



Grapes can be grown in almost any fruit garden in Kansas. They are long-lived, easy-to-grow plants that bear early and do not require much space. With proper care, a vine should produce between 10 and 20 pounds of grapes.

Growing Requirements

Grapes grow well in many different soils, but do best in fertile, deep, well-drained loams. Soil should be at least 4-6 feet deep for good root development, avoiding soils that are extremely wet or dry. Well-drained soil is essential for growing grapes regardless of other desirable soil characteristics. Soil pH can vary, but if pH is above 7.3 as it is in some western Kansas locations, sulfur can be added to reduce alkalinity. Sulfur applications may have to be repeated in areas where soil alkalinity is related to water quality.

Grape Varieties

Kansas gardeners have a wide selection of grape varieties. These include American bunch grape varieties derived from wild species native to North America. Bunch grape varieties and French-American hybrid grapes are among the most productive in Kansas. Temperature-hardy grape varieties can be grown throughout the state, and less hardy varieties can be grown successfully in south central and southeast Kansas. European grapes need a long growing season and mild winter temperatures and are not well adapted to Kansas. They are mostly grown for table grapes and raisins. Muscadine, or southern fox grapes, do not grow well where temperatures drop below 10°F.

American Varieties (*Vitis labrusca*)

Beta – blue fruit; juice and jelly; small-size fruit; vigorous and hardy plant.

Catawba – red; table, juice and wine; large fruit; vigorous and cold hardy.

Concord – blue-black fruit, the quality standard for juice, jam, and jelly; medium clusters of medium to large berries. Susceptible to black rot and phomopsis; uneven ripening is common in Kansas during hot summers or with heavy crop loads; cold hardy.

Cynthiana – black fruit; excellent red wine; medium to small clusters of small grapes; moderate vigor, moderately productive; very disease resistant with good cold hardiness.

Fredonia – blue; extra-large fruit and thick skin; juicy and good quality; vigorous and cold hardy.

Jupiter – reddish-blue seedless table grape; relatively large berries and high yield; fairly hardy with moderate resistance to fungal diseases.

Mars – blue; seedless table grape; medium-size clusters with large fruit; resistance to common grape diseases; vigorous and cold hardy.

Niagara – white; table and wine; large-size fruit with good flavor; vigorous and cold hardy; susceptible to common diseases.

Reliance – red; seedless table grape; excellent raisins; ripens early mid-season; vigorous and winter hardy; susceptible to common diseases.

Steuben – blue fruit; table and wine; concord type; vigorous and cold hardy.

Venus – blue-black; seedless table grape; large berries; early ripening; vines are vigorous, moderately cold hardy.

French-American Hybrids

Foch – blue; wine use; very vigorous and winter hardy.

Aurore – white; table; vines are hardy and productive but susceptible to black rot and splitting at harvest.

Chambourcin – fruity (cherry) dry to semi-dry red wine.

Cynthiana, Norton – The official grape of Missouri; produces a robust, red wine; winter hardy; disease resistant.

Chancellor – blue; wine use; good vigor, productive; moderate hardiness.

Baco noir – blue; wine; clusters are large with small fruit; vines are vigorous and productive; moderately winter hardy.

Vidal blanc – yellow-white fruit; large clusters of large berries; excellent wine; moderate cold hardiness.

Seyval Blanc – medium-size, white-yellow berries in large clusters. Good wine; one of the better white grapes; French hybrids. Medium to high vigor; not very cold hardy.

Vignoles – small to medium white-yellow berries in small clusters; very good wine; medium vigor and cold hardiness; berries are highly susceptible to botrytis.

Site Preparation

Before planting grapes, spade or till the soil to remove perennial weeds. If a site has been planted to grass or has not been cultivated, soil should be worked up and pulverized the fall before planting, improving heavy clay soils by adding organic matter. To determine fertility, collect a soil sample and arrange a soil test through the local extension office.

Plant Selection

If purchasing cuttings from a nursery, select rooted, two-year-old dormant vines for planting. Vines can be grown from hardwood cuttings if the gardener has difficulty obtaining rooted plants or would like to propagate a favorite cultivar. But trademarked or patented cultivars should not be used for cuttings. Cuttings should be made in late January or early February, selecting dormant canes from shoots that were new the previous year. Take cuttings from healthy vines that have been grown in a sunny location. Canes grown in shade may be spindly and lack the food reserves needed to support the cutting while leaves and roots develop.

Make cuttings from a recently removed vine or a branch at least $\frac{1}{3}$ to $\frac{1}{2}$ inch in diameter. For vigorous varieties, such as Niagara and Fredonia, select canes with buds 3-5 inches apart and make cuttings 3-4 buds long. Less vigorous varieties require more buds per cutting. To keep cuttings properly oriented, make a sloping cut just above the top bud and a flat cut below the basal bud closest to trunk. Insert the flat cut at the base into the rooting media.

Store cuttings by bundling and placing them in plastic bags, a box of moist sand, peat moss, or sawdust to keep them from drying out. Bundles should be buried in well-drained soil or kept in a cellar or refrigerator at 40-45°F. Another option is to root cuttings indoors at 70-75°F and transplant them into the garden in the spring. Place cuttings in a loose rooting medium with two buds below and two buds above the surface (Figure 1). Remove the lowest bud to encourage callus formation and rooting. New shoot growth and roots should appear in approximately two weeks.

Cuttings are ready to transplant when they have 12 inches of new growth and the roots are well developed. Do not plant cuttings outside until the danger of frost has passed as rooted cuttings are sensitive to frost and may become damaged. Plants should be exposed to outside conditions for several days before they are placed in the garden. Cuttings can be planted directly into the garden if not rooted indoors. Remove the lowest bud and space the plants 12 inches apart to make them easier to dig up the following spring. Keep the soil moist but not waterlogged.

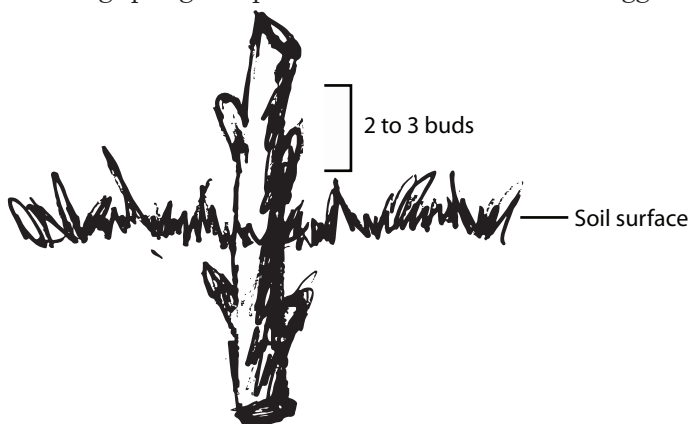


Figure 1. Plant cutting for a grapevine.

Planting

Plant the vines in late March to early April, or before hot, dry summer weather arrives. Set nursery grown plants or rooted one-year-old cuttings at the depth they were grown in the nursery. Prune to a single vigorous cane with two buds, removing any roots that are broken or long. Set the plant into a hole that is large enough to spread the roots without bending.

The trellis system determines spacing between rows, but for most backyard gardens, 9 feet is usually appropriate. Vine spacing within the row depends on cultivar vigor and the training system. European cultivars (*Vitis vinifera*) need 6-7 feet of space between plants, while more vigorous American cultivars should be planted about 7-8 feet apart.

Grape Trellis

A trellis is the most common support structure for grapes. The trellis should be strong and stable enough to support a heavy fruit load and built to begin training the first or second growing season. A trellis consists of two or more wires attached to wood, concrete, or steel posts, similar to a sturdy wire fence. Larger end posts that anchor the structure and support the wires should be set deeper in the ground than the line posts.

Line posts should be spaced 24 feet apart with room to plant three vines between each post. The top wire should be 5-6 feet above the ground. The higher the top wire, the more sunlight that will reach the foliage. The bottom wire should be 30-36 inches above the ground. Trellis wires should be tightened each spring before the new growth begins to weigh them down.

Training and Pruning Systems

A common mistake in growing grapes is not pruning enough to produce quality fruit. About 80-90% of the canes produced during the previous season should be removed during the dormant period, retaining enough wood to produce next year's crop. Annual pruning prevents overproduction and keeps vines healthy. Unpruned vines become weak and produce small fruit clusters that do not ripen uniformly.

In Kansas, gardeners should avoid pruning too early or too late. Pruning early in the winter damages buds remaining on the vines by exposing them to low temperatures. Late pruning causes sap bleeding. While not detrimental to the plant or yield, bleeding sap makes managing and tying new growth difficult and some swollen buds may be lost during late pruning.

Training and pruning are interdependent operations. Productive vines are trained to a defined system and pruned so the vines are supported by the trellis and maximum leaf area is exposed to sunlight. Knowing some grapevine terminology (Figure 2) is helpful when pruning.

The three training systems recommended for Kansas are the single curtain, umbrella Kniffin, and the four-cane Kniffin. The single-curtain training system works best for vigorous and cold-hardy varieties. Varieties that are less vigorous or more susceptible to winter injury should be trained to the umbrella Kniffin system. Both systems are easy to develop and maintain with proper pruning. The single curtain and umbrella Kniffin systems expose foliage to more light, resulting in greater production than with the four-cane Kniffin system.

Training begins in the first growing season. After planting but before growth starts, cut the vine back to the strongest cane, leaving only two buds and training the cane to a stake so a strong, straight trunk develops. If the new shoot from the cane does not reach the top wire, prune it back the next winter to three or four buds. Train the strongest shoot that grows during the following summer, pruning off all others. When the shoot reaches the wire, cut it at a node while dormant and tie it to the wire. Vines may need more training and pruning depending on the system used.

Single-Curtain Training System

For this system, select one strong cane for a trunk and train it to the top of a single-wire trellis (Figure 3). Pinch

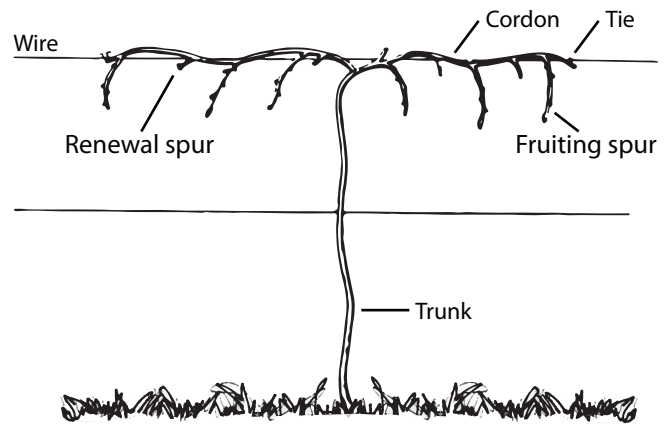


Figure 3. Single curtain training system

off the tip close to a bud just below the wire to encourage the growth of side shoots. When side shoots are about 10-12 inches long, select and train two strong shoots—one in each direction—along the top trellis wire to form the cordons. Remove any side shoots that develop along the trunk and cordons. Continue to tie or wrap the cordons around the wire every 8-10 inches. Pinch off the tips of cordon shoots when they reach 4 feet or touch the cordon of the next vine. Retain side shoots that develop for the next season's spurs.

Grapevine Terminology

Trunk – the main perennial part of the vine.

Cordons – horizontal extensions of the trunk that bear spurs and canes.

Shoot – new growth of green wood. Shoots originate from buds on the trunk, cordons, canes, or spurs. A shoot always produces leaves and tendrils, and it may bear fruit. After leaf fall, mature woody shoots are called canes.

Tendrils – a long, slender, curled structure on shoots that wraps tightly around the trellis wire, posts, or other shoots.

Bud – a compressed shoot in a dormant state that contains primary, secondary, and tertiary buds.

Cane – dormant woody shoot with buds after leaf drop in the fall.

Curtain – plant part with shoots positioned downward or upward.

Fruiting spur – a cane pruned to three to six buds, depending on type of pruning, that produces fruitful shoots.

Renewal spur – a cane pruned to one or two buds that produces non-fruitful shoots that become fruiting canes or spurs the following season.

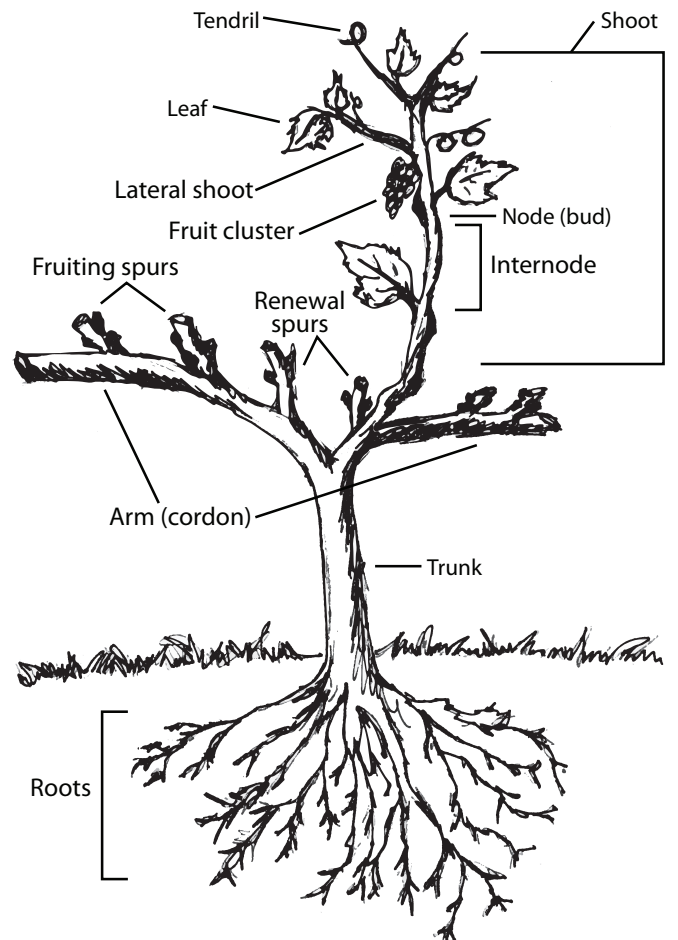


Figure 2. Parts of a grapevine.

During the second dormant season, most of the canes that have branched off the cordons should be pruned to renewal spurs with two buds. These buds will produce nonfruitful, but vigorous, shoots that will be used as fruiting spurs. Only 2-4 canes should be pruned to fruiting spurs containing 3-5 buds for the third growing season. These will produce shoots with a few clusters of grapes. In the third and following dormant season, canes should be pruned to leave 4-6 fruiting spurs, depending on vigor, and the same number of renewal spurs on each cordon. Spurs should be spaced evenly along. Remove all excess canes.

Additional training during the growing season is required. In late spring when shoots are 4 feet or more, flower clusters appear and tendrils begin to form. Shoots should be gently pulled away from the trellis wire and each other, allowing them to hang straight down. This ensures that fruits developing on the vine are well exposed at the top of the canopy and promotes good fruit quality.

Umbrella Kniffin

Select the stronger of the two canes as the trunk and remove the other cane (Figure 4). As new shoot growth starts in the spring, strip off all shoots except from the uppermost bud on the cane. Continue to tie the shoot to the stake as it approaches the top trellis wire. When the shoot is about 6 inches below the top wire, pinch off the shoot tip to encourage side shoot growth. These side shoots will develop into canes that will produce fruitful shoots the following season.

During the dormant period after the second or third growing season, depending on vigor, select 2-6 of the most vigorous canes for fruiting canes. Prune the canes to 10-15 buds, then bend them sharply over the top wire and tie the tips loosely to the lower wire. Select 2-6 of the remaining canes for renewal spurs and prune back to two buds. Remove all other canes.

Each dormant season, remove the previous year's fruiting canes and select and prune back 2-6 fruiting canes from the old renewal spurs depending on vigor. Select and prune 2-6 renewal spurs and remove any remaining canes.

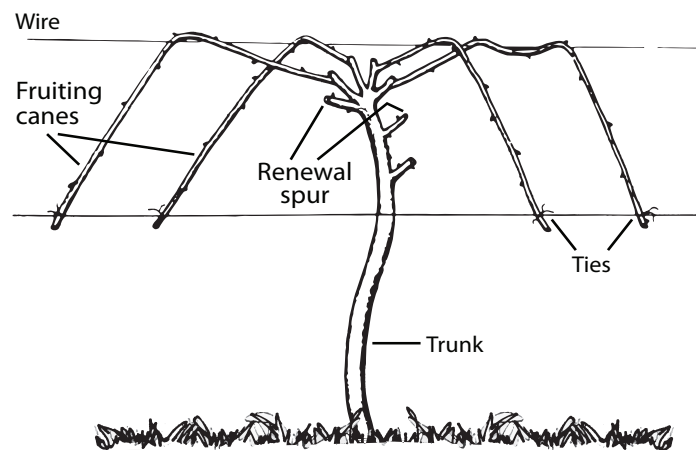


Figure 4. Umbrella Kniffin system

Four-Cane Kniffin

This system is similar to the two-cane Kniffin system except it has four trained fruiting canes. The disadvantage of the four-cane Kniffin is that shading from the foliage on the upper trellis wire may reduce fruit production and quality along the lower wire. Shading is reduced when the top trellis wire is about 6-6½ feet above the ground and the bottom wire is at least 2-2½ feet below the top wire.

During the first growing season, vine growth is managed the same as the single curtain and umbrella Kniffin systems. If growth is weak, dormant pruning the second or third year consists of selecting four vigorous canes for the cordons. Prune these canes to approximately 10 buds on each cane, and then tie them to the trellis wires. Also cut two canes at each wire level to two buds for renewal spurs. Remove all other canes.

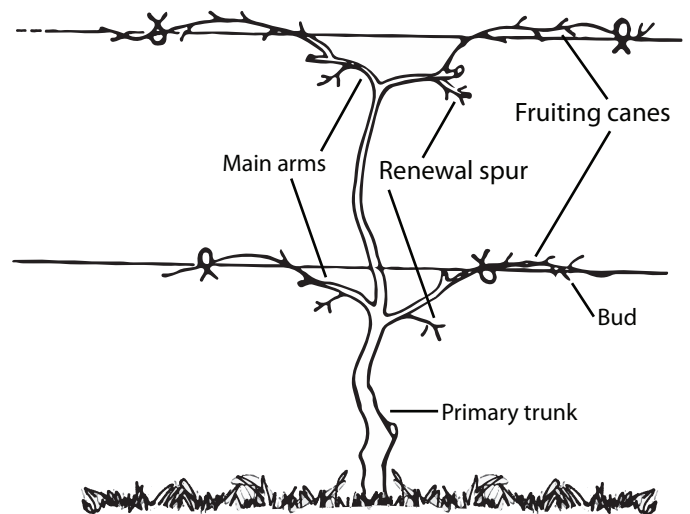


Figure 5. Four-cane Kniffin system.

Grape Arbors

Grape vines can be trained on walls, fences, and arbors to provide shade as well as fruits. When training to an arbor, prune vines less severely for faster and more uniform coverage. Long canes retaining more buds per plant will produce low-quality fruit. For an attractive arbor, plant and train table grapes of three different colors.

Cultural Practices

Watering

Irrigate young and mature vines as required, especially during the summer months. Avoid overhead irrigation, especially during fruit maturity to prevent fruit rots. Water can be applied using conventional methods such as a sprinkler hose placed along the row, but drip irrigation is more efficient. Less water is lost due to evaporation and aisles remain dry. A small trickle of water by each vine is a slow but effective and relatively inexpensive method of irrigation.

Use two drip emitters, one on each side about 12 inches from the vine. If mulch or herbicides are used to prevent weed growth underneath vines, the drip tube can be placed on the ground. If mowing or using a string trimmer to control undergrowth, drip tubing can be suspended from the lower wire, which should be set high for the mower to fit underneath. Vine curls can be used to attach the tubing to the wire. Use of ½ gallon per hour emitters is suggested to reduce the chance of overwatering if the system is not turned off on schedule.

Fertilization

Grapes do not require a high level of fertility. Overfeeding causes more problems than underfeeding. Apply a balanced fertilizer such as a 10-10-10 or 12-12-12 according to the guidelines shown in Table 1.

Table 1. Grape fertilization

Year	Cups per vine	How to apply
1	1/2	Apply as growth starts, repeat after 1 month
2	1	Apply as buds swell
3	1–1.5	Apply as buds swell
4 and thereafter	1–2	Apply as buds swell

(Adapted from the University of Missouri)

Fertilizer should be applied in a band 1-1½ feet away from the new plant, increasing the distance gradually each year up to a maximum of 2-3 feet for a mature vine. Fertilizer should be worked 2 inches deep into the soil to allow roots to take up the phosphorus and potassium more easily. Compost can be used, but heavy applications can cause excessive growth or delay fruit maturity. Check fruiting canes on mature vines to determine how much, if any, fertilizer to use. Fruiting canes should be 4-6 feet long and slightly larger in diameter than a pencil. Reduce fertilization if growth is more vigorous.

Pest Management

Weeds – Cultivate shallowly as needed to control weeds and apply a layer of organic mulch several inches deep.

Disease and insects – Grapes are susceptible to diseases and insects. Chemicals are applied when new shoots are about 2 inches long and about 6-8 inches long, just before bloom, just after bloom, and in mid-to late July. Black rot is the most common disease pest of grapes in Kansas. A spray schedule for home gardeners can be found in Table 2 on page 6.

Birds – Netting is effective for excluding birds that can threaten the fruit crop. The most common and least expensive type is a lightweight, black, polypropylene netting with a ½-inch by ½-inch mesh size. Though effective, this type of netting can be difficult to install and remove and tends to stick to itself and the vines. Woven

mesh bird netting also works. Though easier to use, it is also more expensive. A trellis with a 6-foot-high wire requires a net at least 14 feet wide that can be draped over the grapes and secured along the bottom edge with clothespins. Larger, 17-foot-wide nets are available, and though less common, they offer more material to work with and are easier to secure.

Raccoons – Raccoons can be a significant pest as the fruit approaches maturity, but can be discouraged with electric fencing. The electric fence should consist of two or more wires, with the first one placed about 5 inches above the ground and the second one 4 inches above the first, or about 9 inches above ground. Raccoons should not be able to crawl under, go between or over the wires without getting shocked.

Posts made for electric fences with appropriate insulators work well for this purpose. It is much easier to use the woven electric wire with strands of wire embedded than to use a solid metal wire. The woven wire is easier to bend around corners and to roll up when done for the year.

Though both the plug-in and battery operated fences work, battery operated models allow for more versatility in areas where grapes are grown. One set of batteries usually is sufficient for the season. Start the charger before the grapes are close to being ripe because once raccoons get a taste of the fruit, they are more difficult to discourage.

Control weeds to keep them from touching the wire and intercepting voltage, which allows raccoons to enter beyond the weed. Occasionally, check the wire for current, using tools to measure the voltage.

Harvesting

Fruit maturity is usually determined by the taste and color of the fruits as they change from green to brown. The stem of the grape cluster turns brown and berries become easier to pull off as they ripen. Berry color is not a reliable gauge of maturity for grapes as most varieties change color 2-3 weeks before they are fully ripe. Clusters exposed to sunlight develop the best flavor and quality.

Table 2. Grape Spray Schedule*

Growth Stage	Disease or Insect	Pesticide	Comments
Dormant	Anthracoze	Lime sulfur	
Bud swell	Grape flea beetle	Carbaryl (Sevin dust)	Do not apply unless flea beetles are making holes in the leaves
When new growth is 2- 4 inches long	Black rot, phomopsis, powdery mildew	Captan or mancozeb	Early season sprays are very important because this is a protectant spray program.
New growth (10-15 inches long or 7-10 days after last spray)	Black rot, Phomopsis, powdery mildew, downy mildew	Captan + myclobutanil**	Immunox is systemic and will not wash off.
Pre-bloom (just before blooms open)	Black rot, phomopsis, powdery mildew, downy mildew	Mancozeb	
Bloom	Black rot, powdery mildew, downy mildew	Captan + myclobutanil	Immunox is systemic and will not wash off
Post-bloom	Black rot, powdery mildew, downy mildew	Captan	Mancozeb cannot be used within 66 days of harvest; switch to Captan approximately mid-June.
	Grape berry moth	Carbaryl (Sevin dust)	
First cover through fourth cover (every 10-14 days)	Powdery mildew, downy mildew	Captan	
	Japanese beetle, green June beetle	Carbaryl (Sevin dust)	Spray only if Japanese beetle or green June beetle is present.

*Adapted from Simplified Backyard Grape Spray Guide, University of Kentucky.

** Myclobutanil is found in Immunox, F-Stop Lawn & Garden Fungicide, and Fungi-Max.

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