



**MASTER GARDENER**  
**COLORADO STATE UNIVERSITY**  
**EXTENSION**



# Small Fruits

## Reference / Supplemental Reading

**CSU Extension Publications** available online at [www.cmg.colostate.edu](http://www.cmg.colostate.edu)

- Blackberries – *Growing Blackberries in Colorado Gardens* – CMG GardenNotes #762
- *Currants* - Planttalk #1214
- *Currants, Gooseberries and Jostaberries* - Fact Sheet #7.005
- *Elderberries* - Planttalk #1212
- *Gooseberries* - *Currant, Gooseberries and Jostaberries* - Fact Sheet #7.005
- *Gooseberries* - Planttalk #1215
- *Grapes* – *Growing Grapes in Colorado Gardens Garden* – CMG GardenNotes #764
- *Grapes* - Planttalk #1203
- *Japanese Beetles* - Fact Sheet #5.601
- *Raspberries* – *Growing Raspberries in Colorado Gardens* – CMG GardenNotes #761
- *Raspberries* - Planttalk #1207
- *Raspberry Cane Borer* - Planttalk #1478
- *References and Review Questions: Small Fruits*, CMG GardenNotes #760
- *Root Weevils* - Fact Sheet #5.551
- *Serviceberries* - Planttalk #1213
- *Spider Mites* - Fact Sheet #5.507
- *Strawberries* - Planttalk #1208
- *Strawberries for the Home Garden* - Fact Sheet #7.000
- *Strawberries* – *Growing Strawberries in Colorado Gardens* – CMG GardenNotes #763
- *Strawberry Diseases* - Fact Sheet #2.931
- *Strawberry Pests and Diseases* - Planttalk #1441

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Revised October 2014

# Small Fruits

## Learning Objectives

At the end of this unit, the student will be able to describe:

- Planting of raspberries.
- Pruning of fall-bearing (primocane-fruiting) raspberries and summer-bearing (floricane-fruiting) raspberries.
- Trellising systems for raspberries
- General care of raspberries.
- Trellising and pruning of trailing, erect, and semi-erect type blackberries
- Planting and renewal of June-bearing strawberry cultivars.
- Planting and renewal of fall bearing and day neutral strawberry cultivars.
- General care of strawberries
- Trellising and pruning of grapes in a single curtain system (include first spring, second spring, third spring, and forth spring and beyond.

## Review Questions

1. What is the difference in raspberry fruit and blackberry fruit?
2. Describe planting for red raspberries.
3. Describe pruning for summer crop raspberries.
4. Describe pruning for fall-bearing raspberries if you want both the summer and fall crops. Describe pruning for fall-bearing raspberries if you want only the higher quality fall crop.
5. Describe irrigation and fertilization needs of raspberries.
6. Describe planting and care of June-bearing strawberries. How is the patch renewed?
7. Describe planting and care of ever-bearing and day-neutral strawberries. How is the patch renewed?
8. Describe grape pruning at planting, year 1, year 2, year 3, and year 4+. Why are grapes pruned so heavily?



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CMG GardenNotes #761

# Growing Raspberries in Colorado Gardens

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## Types and Cultivars

**Fall-bearing (primocane-fruiting) red raspberry** cultivars are typically more hardy than summer crop cultivars. Suggested cultivars include *Autumn Britten*, *Polana*, *Jaelyn*, *Caroline*, and *Heritage*. *Joan-J* and *Himbo-Top* have not performed well in Colorado trials.

**Summer-bearing (floricane-fruiting) red raspberry** cultivars have some winter hardiness problems in climates like Colorado, with frequent winter to spring and back to winter temperature swings. Suggested cultivars include *Nova*, *Boyne*, and *Killarney*.

**Black raspberry** or “**blackcap**” – Suggested cultivars include *MacBlack* and *Jewel*.

**Purple raspberries** are a hybrid of red and black. Suggested cultivars include *Royalty*.

**Yellow raspberries** are a mutation of red. Suggested cultivars include *Anne*.



Figure 1.  
Raspberries are a good crop for the home gardener.

## Planting Raspberries

With good growing conditions, a raspberry patch may last 10 to 15 years. Viral diseases and hardiness problems frequently shorten the life of a patch. Raspberries need full sun, but avoid reflected heat in areas with hot summer temperatures. In open windy areas, wind protection is important as dry winds can dehydrate and kill exposed canes.

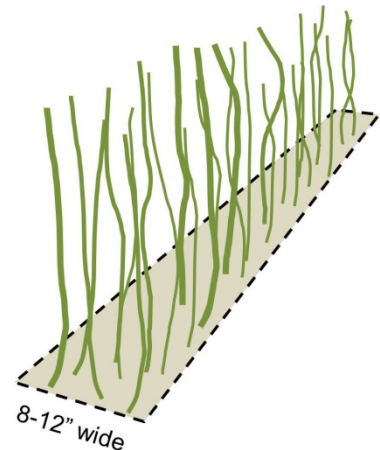
Raspberries prefer a deep, well-drained, sandy loam soil. They perform poorly on compacted clayey soils and soils with poor drainage. On clayey soils, plant in a raised bed. Because raspberries are a long-term crop, extra efforts to improve the organic content of the soil to 5% gives good dividends.

Due to soil borne diseases, do not plant raspberries where raspberries, strawberries, tomatoes, peppers, eggplant, potatoes, or vine crops (cucumbers, squash and melons) have been grown in the past four years. To reduce virus potential, do not plant raspberries next to blackberries. To help manage virus problems, purchase certified virus-free nursery stock.

In the home garden, raspberries are generally planted in a hedgerow. Place plants in a row 12 to 18 inches between plants with four to eight feet between rows (depending on trellising system and equipment used. If planting bare-root plants, soak plants in water for a few hours before planting. Dig shallow holes large enough to spread out the root mass and set plant with the top root one to two inches below soil level. Water plants to settle the soil. Cut newly planted canes to 6 inches. Care of the new planting should be similar to vegetable transplants with frequent, light irrigation until the plants become established.

Allow canes to fill in making the hedgerow. By hoeing or cultivation, routinely remove any canes that come up outside of the hedgerow. For higher yields and reduced pest problems, keep the hedgerow width to only 8 to 12 inches for fall cultivars and 12-18 inches for summer cultivars. [Figure 2]

Figure 2. Red raspberries in a hedgerow. For higher yield, keeps width of hedgerow to only 8 to 12 inches wide for fall bearing cultivars.



## Pruning

**Primocane vs. Floricane** – The crown and roots system of raspberries are perennial. The canes are biennial. *Primocane* refers to the first year canes; *floricane* refers to the second year canes.

### Fall-Bearing (Primocane-Fruiting) Raspberries

In fall-bearing cultivars, the fall crop starts at the top of the *primocane* (new cane this summer), working its way down the cane with each picking. Next summer, the crop starts at the point where the fall crop ended the previous season, continuing downward.

**For best yields and high fruit quality,** prune to a fall crop only. In February/March, prune all canes to the ground. This eliminates the summer crop, putting all the growth into the superior fall crop. This also helps eliminate winter injury problems and many common insect pests.

**For a fall and summer crops,** prune the same as summer-bearing cultivars.

### **Summer-Bearing (Florican-Fruiting) Raspberries**

1. *Primocanes* (new canes the first year) are not pruned.
2. In spring (February/March), prune as follows:
  - Remove spindly canes, leaving stocky canes  $\frac{1}{4}$  inch in diameter and larger. Thin stocky canes to about 10 canes per foot of hedgerow.
  - **For larger fruit size,** tip canes at a convenient height where they will be self-supporting, typically around 5 feet. Canes may be tied in clusters to a trellis.
  - **For larger yields,** do not tip canes. Canes may be tied in clusters to a trellis
3. Mid summer when the fruiting is finished, remove all *floricanes* (flowering/fruiting canes) to the ground. They will not fruit again. This makes room for the new crop of *primocanes*.

## Trellising

Raspberries are easier to manage if trellised. Examples of trellising systems are given in figures 3-5. [Figures 3-5]

Figure 3. The **one-line trellis** system has wires running at 30 inches and 4½ to 5 feet. Canes are tied to the lines in bundles.

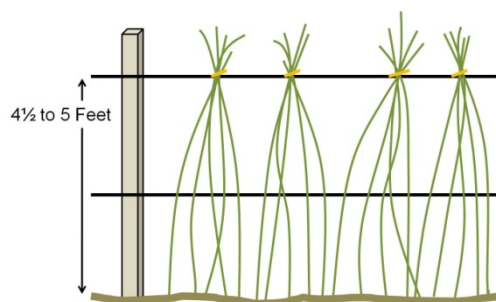


Figure 4. The **two-line trellis** system added an 18-inch cross arm at 4½ to 5 feet. Wires are run at the edge of the cross-arm forming a box. Canes are tied in bundles on the two lines.

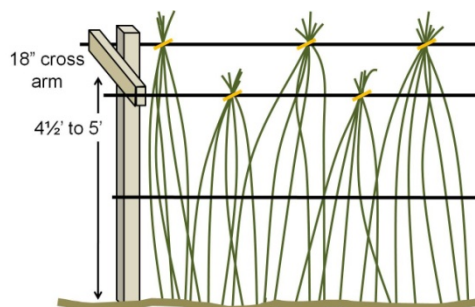
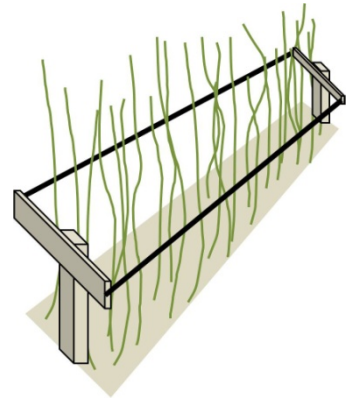


Figure 5. The **T-trellis** system is popular for fall bearing (primocane-fruiting) cultivars. At knee height, a cross arm and wire form a box. Canes are free floating inside the box.



## Irrigating

Raspberries need about one-inch of water (rain and irrigation) per week during blooming/fruiting. Depending on soil type, this may require irrigation once to twice a week. When watering, avoid wetting the leaves and fruit as this can cause disease problems. Raspberries work well with drip irrigation under wood chip mulch.

Water use is significantly less during nonfruiting times. Iron chlorosis (yellowing of leaves with veins remaining green) is a common symptom of over-watering. [Figure 6]

Figure 6. Iron chlorosis (yellowing of leaves with veins remaining green) is a common symptom of over-watering. Raspberries are commonly over watered in the spring.



## Fertilizing

A good guide for fertilization is to observe plant growth. Leaves should be healthy green and primocane should grow to 5-8 feet. Adjust actual fertilizer rate if plants grow too tall or are too short.

Fertilize all raspberries in the spring as growth starts and repeat in early June. For fall bearing cultivars, make a third application in August. Apply  $\frac{1}{2}$  to 1 cup of ammonium sulfate (21-0-0) or similar fertilizer per 10 feet of hedgerow. The fertilizer may be broadcast over the hedgerow area and watered in or placed in a band one foot to the side of the row.

If using compost or manure, make application in the late fall or early winter, but avoid early fall applications which can push late fall growth.

# Common Raspberry Pests

## Abiotic

- **Winter dehydration** is less of a problem in fall bearing cultivars where they are pruned to the ground each spring.
- **Sunburn of fruit** (light color patches on the top side of fruit) is common in hot weather. Raspberries prefer cooler temperatures.
- **Iron chlorosis** (yellow leaves with veins remaining green) is a common symptom of springtime over-watering. Correct watering problems. For additional information on iron chlorosis, refer to CMG GardenNotes #623, *Iron Chlorosis*.

## Insects and mites

- **Spottedwing drosophila flies** can affect ripening raspberries, in particular fall bearing cultivars.
- **Grasshoppers** eat raspberries.
- **Spider mite** populations explode in hot summers and following the use of the insecticide Sevin (carbaryl). Leaves appear bronzed. For additional information, refer to CSU Extension Factsheet #5.507, *Spider Mites*.
- **Cane borer, crown borer, and stem borer** are common borers of cane crops. These are less of a problem in fall bearing cultivars where the canes are removed to the ground each spring. For additional information, refer to PlantTalk Colorado #1478, *Raspberry Cane Borers*.
- **Plant bugs** cause misshapen fruit.
- **Raspberry sawflies** are caterpillar-like insects that feed on leaves.
- **Leaf rollers**

## Diseases

- **Virus complex** – Raspberries are prone to a variety of viruses. Simply remove the patch when the fruit become small and the patch is less productive. Start the new patch in another area of the garden using new, virus-free plants.

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Revised August 2018





CMG GardenNotes #762

## Growing Blackberries in Colorado Gardens

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  - Erect blackberries, page 3
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In blackberries, the receptacle (white core of the fruit) is part of the fruit when picked. In raspberries the receptacle remains on the plant when picked.

### Types and Cultivars

**Trailing blackberries** produce vigorous *primocanes* (first-year vegetative cane) from the crown of the plant rather than roots. Second year *floricanes* produce long shaped fruit with relatively small seeds and a highly aromatic, intense flavor. They are not hardy in climates like Colorado, experiencing damage at temperatures of 13°F in mid winter, and in the 20s°F in late winter/early spring.

**Erect blackberries** have stiff arching canes that are somewhat self-supporting. However, they are much easier to handle when trellised and pruned. Summer prune or tip primocanes to encourage branching and increase fruit production on the second-year floricanes. Plants can become invasive to an area as they can produce new primocanes (suckers) from roots.

Erect blackberries produce fruit with relatively large seeds. Flavor and aroma are not as intense as in the trailing blackberry cultivars. They are semi-hardy in climates with rapid springtime temperature shifts, like Colorado.

Primocane-fruited cultivars of erect blackberries produce fruit on the new canes. This make management easier as the canes can be cut to the ground each winter. Suggested cultivars include *Prime Jan* and *Prime Jim*.

**Semi-erect blackberry** plants are thornless and produce vigorous, thick, erect canes from the crown. No primocanes are produced from the roots (suckering). Prune primocanes in the summer to encourage branching and increase fruit production on floricanes. A trellis is required to support the canes.

Semi-erect blackberries generally produce a higher yield than trailing or erect types. Fruit quality is similar to that of the erect blackberries. Suggested cultivars include *Triple Crown* and *Chester Thornless*.

Figure 1. Blackberries

**Blackberry/red raspberry hybrids** are generally natural crosses between blackberries and raspberries. Because the receptacle (white core) comes off with the fruit, they are generally considered a type of blackberry. Popular cultivars include *Boysen* (Boysenberry), *Logan* (Loganberry), and *Tay* (Tayberry).



## Planting and Care of Blackberries

Blackberries produce best in full sun, but are tolerant of partial shade. They are more tolerant of clayey soils than raspberries. However, good drainage is essential. Because blackberries may last for 10 to 15 years, extra attention to improving the soil organic content to 5% gives big dividends.

For semi-erect cultivars, space plants five to six feet apart. Space erect cultivars two to three feet apart. Space trailing cultivars four to six feet apart. Start with certified disease-free nursery stock. Planting would be similar to raspberries. To reduce virus problems, do not plant blackberries adjacent to raspberries.

Irrigation, fertilization, and pest management would be similar to raspberries. Refer to *CMG GardenNotes* #761, **Growing Raspberries in Colorado Gardens**.

## Trellising and Pruning

Trellising is recommended for all blackberries.

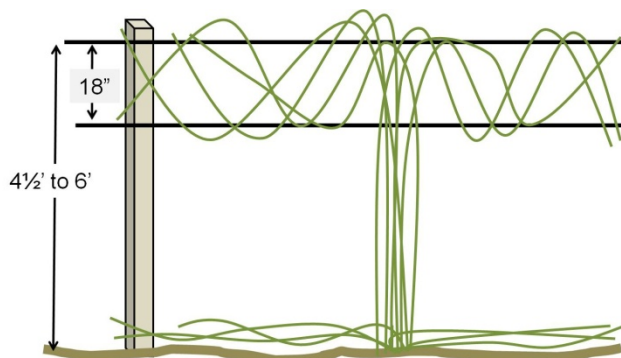
**Trailing blackberries** are easy to grow on a two-wire system. Run a top wire at five to six feet with a second line 18 inches below the top wire.

After the first year, there will be fruiting floricanes along the wires. Train the new primocanes into a narrow row below the fruiting canes. Directing all canes in one direction may make it simpler.

After the fruit harvest period, the old fruiting (floricanes) are removed. However, unless there is a lot of disease, it's best to delay removing the old fruiting canes until they have died back considerably. This allows the dying canes to move nutrients back into the crown and roots. After old fruiting canes are removed, train the primocanes up on the wires. Work with one or two canes at a time in a spiral around the trellis wires. Canes from adjacent plants may overlap a little. No pruning of primocanes is necessary.

In areas with low winter temperatures, leave the primocanes on the ground for the winter where they can be mulched for winter protection. In the spring, after chance of extreme cold has passed, train the old primocanes (now floricanes) up on the wires. Avoid working with the canes in cold weather, as they are more prone to breaking. [Figure 2]

Figure 2. Two wire trellis for trailing blackberries. Spread floricanes up on a two-wire system.

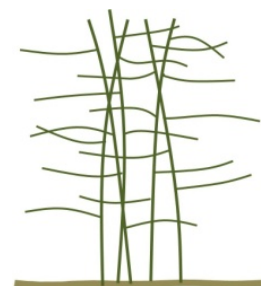


**Erect blackberries** produce stiff, shorter canes that come from the crown and root suckering (forming a hedgerow). A T-trellis supports erect blackberries well.

Erect blackberries require summer pruning. Remove the top one to two inches of new primocanes when they are four feet tall. This causes the canes to branch, increasing next year's yields. This will require several pruning sessions to tip each cane as it reaches the four foot height. Primocanes (suckers) that grow outside the hedgerow should be regularly removed.

In the winter, remove the dead floricanes (old fruiting canes) from the hedgerow. Also shorten the lateral branches to about 1½ to 2½ feet. [Figure 3]

Figure 3. Pruning of erect blackberries after winter pruning.



**Primocane-fruiting erect blackberries** – For best quality fruit, cut all canes off just above the ground in the late winter. In the summer, when the primocanes are 3½ feet tall, removed the top 6 inches. The primocanes will branch, thereby producing larger yields in the fall.

**Semi-erect blackberries** are vigorous and easier to manage on a Double T Trellis. Install four-foot cross arms at the top of a six foot post. Install a three-foot cross arm about two-feet below the top line. String high-tensile wire down the rows, connecting to the cross arms.

Semi-erect blackberries require summer pruning. When the primocanes are five feet tall, remove the top two inches to encourage branching. This will require several pruning sessions to prune canes as they reach this height.

In the winter, remove the dead floricanes (old fruiting canes). Spread the primocanes (new floricanes) out along the trellis. Canes do not need to be shortened. However, they can be if they are difficult to train.

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Revised August 2018



CMG GardenNotes #763

# Growing Strawberries in Colorado Gardens

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## Types and Cultivars

**June-bearing cultivars** have one large crop in early summer (late June to early July along the Colorado Front Range) with larger fruit and higher yields. They are less hardy in climates like Colorado because of rapid springtime temperature swings. They are often damaged by late spring frosts. Strawberries are popular for freezing and jams with flavorful, aromatic berries. Suggested cultivars include *Honeoye*, *Guardian*, *Kent*, *Redchief*, *Delite*, *Jewel*, *Mesabi*, *A.C. Wendy*, *Cabot*, *Bloominden Gem*, *Carskill*, and *Geneva*.

**Ever-bearing cultivars** have two crops, one in early summer and a second crop in the fall. They tend to be more reliable than June bearing cultivars in cold climates like Colorado. Berries are smaller than the June bearing types. Suggested cultivars include *Quinalt*, *Ogallala*, and *Fort Laramie*.

**Day-neutral cultivars** blossom most of the summer and fall in cycles lasting around six weeks each. Blossoming will slow or stop during hot weather. Fruit is typically small. These provide a light, daily harvest through most of the summer and fall. They need constant, light fertilization and regular removal of runners. Suggested cultivars include *Tribute*, *Tristar*, and *Fern*.

Figure 1. Day-neutral cultivars provide a small, continual harvest of fresh strawberries throughout the summer and fall (except in extreme heat).



## Plantings

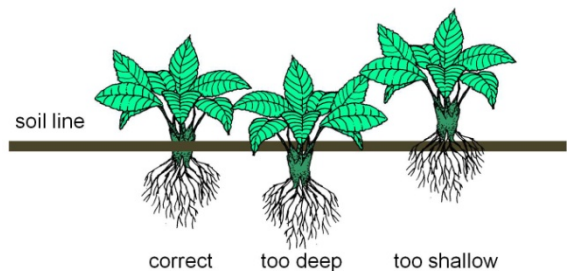
The key to a good strawberry patch is well-drained soil high in organic matter. Strawberries need full sun (8 hours minimum), but do not perform well in reflected heat. They need protection from wind. In clayey soils, they grow better in raised-beds that provide better drainage. Strawberries are shallow rooted and intolerant of weed competition.

Due to soil borne diseases, avoid soils where strawberries, raspberries, tomatoes, peppers, eggplant, potatoes, and vine crops (squash, melons, pumpkins and cucumbers) have been growing in the past four years.

Blossom potential for the following year is based on plant health in the fall. The strawberry patch may need covering for spring frost protection.

Strawberry plant crowns (short segment with roots below and leaves above) need to be at the soil line. If the plant is too deep (leaf stems buried), the plant rots. If too shallow (roots exposed), the plant dehydrates. [Figure 2]

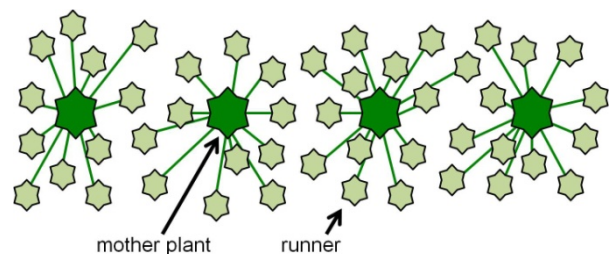
Figure 2 Strawberries are fussy about planting depth. The short crown section needs to be at the soil surface.



## June-Bearing Cultivars

**Planting** – Since June-bearing cultivar set a lot of runners, they are planted in a matted row system. Set plants 18-24 inches apart in rows four plus feet apart. Allow runners from the “mother” plant to fill in a matted row, to a plant population of five to six plants per square foot. Remove excessive runners. Prune off runners outside the matted row and all new runners after September 1<sup>st</sup>. [Figure 3]

Figure 3. June-bearing cultivars in matted row system. Runners from the mother plant fill in a block 18-36 inches wide.



**First Season Care** – Remove all flowers the first year. Flowering the first year decreases the growth and next season’s yields. If growth is weak and leaves are light green, fertilize lightly in June, July, and August. Use water-soluble fertilizes (like Miracle-Gro, Peters, Rapid Gro, etc.) or one cup of 21-0-0 per 100 square feet (broadcast over bed and water in).

**General Care** – Fertilize after the summer crop is off with water solubles or one cup 21-0-0 per 100 square feet (broadcast over the patch and water in). Strawberries need one inch of water (rain plus irrigation) per week during blossoming/fruiting. Water needs will be significantly less when not in fruit production. Iron chlorosis (yellow leaves with veins remaining green) is a symptom of over watering. Renovate every year or restart bed every two to four years

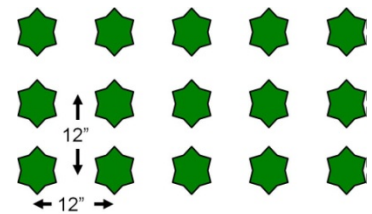
### **Renovation of June-bearing growing bed**

1. After the fruiting period, mow or cut foliage to two inches. Remove all plant debris.
2. With shallow cultivation, create alternating strips (eight to ten inches wide) of plant left and plants removed.
3. Allow runners to spread into the cleaned area, up to an optimum plant density of five to six plants per square foot.
4. Remove excessive runners and all runners after September 1.
5. In future years, alternate the strips by taking out the plants the plant strips left the previous year.

### **Everbearing and Day-Neutral Cultivars**

**Planting** – Because ever-bearing and day-neutral strawberries have fewer runners, the hill system is typically used. Set plants 12 inches apart in a double or triple wide row bed. Remove all runners as they develop. [Figure 4]

Figure 4. In the Hill System, plants are space 12 inches apart in double or triple rows 12 inches apart. All runners are removed.



**First Season Care** – Removed the first flush of flowers, and allow flowers to develop after July 1<sup>st</sup>.

**General Care** – Periodically remove all runners. Fertilize lightly throughout the growing season using water-soluble or ¼ cup 21-0-0 per 100 square feet (broadcast and water in). Start a new patch every three to four years.

### **Harvesting**

Pick strawberries every other day during the peak of the season. If berries are eaten or preserved immediately, harvest only red-ripe fruit and leave the caps on the plants. If the fruit will not be used for a few days, harvest the berries, caps and all, while still pink.



## Winter Care

Keep soil damp until fall frost. Then, withhold water to help harden off the plants. A final November watering before soils freeze helps prevent winter-kill from drying.

In cold winter climates, like Colorado, a winter mulch of clean, seed-free straw (or similar material) is recommended. Apply it when the ground freezes (around December 1<sup>st</sup> along the Colorado Front Range). Apply two inches, but not more as it could smother the plants. In windy areas, bird netting over the mulch helps hold it in place. Mulching helps protect plants from drying winter winds and from root damage by alternative freezing and thawing of the ground.

In climates with late spring frosts (like Colorado), leave the mulch on as long as possible to restrain plant growth in the early spring. In March, start checking plants under the mulch for growth. As growth begins, remove mulch over time, allowing sunlight into the plants. Some may remain on the soil to keep strawberry fruit off the ground.

## Summer Mulch

Because strawberries are shallow rooted, summer mulch helps stabilize soil moisture and also helps suppress weeds. Use grass clippings (that contain no weed killers), seed-free straw, or other mulching materials. On ever-bearing and day-neutral cultivars (where runners are not allowed to set), black plastic mulch may be used. Plants must spread and cover the plastic mulch before summer heat sets in or it will be too hot.

## Common Strawberry Pests

### Abiotic

- **Iron chlorosis** (yellow leaves with green veins) is a symptom of over-watering. For additional information, refer to CMG GardenNotes #223, *Iron Chlorosis*.
- **Winter injury** often kills plants.
- **Drought injury** (Strawberries are shallow rooted, requiring frequent, light irrigations).
- **Hail** readily defoliates strawberries.
- **Wind**

### Insects and Insect Relatives

- **Lygus bugs** feed on fruit. – Control weeds, alfalfa and legumes. Use insecticidal soap, avoid treating during bloom
- **Aphids**
- **Slugs and millipedes** – Decrease free moisture with proper watering. Remove fruit and decaying debris. Mulch to raise fruit up off the soil.
- **Spider mites** bronze leaves. Populations explode in hot weather and following the use of the insecticide Sevin (carbaryl).
- **Spottedwing drosophila flies** can affect ripening strawberries.



## Diseases

- **Strawberry leaf spots** show as red spots with tan centers on leaves.
- **Powdery mildew** appears as white mold on leaves.
- **Botrytis gray mold** is the fuzzy mold on fruit.
- **Red stele** and **black root rot complex** are common root disorders.
- **Verticillium wilt** is a common soil borne disease.
- **Virus complex** – strawberries are prone to a variety of viruses.

## Wildlife

- **Birds** – Bird netting may be necessary spread above and over the strawberry patch.
- **Rabbits**
- **Deer**

For addition information, refer to the following CSU Extension Publications:

- Factsheet #2.931, *Strawberry Diseases*
- PlantTalk Colorado #1441, *Strawberry Pests and Diseases*

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Authors: David Whiting (CSU Extension, retired), with Merrill Kingsbury (CSU Extension).  
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- Colorado Master Gardener *GardenNotes* are available online at [www.cmg.colostate.edu](http://www.cmg.colostate.edu).
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Revised August 2018



CMG GardenNotes #764

# Growing Grapes in Colorado Gardens

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## Types and Cultivars

### Types of Grapes

- **Table grapes** are used for fresh eating. Most popular cultivars are seedless. Popular cultivars include *Himrod*, *Interlaken*, *Canadice*, *St. Theresa*, and *Reliance*.
- **Juice and jelly grapes** – Popular cultivars include *Concord*, *Valiant*, *Niagra*, and *St. Croix*.
- **Wine grapes**
- **Raisin grapes**

Figure 1. Grapes on a trellis make a living fence.



### Types of Cultivars

- **American cultivars**, *Vitis labraarуска*, have a strong “foxy” (musty) flavor and aroma. They are use for juice, fresh eating, and some wines.
- **European cultivars**, *Vitis vinifera*, with tight clusters, thin skins, and a wine-like flavor, are used for wines. They require more heat units for maturity and have limited potential in Colorado.
- **French-American hybrids** are popular for wine. Characteristics depend on parentage.

## Planting Grapes

Grapes need full sun and protection from wind. Space plants 6 to 8 feet apart, in rows 6 to 10 feet apart (depending on trellising system). Strong trellising systems are required to support the heavy vines and fruit. Use treated posts and 12-gauge or heavier wire.

## Trellising and Pruning

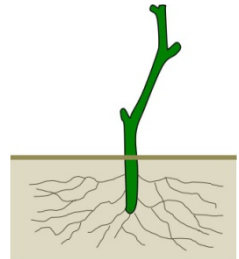
Grapes fruit on one-year-old wood (canes that grew the previous summer). Thus, pruning is a balance between growing fruit and renewing the one-year-old wood. Correct pruning is essential for production. Un-pruned or under-pruned grapes give many, small-clusters of tiny grapes. Correctly pruned, grapes give high yields of large clusters of large grapes. Over-pruning simply cuts the yield.

There are many methods to trellis grapes. A simple method for the home gardener is the Single Curtain System.

### Single Curtain System

**Pruning at Planting** – At planting, prune back to two to three buds. Allow the summer growth to develop what will become the primary trunk. [Figure 2]

Figure 2. At planting, prune the grape back to just two to three buds. This heavy pruning pushes growth of lone canes. One of the canes will become the trunk.



**Pruning the Second Spring** – In the spring, select one of the last summer's canes to become the trunk. Remove the others, leaving one or two renewal spurs (buds close to the trunk). Renewal spurs allow for replacement growth of potential trunk wood if something damages the trunk. If growth was poor (not generating the desired trunk), start over by pruning back to two to three buds. [Figure 3]

Figure 3. Second spring pruning: Left: Before pruning with three canes. Right: After pruning with one canes selected to become the trunk and other canes pruned back to a renewal spur (shown in red).



### Pruning the Third Spring

1. Select two one-year-old canes (one to the left and one to the right) to become the *fruiting canes* and *cordon arms* along the trellis. The ideal cane is about pencil diameter with moderate spacing between buds. [Figure 4]
2. Select two canes (one to the left and one to the right) to become *renewal spurs* by pruning them back to two buds each. The purpose of renewal spurs is to give more options near the trunk in selection fruiting canes in future years.
3. Remove all other canes!

4. Prune the two fruiting canes back to 40-60 buds per plant (more buds for smaller fruit clusters, or less buds for larger fruit clusters).

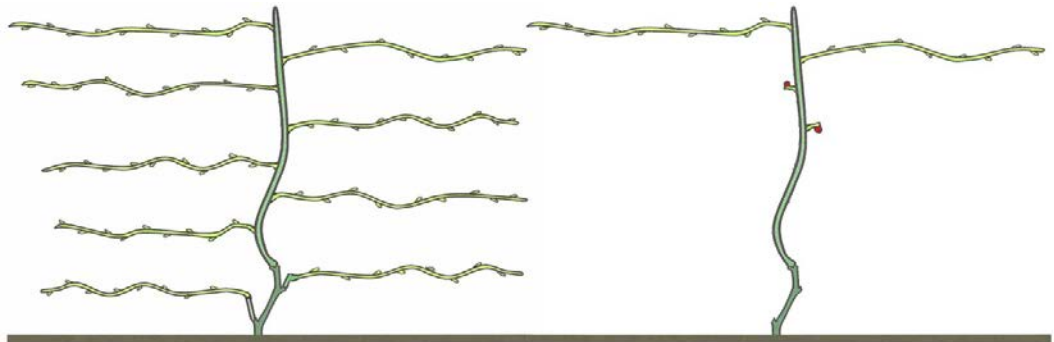


Figure 4. Pruning the third spring: Left: Before pruning. Right: After pruning. A one-year-old fruiting cane is selected to go to the left and another to the right. These become the *cordon arms* along the grape trellis. Another cane to the left and to the right (near the trunk) are pruned back to two buds as renewal spurs. All the other wood is removed. This heavy pruning balances fruit production with renewing the one-year-old wood for next year's crop.

### Spring Pruning the Fourth Spring and Beyond

1. Select two, one-year old canes (one to the left and one to the right) to become the new *fruiting canes* and spread them out along the trellis as *cordon arms*. The ideal cane is about pencil diameter with moderate spacing between buds. To keep the fruiting wood near the trunk, these could be selected from the first couple of canes on last year's cordon arm or from the renewal spurs. [Figure 5]
2. Select two canes (one to the left and one to the right) to become *renewal spurs* by pruning them back to two buds each. These could be selected from the renewal spurs of the first couple of canes on last year's fruiting cane. The purpose of the renewal spurs is to give options to select future fruiting canes/cordon arms close to the trunk.



Figure 5. Fourth spring and beyond pruning: Left: Before pruning: One-year-old fruiting canes shown in yellow. The one-year-old fruiting canes that have been selected to become the new cordon arm are shown in orange.

Right: After pruning. A one-year-old fruiting cane is selected to go to the left and another to the right. On the left, a cane from the renewal spur was selected. On the right, a cane from last year's cordon arm was selected. These become the *cordon arms* along the grape trellis. Another cane to the left and to the right (near the trunk) are pruned back to two buds as renewal spurs. All the other wood is removed. This heavy pruning balances fruit production with renewing the one-year-old wood for next year's crop.

3. Remove all other canes! This heavy pruning balances fruit growth with growing new fruiting wood for next year's production.
4. Prune the two fruiting canes back to 40-60 buds per plant (more buds for smaller fruit clusters, less buds for larger fruit clusters).

## General Care of Grapes

- Grapes perform best with a four-foot wide weed-free bark/wood chip mulch strip under the grape trellis. They perform poorly with lawn competition.
- Avoid over-watering. Iron chlorosis is a symptom of springtime overwatering.
- Go light on grape fertilization. Apply one-fourth cup of 21-0-0 (or equivalent) per established plant. Broadcast it under the trellis and water in.
- For home gardeners, flavor is the best method to evaluate harvest time.

## Common Grape Pests

### Fruit

- **Birds** – Bird netting over the plants may be necessary.
- **Botrytis bunch rot** (generally becomes a problem with excessively heavy canopy (due to inadequate pruning) and the lack of good air circulation.
- **Spotted wing drosophila flies** can affect ripe grapes.

### Plants

- **Powdery mildew**, refer to CSU Extension Fact Sheet #2.902, *Powdery Mildew*
- **Iron chlorosis** (symptom of over-watering) refer to CMG GardenNotes #223 *Iron Chlorosis*
- **Poor soil drainage** with related root rots.
- **Inadequate control of weeds and diseases** (Grapes do not tolerate the competition.)

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Revised August 2018