak, if the season allows. Unless berries contain at least 20% sugar, additional sugar will be needed for winemaking purposes. Harvest grapes for jellies slightly before peak maturity, since the pectin content is greatest at this time. Some cultivars contain more pectin and are especially suited for jellies.

Harvested grapes do not get sweeter or improve in color after picking and will, in fact, lose quality. If the fruit needs to be held for any length of time before use, discard all over-ripe, diseased or damaged grapes and keep the rest in a cool place or refrigerator. Grapes begin to lose flavor and may decay after 2-4 weeks.

CONVERSION FACTORS

Metric units	Approximate conversion factors	Results in:
LINEAR		
millimetre (mm)	x 0.04	inch
centimetre (cm)	x 0.39	inch
metre (m)	x 3.28	feet
kilometre (km)	x 0.62	mile
AREA		
square centimetre (cm ²)	x 0.15	square inch
square metre (m ²)	x 1.2	square yard
square kilometre (km ²)	x 0.39	square mile
hectare (ha)	x 2.5	acres
VOLUME		
cubic centimetre (cm ³)	x 0.06	cubic inch
cubic metre (m ³)	x 35.31	cubic feet
	x 1.31	cubic yard
CAPACITY		
litre (L)	x 0.035	cubic feet
hectolitre (hL)	x 22	gallons
	x 2.5	bushels
WEIGHT		
gram (g)	x 0.04	oz avdp
kilogram (kg)	x 2.2	lb avdp
tonne (t)	x 1.1	short ton
AGRICULTURAL		
litres per hectare (L/ha)	x 0.089	gallons per acre
	x 0.357	quarts per acre
	x 0.71	pints per acre
millilitres per hectare (mL/ha)	x 0.014	fl. oz per acre
tonnes per hectare (t/ha)	x 0.45	tons per acre
kilograms per hectare (kg/ha)	x 0.89	lb per acre
grams per hectare (g/ha)	x 0.014	oz avdp per acre
plants per hectare (plants/ha)	x 0.405	plants per acre

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