Small Fruit Varieties and Sources of Info

From

CMGDE Small Fruits Presentation

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Basics of Success- Variety Selection

- Look for varieties that are:
  - Hardy and *early maturing*, not early blooming
  - Tolerant of high pH
  - If the small fruit species you are interested in growing has day length requirements
    - Look for either long day or day neutral varieties for our area

Red raspberry cultivars

Fall-bearing

- **Heritage**
- **Autumn Britten**
- **Caroline**
- **Jaclyn**
- **Polana**

Red raspberry cultivars

Summer-bearing

- **Nova**
- **Boyne**
- **Killarney**

Will have winter damage on cold years.

Raspberry Varities

- Nova is hardy, adaptable red mid season
- Boyne is very hardy, early red
- Kilarney is very hardy, early-mid

- **‘Autumn Bliss’**
- Hardy and productive, early producer, large, flavorful fruit
- **‘Caroline’**
- Did outstanding in trials in New Mexico and Minnesota
- **‘Heritage’**
- Widely adapted, a classic but sometimes a poor producer
- **‘Polana’**
- Produces 3 weeks earlier than Heritage, short plants

- **‘Red Wing’**
- Heritage x Fall Red cross, developed in Minnesota, matures earlier than Heritage Yellow Raspberries
- **‘Fall Gold’**
- Very hardy variety, from New Hampshire
- **‘Kiwi Gold’**
- Ripening and yields similar to Heritage

For Further Information

- CSU Fact Sheet 7.001

  Raspberries for the Home Garden

- CMG GardenNotes #761

- Raspberry and Blackberry Trials http://specialtycrops.agsci.colostate.edu/organic-raspberry-and-blackberry-variety-trials/

Strawberries

June-bearing cultivars

- Suggested cultivars
  - Honeoye
  - Guardian
  - Kent
  - Redchief
  - Delite
  - Jewel
  - Blominden Gem
  - A.C. Wendy
  - Cabot
  - Mesabi
  - Carskill
  - Geneva

Strawberry

- Joels variety recommendations from first-to-bloom to last-to-bloom and produce- these bloom relatively late
  - A.C. Wendy
  - Earliglow
  - Honeoye
  - Mesabi
- Jewel

- **June Bearing**
  - ‘Honeoye’
  - ‘Guardian’
  - ‘Kent’
  - ‘Gem’
  - ‘Carskill’
  - ‘Geneva’

Strawberries

Ever-bearing cultivars

- Suggested cultivars
  - Ft. Laramie
  - Quinalt
  - Ogallaga

- Avoid
  - Ozark Beauty
  - Rockhill

Strawberries

Day-neutral cultivars

- Suggested cultivars
  - ‘Tribute’
  - ‘Seascape’ hase
  - ‘Albion’hase
  - ‘Tristar’
  - ‘Fern’
  - ‘Mara Des Bois’hase

Strawberries

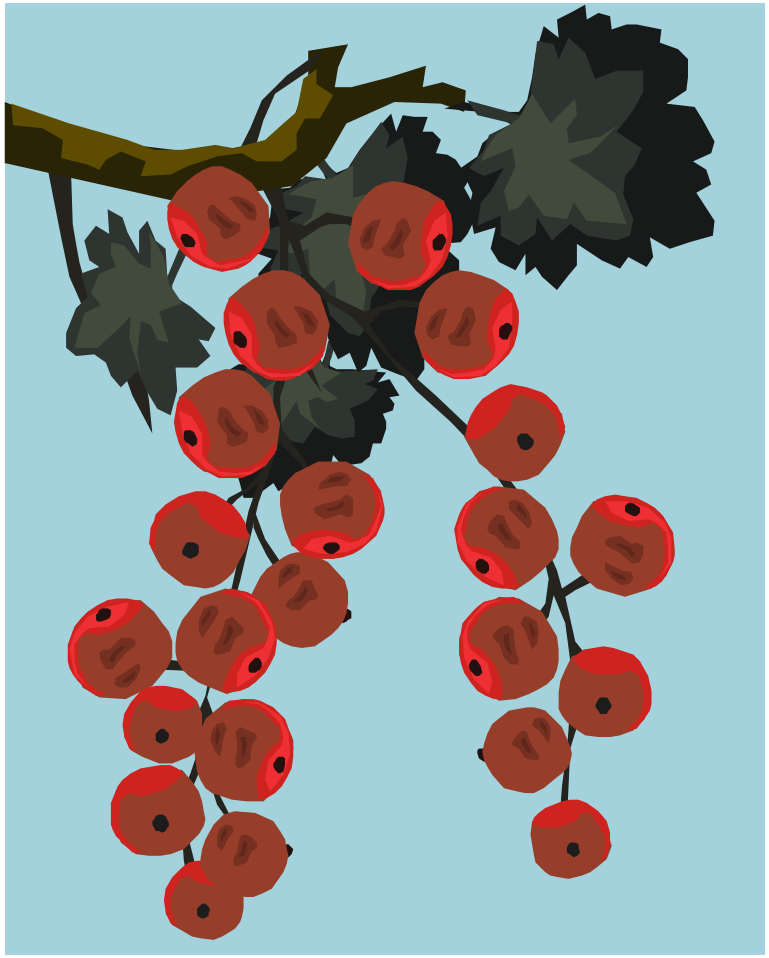
- **Day neutrals- recommended for when producing in a high tunnel greenhouse**
  - ‘Tribute’- release in 1980’s has a smaller fruit– ae improved new varieties
  - ‘Tristar’
  - ‘Fern’
  - ‘Seascape’ good flavor, smaller fruit

For Further Information about Strawberries

- CSU Fact Sheet 7.000
- CMG Garden Notes #763
- High Tunnel Strawberry Production
  http://webdoc.agsci.colostate.edu/hortla/greg/2014Annual%20Report_Sunspot.pdf

Red and White Currants

Ribes sativum
Ribes rubrum
Ribes petraeum



Red and white currants-

- ‘ Red Lake’
- ‘ Wilder’
- ‘Cascade’
- ‘Champagne’
- ‘Perfection’
- ‘Jhankeer Van Tets’
- ‘White Grape’
- ‘White Imperial’

Black Currants

Ribes nigrum
Ribes odoratum
Ribes aureum

‘Boskoop Giant’
‘Ben Sarek’
‘Brodtrop’
‘Consort’
‘Crusader’

Black Currants

Ribes aureum

This is a CO native

Tolerates pH 8

‘Crandall’*

Gooseberries

Ribes uva-crispa
Ribes hirtellum

‘Welcome’
‘Pixwell’
‘Jahn’s Prairie’
‘Hoenings Early’
‘Early Sulphur’
‘Red Jacket’
‘Invicta’

‘Welcome’ are good flavored and easy to pick pink gooseberries

Some say “Pixwell’ doesn’t have that good of flavour

For Further Information

- CSU Fact Sheet 7.005 Currants, Gooseberries and Jostaberries

Grapes

American cultivars (*Vitis labrusca*)

- Strong “foxy” (musty) flavor and aroma
- Used for juice and fresh eating

European cultivars (*Vitis vinifera*)

- Tight clusters and thin skins and a wine-like flavor
- Require more heat units for maturation

French-American hybrids

- Characteristics depends on parentage

Grape cultivars

- **Beta** -- juice
- **Bluebell** -- table, juice and jelly
- **Canadice**[JR] (seedless) -- table
- **Concord** -- juice and jelly[JR]
- **Edelweiss** -- table and wine
- **Elvira** -- table and wine
- **Fredonia** -- table, juice and jelly
- **Himrod**[JR] (seedless) – table
- **Kay Gray** -- wine and table
- **Swensen Red** -- table
- **St Pepin** -- wine, juice and jelly
- **Valiant** -- juice, jelly and table
- **Van Buren** -- table, juice and jelly
- **Vanessa**[JR] (seedless) -- table
- **Worden** -- table, juice and jelly

For details on cultivars, refer to ***Growing Grapes for Home Use***, University of Minnesota Extension Service, Fact Sheet FO-1103 available on-line at www.extension.umn.edu/distribution/horticulture/DG1103.html

Grapes

Vitis spp.

very hardy varieties:

‘Valiant’, ‘Kay Gray’, ‘St. Croix’, ‘Beta’

Plant Select variety- ‘St. Theresa’

Vitis labrusca varities are hardier than *Vitis vinifera* varieties:

‘Golden Muscat’, [JR]
‘Niagra’ [JR] and ‘Concord’ [JR]

Grapes

Other cultivars to consider (joel Reich):
Himrod
Interlaken
Lakemont
Concord
Niagara
Stueben
Golden Muscat
Vanessa
Reliance
Canadice

For Further Information

- CSU Fact Sheet: Grape Varieties for Cold Areas of Colorado
- CMG GardenNotes #764
- **Organic Table Grape Variety Trials**

  http://specialtycrops.agsci.colostate.edu/perennial-small-fruit-project/

Blueberries

Vaccinium spp.

Lowbush and half high are hardiest

Some native varieties

pH 4–5.3

Plant in containers in greenhouse or in bags of peat

Blueberries in Pots
http://specialtycrops.agsci.colostate.edu/blueberries-in-pots/

Blueberries (variety selection)

- **Northern Highbush**
  - BlueCrop
  - BlueGold
  - BlueRay
  - Duke
  - Elizabeth**
  - Elliott
  - Jersey
  - Reka**

Half-High

- Little Giant**
- Northsky
- Northblue

Black Elderberry

‘Adams #1’
‘Adams #2’
‘Johns’
‘Nova’
‘Scotia’
‘York’
‘Madonna’

Elderberry Varities

- **Adams #1 and Adams #2:** The oldest varieties, which are vigorous and productive, with large fruit clusters and berries. They ripen in early September.
- **Johns:** Also very vigorous, producing 10-foot canes on fertile soils. It ripens about 10 days earlier than the Adams varieties.
- **Scotia:** Yields berries with a higher sugar content than other varieties, although the bushes are somewhat smaller.
- **Nova:** Has larger, sweeter berries than the Adams varieties. It also lacks the astringency of some varieties.
- **York:** Productive and matures relatively late. Plants are large and vigorous

- Samdal- biennial canes make easy to prune

Blackberries

Rubus

Not as hardy as raspberries but take heat better

Upright are hardier than trailing

Culture is similar to raspberries

‘Snyder’ and ‘Brazos’ are worth trying for hardiness

‘Prime Jim’, ‘Prime Jan’- not that tasty

‘Chester’, ‘Triple Crown’- tasty

http://www.specialtycrops.colostate.edu/scp_exp_demo/small_fruit.htm

Serviceberries

Amelanchier alnifolia

Zones (1)3-8

pH 5-7

Sun to part shade

Self fruitful

Canadian varieties are best

‘Regent’- sweeter

Juniper-Hawthorne rust

Pear slugs

Honeyberries, Haskaps edible blue honeysuckle

Lonicera caerulea

- very hardy (Zones 2-6)
- Flowers are hardy to -7 degrees (18 degrees)!
- Needs a pollinator
- ‘Blue Moon’, ‘Blue Velvet’ (Russian varieties)
- ‘Borealis,’ ‘Tundra,’ and ‘Indigo Gem’ (Canadian varieties)
- ‘Dolce Vita’

sugar mountain blue sweetberry honeysuckle

For Further Information Honeyberry

- University of Saskatchewan, Canada has new introductions

- In collaboration with Dr. Maxine Thompson, Professor Emeritus at Oregon State University, the University of Idaho is helping to develop improved varieties and production methods for *Lonicera caerulea.*

Black Chokeberry

Aronia melanocarpa

- Not fussy about soil texture/ tolerates higher pH
- Not drought tolerant – grows best in areas that receive 15”+ rainfall
- Doesn’t require a lot of pruning
- ‘Viking’, ‘Morton’ (Iroquois Beauty, McKenzie’

Black Chokeberry

Aronia melanocarpa

- https://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/ndpmcpg8351.pdf

- The CSU Specialty Crop Program is currently installing an irrigation trial on *Aronia melanocarpa,* or black chokeberry.

Hardy kiwi

Actinidia kolomikta

Zones 3

pH 5.5-7.5

Part shade, well-drained soil, wind protection

Require long growing season (120 days)

Take 2-9 years to mature to produce fruit

Spring growth susceptible to late frosts

Dioecious so need male plant for every 6 female plants

‘Geneva’- shorter season

Rhubarb Custard Pie

- **Beat 3 eggs, 1/4 cup flour, 1 cup sugar, 1/2 teaspoon vanilla, and a dash of salt. Add 4 cups rhubarb. Put 6-7 pats of butter on top. Bake about an hour at 375 or until browned. Use 9 inch pie shell.**

- **From Ruth Amstutz, Mennonite 'grandma'**

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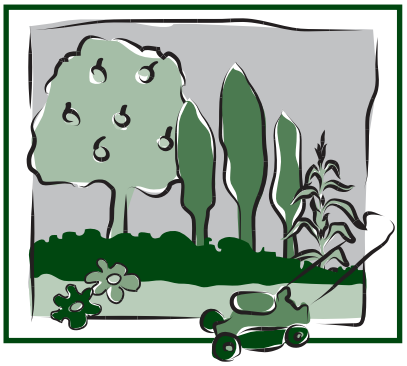

Strawberries for the Home Garden

Fact Sheet No. **7.000** Gardening Series | **Fruits and Vegetables**

by H. Hughes, J.E. Ells, G. Schweitermann, J. Reich*
Revised by L. Langelo**

Strawberries require at least eight hours of full sun each day of the growing season to produce at their maximum capability. Because a strawberry planting will remain in the same location for multiple years, locate them in an area that does not interfere with the annual garden cultivation.

When strawberries are planted after sod, grubs, which have been feeding undetected on the sod roots, divert their attention to the strawberry roots. Because there are fewer strawberry roots, a sizable grub population may cause severe damage. After removing the sod, wait a year before planting strawberries because the grub population will decline.

The gardener generally has no choice as to soil type; however, a sandy loam soil with a southern exposure is ideal. Strawberries like a loose, moderately fertile soil. Before planting, work in 4 bushels of organic matter, 1 pound of nitrogen (N), 1 pound of phosphate (P_2O_5) and 1 pound of iron chelate per 1,000 square feet. In general, do not add more than 4 bushels of fresh manure or more than 8 bushels of decayed manure. If you add more than 4 bushels of raw organic matter such as straw and sawdust, also add 1/4 to 1/2 pound of nitrogen for each bushel in excess of four.

Varieties

Strawberry varieties are classified as June bearing, everbearing or day neutral. June-bearing varieties tend to produce the most flavorful, aromatic berries. However, if their flowers are damaged by a late spring frost, they will produce a much reduced crop or no crop at all. In most areas of Colorado, June-bearing varieties actually ripen in July. Recommended June bearers (one crop) for this area are Guardian, Kent, Honeoye, Redchief, Delite, Jewel, Mesabi, A.C. Wendy, Cabot and Bloomiden.

Everbearing strawberries typically provide two main crops each year, with small amounts of fruit produced between the main crop in June and a lighter crop in late summer or early fall. For Colorado, everbearing strawberries are recommended for the home gardener because they tend to be very reliable producers. If a late spring frost kills the first flowers, you will still get a crop in late summer or fall. Some of the more common everbearing varieties are Ogallala, Fort Laramie and Ozark Beauty. Ogallala and Fort Laramie are recommended for Colorado because they are more hardy.

Day neutral varieties are similar to everbearers, but flower and fruit more consistently over the summer. Recommended day-neutral varieties include Tribute, Tristar and Fern.

Many gardeners plant everbearing, day-neutral and June-bearing types in order to extend harvest over the longest possible season.

Planting

There are two systems used for strawberry culture: the matted row, used with June-bearing strawberries, and the hill system, used with everbearing or day neutral varieties.

In the matted row system, space the plants 2 feet apart in rows 4 feet apart. These plants are allowed to produce runners to fill in the row. Leave a pathway 1 1/2 feet wide between rows. Remove or relocate runners that root in this pathway or within 5 inches of an established runner.

*H. Hughes, Colorado State University professor, horticulture and landscape architecture; J.E. Ells, former Colorado State University Extension vegetable crops specialist and associate professor (retired); and G. Schweitermann, former student, horticulture and landscape architecture. Previously reviewed by J. Reich, former Extension horticulture agent, Boulder County.

**L. Langelo, Colorado State University Extension horticulture agent, Golden Plains Area. 12/2014

Quick Facts

- Strawberries are classified as June bearing, everbearing or day neutral.
- They should receive full sun at least eight hours every day.
- They adapt to nearly all areas of Colorado, even high elevations.
- Strawberry beds generally are kept for three years.
- Having two people plant means less stooping.
- Remove the first blossoms to produce a stronger plant that will bear more fruit.
- Strawberries are remarkably free from most insects and diseases in Colorado.
- Leave the caps on the plant if the berries will be eaten or preserved right away.
- Protect strawberries over the winter, generally with a straw mulch applied about December 1.

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With the hill system, space plants 1 foot apart in three rows that also are 1 foot apart, with 3 feet between each set of three rows. Remove all runners as they develop.

Select certified plants over non-certified ones. They have been certified to be free from insects and diseases. Unpack plants and plant right away or heel them in a trench as a temporary location until they can be set out in the garden.

Transplant in the late afternoon to reduce wilting due to heat stress. Discard plants with dark roots or unhealthy looking roots. Remove flower buds, runners and damaged leaves before planting. The usual planting method is to drive a spade into the soil, push the handle away to open up the soil, fan out the roots of the plant, and place the plant in the opening so that the soil level is even with the crown. While the plant is held with one hand, remove the spade with the other. Allow the soil to fill in the hole and tamp it down gently. It is important to water each plant immediately after planting. This practice will help avoid transplant shock and water can be used to settle the soil in around the roots without compacting the soil by pushing on it. Much stooping can be avoided if two people are involved in this operation. Watering each plant individually at planting, rather than sprinkling the plants when finished, will help to avoid forcing wilted leaves into the soil.

Cultivation

After planting, keep weeds down by hoeing. If the planting is large enough, consider an herbicide such as Dacthal. Apply this compound according to label instructions.

Remove the first blossoms that form on a new planting at least once on the hill system and twice on the matted row system. This diverts the resources of the plant into producing a strong plant and, in the case of the matted row system, more runners. Stronger plants bear more fruit than those allowed to fruit early. Later in the season, there will be some fruit to enjoy on the everbearers or day neutral varieties.

About July 1, fertilize the crop with 1 pound of nitrogen per 1,000 square feet. This may be obtained from 5 pounds of a 21-0-0 formulation. If the fertilizer is broadcast, drag the foliage with a sack to dislodge the fertilizer and then water. Repeat this process again in September. Nitrogen applied before fruiting results in soft fruit and is not recommended.

Generally, keep a strawberry bed for three years. Remove it as soon as it ceases to bear in the fall, or leave it until spring. If the matted row system is used and the plants are still insect and disease free, plant a new bed in late August by carefully removing good, healthy, rooted runners and using them for planting the new bed. If the hill system is used where no runners are permitted, or if the plants are not healthy, order new plants in time for planting a bed in the spring, preferably in a different location.

Keep the soil damp until the first fall frost, then withhold water to help harden off the plants for winter. A final November watering helps prevent winter-kill from drying out the root system.

Insects and Disease

Strawberries are remarkably free from most insects and diseases in Colorado. Occasionally, an insect problem arises, such as crownborers, leafhoppers, aphids, earwigs, slugs or tarnished plant bugs. Malathion is a good standard home insecticide to control aphids, leafhoppers and quite a few other sucking and chewing insects. Use Sevin to control earwigs and beetles. Control crownborers with a soil-applied insecticide. Control slugs with commercially prepared baits available at most garden centers. Do not spray plants when in flower—pollinating insects may be harmed.

Disease problems occur less frequently than insect problems. Usually, the disease is controlled by removing the diseased plant or plant part. However, if it is widespread, other measures must be taken. In the case of systemic diseases, such as yellows (virus) or red stele (vascular), nothing can be done except to remove diseased plants. However, if a fungus develops on the foliage, spray the plants with a fungicide, such as Captan. Bacterial diseases on strawberries are not important in Colorado.

For more information, see fact sheet 2.931, *Strawberry Diseases*.

Harvesting

Pick strawberries every other day during the peak of the season. It is poor practice to let fruit rot on the vine, so pick even the rotted fruit. If berries are eaten or preserved immediately, harvest only red-ripe fruit and leave the caps on the plant. If the fruit will not be used for a few days, harvest the berries, caps and all, while still pink.

Mulching

Protect strawberries over the winter, generally with a straw mulch applied about December 1. By then, cold weather has inhibited growth and the soil is cold. Distribute the mulch over the plants to a depth of 1 to 2 inches. Hold it in place with weighted boards or piles of soil. This mulch prevents the plant from losing moisture to drying winter winds. It also prevents root damage caused by alternate freezing and thawing of the ground.

Leave the mulch on as long as possible to restrain plant growth in the spring. Early spring growth produces early flowers subject to damage by adverse weather. Therefore, check the plants under the mulch in March for new growth. When growth begins, part the mulch to allow sunlight to reach the foliage. As the plants continue to grow, gradually remove the mulch, leaving as much as possible as a soil mulch to keep the fruit off the ground. Rake the mulch back over the plants to protect them in case of a late spring frost. Remove soon after the frost danger is over.

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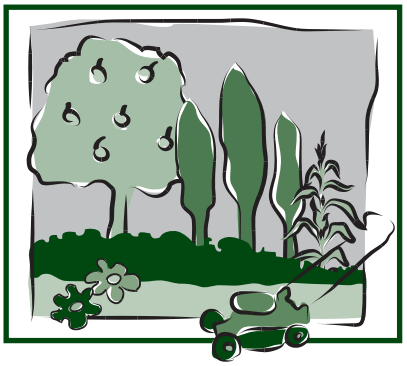
Currants, Gooseberries and Jostaberries

Fact Sheet No. **7.005** Gardening Series | **Fruits and Vegetables**



by H. Hughes, J.E. Ells and J. Reich*

Red currants (*Ribes sativum* and *R. rubrum*), black currents (R. nigrum) gooseberries (*R. grossularia svn. R. uva-crispa*) and jostaberries (*R. nidigrolaria*) have ornamental as well as fruit value. Their hardiness and adaptability allow them to succeed where most other fruit crops fail. With proper variety selection and care, currants, gooseberries and jostaberries may be grown at elevations up to 10,000 feet.

Varieties

Red and black currants are preferred for fruit production over alpine or golden currants. Red Lake produces a dark red, mild, subacid berry averaging 3/8 inch. It is the most popular variety carried by local nurseries and is recommended for Colorado. Wilder, a similar variety but with larger clusters, also is recommended. White and pink currants are also available. Both are red currants selected for their pale fruit color. Zante currants are actually dried grapes (raisins); do not confuse them with currants.

Gooseberries recommended for Colorado are Pixwell and Welcome. Pixwell produces round 1/2-inch berries that are light green, maturing to a soft pink. Welcome, sweeter and darker at maturity, also produces a 1/2¬inch berry. Its thorns are not as numerous or stiff as Pixwell, making it easier to pick. Other varieties that may be of interest to Colorado gardeners are Hinnomaki Red, which produces small, dark red berries with good flavor, and Invicta, which produces very large, pear-shaped berries with excellent flavor.

Jostaberries are a hybrid between the gooseberry and the black current. Berries are two to three times the size of the red current, nearly the size of the common gooseberry. They are nearly black, although more reddish forms are available. Best fruit set occurs when both black and red jostaberries are grown.

Both currants and gooseberries are self-fruitful, meaning only one variety is needed for fruiting. However, having more than one plant and plants of different varieties may increase yields.

Location and Soil

Currants, gooseberries and jostaberries grow best in full sunlight but do tolerate partial shade. For large scale production growers should provide a windbreak. Otherwise, drying winds may reduce plant growth and fruit size.

They produce best in fertile, loamy, well-drained soils with a pH of 6 to 7. However, they will tolerate clay soils with higher a pH and because they produce some fruit even in poor soils, they can serve as ornamentals that attract wildlife in areas receiving infrequent watering.

A soil test is best for determining fertility levels. However, in lieu of a soil test, the following recommendations are made. If planted in good garden soil, the plants need only a maintenance amount of fertilizer

– 4 pounds of ammonium sulfate and 2 pounds of treble superphosphate per 1,000 square feet.

However, if the soil has not produced a good garden, apply 8 pounds of ammonium sulfate, 4 pounds of treble superphosphate, 1 pound of zinc sulfate and 1 pound of iron chelate per 1,000

*H. Hughes, Colorado State University professor; and J.E. Ells, Colorado State University Extension vegetable crops specialist and associate professor. 10/99. Reviewed by J. Reich, Extension horticulture agent, Boulder County. 10/09, reviewed and revised by E. Hammond, horticulture Extension agent, Adams County, 1/2017.

Quick Facts

- Currants, gooseberries and jostaberries have value both as ornamentals and fruits.
- Maximum yields and top quality fruit are produced on fertile, well-drained, loamy soils.
- Currants and gooseberries are hardy and can be grown on poorer soils.
- Pick gooseberries green for pies and jams or fully ripe for dessert-quality fresh fruit.
- For fruit, red and black currants are preferred over alpine or golden.
- Jostaberry is a fast-growing hybrid between the black currant and gooseberry.

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square feet. For smaller plantings 4-8 ounces of a 10-10-10 fertilizer should be applied per plant per year.

For new plantings it may be beneficial to incorporate 3 yards (approximately 1 inch) of manure or manure based compost or 6-9 yards (2-3 inches) of plant based compost into the top 6-8 inches of soil per 1,000 square ft.

Planting

Currants and gooseberries are propagated from cuttings of year-old wood or through mound layering. They generally are sold as one- or two-year old bare-root plants. Local nurseries carry them growing in containers as two- or three-year-old plants.

Plant them 3.5 to 4.5 feet apart in early spring, in rows spaced 6 to 8 feet apart. Prior to planting, prune out all damaged roots and branches of bare-root stock. Cut branches back to 5 inches, and set plants 1 to 2 inches below the soil line. Water well.

Care and Maintenance

Control weeds to reduce competition and increase yield. These shrubs respond well to a heavy mulch of straw or similar material. When using straw, apply nitrogen at the rate of one part per 100 parts of dry matter.

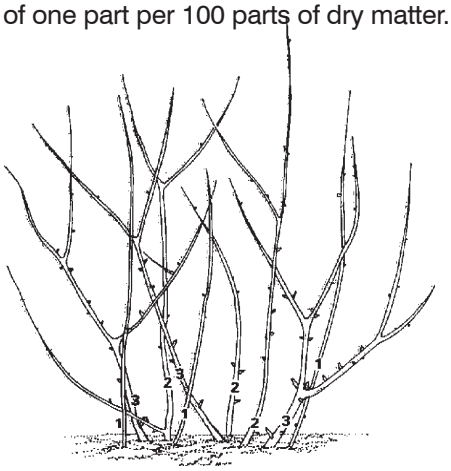


Figure 1: Currant showing correct pruning of mature shrub. Numbers 1, 2 and 3 indicate age of stem in years.

Mulch reduces weeds, water needs, and winter injury to roots caused by alternate freezing and thawing.

Apply adequate irrigation for best fruit size and yield. After harvest, gradually reduce the amount of water to harden the plants prior to winter. Give a final watering in November to reduce drying during the winter.

Pruning

Pruning is required for good yield. Red currants and jostaberries bear fruit on spurs (shortened fruiting branches) of two- and three-year-old wood. Some fruit is borne near the base of year-old wood. Gooseberries are similar, but their year-old wood is more fruitful.

Prune in late winter or early spring prior to bud swelling. Remove wood more than three years old, and thin out younger wood. The resulting bush should have three upright canes each of three-, two- and one¬year-old wood. Gooseberries sometimes are pruned to remove more of the three-year¬old wood while retaining more younger wood. See Figure 1.

Insects and Diseases

A wide range of insects and diseases affect currants, gooseberries and jostaberries. To avoid problems, purchase only quality, disease-free plants.

Insects most commonly observed are aphids, cane borers and red spider mites. Aphids are small, soft-bodied, pear-shaped insects on the underside of leaves.

Caneborers are small white grubs that bore into stems, causing wilting of the upper portion of the cane. Control them by pruning well below the wilted tip and destroying the affected part.

Red spider mites are hard to see because they are so small. Look for yellow spots on the leaves that eventually turn brown.

Although diseases are common to currants, gooseberries and jostaberries in other areas, they have not yet been reported as major problems in Colorado.

Harvesting and Preservation

Red currants are borne in clusters and generally are deep red and soft when fully ripe. Pick currants by pinching off the main cluster stem at the base, using the forefinger and thumb. For jelly, pick them slightly underripe when the pectin level is high. For juices, jams and tarts, pick them when fully ripe and soft. Picking may last two or three weeks, as they remain useable for some time while on the bush. Currants may be dried and used as a substitute for raisins.

Gooseberries often are picked green, after they reach their full size but before they ripen. Avoid the thorns when picking. Use them within a few days after picking. Use immature gooseberries in pies, tarts, jams and meat sauces. Fully ripe fruit, soft and pink or red, makes an excellent fresh, sweet fruit.

Pick jostaberries when they are fully colored (reddish-black to black) and soft. Harvest time is not critical – berries have a long shelf-life. They make excellent preserves, considered by some to be better than either red currant or gooseberry.

Fruit yield for currants and gooseberries may be 4 to 8 quarts from mature plants, which remain productive up to 20 years.

References

Shoemaker, T.S. *Small Fruit Culture, 5th Edition.* AVI Pub. Co. Inc., Westport, Conn. 1977.

Barney D.L. and Hummer K.E. *Currants Gooseberries and Jostaberries A Guide for Growers, Markerters and Researchers in North America.* CRC Press, Boca Raton, Fl. 2005.

Propagation

Grapes are easily propagated from dormant cane cuttings. To propagate your plants, collect dormant wood (pencil thickness, exposed to full sun) in December and store it in a cold, but not freezing, place until spring, making sure to note which end of the cuttings is up—the cuttings will not root if put in the soil upside down. In the spring, place the cutting two nodes deep in friable, moist, well-drained soil, and keep them watered. Rooting generally will occur in 4 to 8 weeks or so. Transplant to the desired site the following spring. In vineyard situations with such fox grape cultivars as 'Catawba', 'Concord', or 'Niagara', I have often trained a long cane 6 to 8 feet (1.8–2.4 m) from the vine, buried a node, and propagated a new vine right there. (A U-shaped piece of wire can be used to hold the cane in place initially.) Few plants allow you the luxury of such easy propagation.

Pruning and Training Systems

Grapevines can be grown to conform to numerous shapes—arbors, fences, and decorative trellises are only a few of the possibilities. Since many home gardeners may opt for less traditional training systems, a few general principles should be kept in mind when pruning and training your grapevines. As with all fruit crops, this primary pruning should be done in the dormant season.

1. The grapevine should be trained to reasonably fill the structure but not become overgrown. This is easier said than done, since initially the vine grows fairly slowly, but as it matures, it may become a monster of vegetation. One to two layers of leaves for any area on the canopy is best for flower bud and fruit development.
2. Mature grapevines, by their nature, produce much more wood than they can support. Think of the wild grapevine growing in the forest: it produces a huge amount of wood just to climb up to the sunlight. Your garden grapevines will not need to do that, but they still produce much more wood than is necessary or desirable. Typically during dormant pruning you need to remove as much as 90 percent of the new growth on a mature grapevine. Plan on leaving about three or four buds per foot of cordon (the horizontal trunk on a grapevine) length. Dormant pruning is usually done in late winter or early spring (February or March in Pennsylvania).
3. Grapes bear their fruit on one-year-old wood. Figure 6.1 shows the shoot that is formed from a single bud on a one-year-old cane.
4. Different grape cultivars have different growth habits. The canes of American cultivars tend to grow in a willowy, downward direction, whereas those of the European cultivars and many French-American hybrids tend to grow directly up. Choose your training system with this in mind.
5. Grapevines vary considerably in their vigor, due to both inherent (genetic) and environmental factors. Because of this variation, it is difficult to make exact recommendations as to how many buds (how large a crop) to leave on the vine in any given year. Vigorous vines can support and ripen a larger load of fruit than less vigorous vines. In other words, you can leave more buds for next year's fruit development on a big and robust vine than you can on a little waif of a thing. Makes sense. Therefore, you need to make a judgment about how many buds to leave during pruning based on how much growth the plant achieved in the previous growing season, which can be estimated by the amount of wood you have to remove during dormant pruning. As a general rule, plants that are relatively weak growing should have 2 buds per foot of cordon (row) or 30 buds per plant retained, whereas vigorous vines should have 3 to 4 buds per foot of cordon or 40 to 45 buds per plants retained. This concept is called "balanced pruning" because it balances the crop for next season with last season's growth.

Remember that although our methods of pruning and training are based on science and experimentation, much of grape pruning relies on experience and, for lack of a better word, art. These instructions seem a little befuddling at first glance, but as you engage

in the process of pruning, you will understand them more fully and come to appreciate the time spent in your vineyard in winter, in sweet anticipation of the summer to come.

By way of guidance, some traditional training systems employed by commercial and backyard viticulturists (grape growers) are described here. All the figures illustrating the various trellis systems depict a vine in the early spring after dormant pruning.

High-wire cordon (Figure 6.2, Plate 23). American cultivars such as 'Concord' or 'Niagara' tend to produce shoots that grow in a downward direction, so it generally makes sense to put the permanent horizontal branch (the cordon) on a high wire and let the plant drape toward the ground. In the high-wire cordon system, also known as the Hudson River Umbrella, a single horizontal wire is secured at a height of 6 feet (1.8 m), and another is placed at a 3-foot (1-m) height. The lower wire will be used to hold the vine up during early training, and later, after the plant is trained, it will only be used to secure the trunk in place.

In training a vine to this system, select two strong canes and train them up to the top wire; then, as the canes grow, place them along the top wire, in opposite directions. Be careful not to wrap the canes around the wires, since they will expand in girth over time and can girdle themselves on the wire. It is better to tie the canes to the top wire at first. They will eventually send out tendrils to secure themselves to the wire, but they will need a little help initially. Make sure that you keep an eye on the string that is securing the canes to the wire, since the string can also girdle the canes as they grow. Cordons from one vine should not overlap with those of adjacent vines. Ideally, you would like to train up the first two canes in the first year of growth, but realistically it often takes two years to get the cordons trained to the upper wire. Have patience—they will eventually get there, provided that they are in the appropriate climate. As is the case with growing many other perennial small-fruit crops, your training and patience in the first years will pay off in future decades.

Once the cordons are established, they should be pruned so that you are left with several shoots (spurs) that are five to seven buds

long, for a total of 30 to 45 buds per plant, depending on the vigor of the plant, as discussed earlier. These spurs should be spaced 6 to 12 inches (15–30 cm) apart on the cordon. In addition, for each seven-bud spur, leave one two-bud renewal spur. The smaller spurs will provide the shoots for the following year.

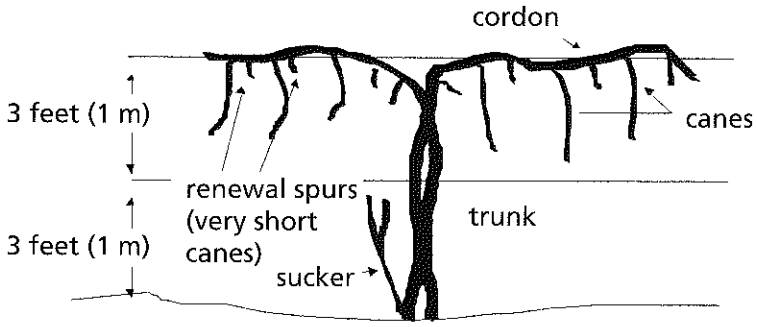


Figure 6.2. High-wire cordon (Hudson River Umbrella).

The fruiting shoots will hang like a curtain in groups from the spurs that originate from the arms along the top wire. Shoots should be carefully separated and placed vertically downward from the top wire for a distance of 18 to 24 inches (45–60 cm). Positioning should be carried out as soon as the shoots have toughened, usually two to three weeks after peak bloom (when 50 percent of the fused petals have fallen). Extreme care must be exercised during shoot positioning, as any shoot lost at this time can result in a poorly filled trellis.

In subsequent years, select new canes and leave new renewal spurs from the shoots that developed from the previous year's buds. Remember to balance the number of buds with the vigor of the plant: a higher number of buds should be left on vigorous plants than on weaker ones.

Low-wire cordon (Figure 6.3). The idea behind the low-wire, or low-bilateral, cordon training system is similar to that of the Hudson River system just described. The low-wire system, however, is

used for grapevines that have a tendency to grow up rather than down, as is the case with the European grapes and most of the French-American hybrids. If you put these forms on a Hudson River system, the shoots would grow up from the top, 6-foot (1.8-m) high wire—not a good thing. The low-wire cordon system takes advantage of the plant's natural tendency to grow up, allowing the shoots from the permanent cordons on the lower, 3-foot (1-m) high wire to fill in the trellis from the bottom up. Of course, gravity tends to work against you, so as the shoots grow up, you need to "help" them by using catch wires that sandwich the new shoots between them as they grow up. Usually, two sets of catch wires are adequate.

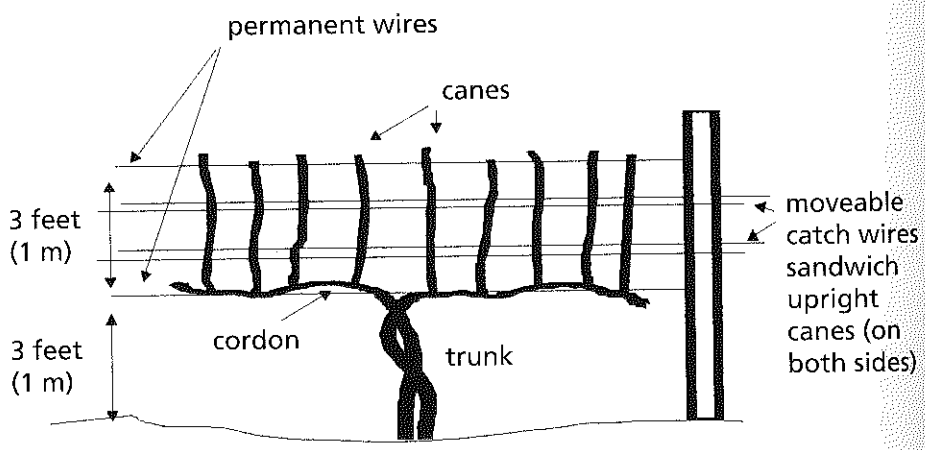


Figure 6.3. Low-wire cordon.

Umbrella Kniffin system (Figure 6.4). In the Umbrella Kniffin system, the plant's trunk is brought up and tied to a 6-foot (1.8-m) high wire, with four or more canes left near the top of the trunk (head) bearing a total of 50 to 60 buds. All other wood except for two renewal spurs (short canes of one or two buds) is removed from near the head. After pruning to the desired number of buds, retie the trunk to the top wire. The canes should be bent rather sharply over the top wire so that the outer bark cracks, and the tips are tied

to the lower, 3-foot (1-m) high wire. The renewal buds will develop into shoots that probably will not be fruitful but should be allowed to grow. They are there to be used for next year's fruiting canes. The buds on the main canes will form fruiting shoots that do not need to be tied because the vine has already been trained. Some of those shoots may be well located and can replace the original canes the following season, in which case the renewal shoots are not needed.

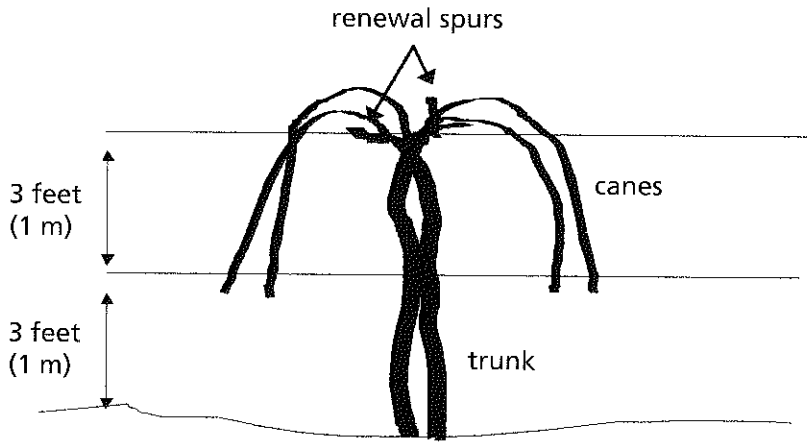


Figure 6.4. Umbrella Kniffin trellis.

Four-Cane Kniffin system (Figure 6.5). The Four-Cane Kniffin system is a variation on the Umbrella Kniffin system in which the canes are selected from both the top and the middle of the trunk. It is most often used on low-vigor cultivars. The lower canes are shaded by the upper canes, and the lower ones often produce later-maturing fruit that may be lower in quantity and/or quality than that on the cordons trained on the top wire.

Other training systems. The production of 'Thompson Seedless' grapes in California and similar climates requires cane-pruning systems, since the buds closest to the base are not fruitful, yet those are

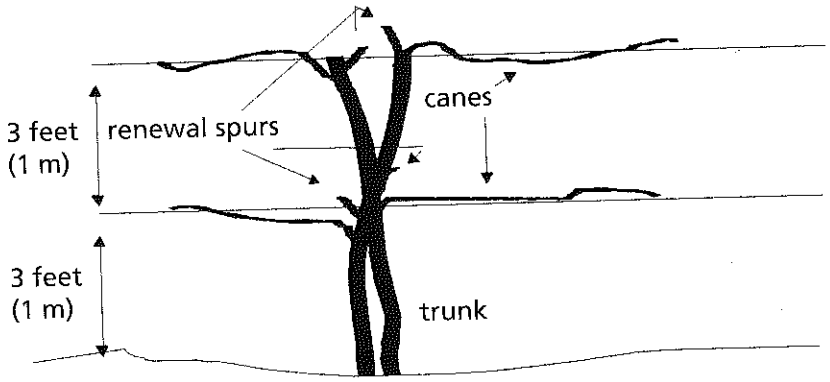


Figure 6.5. Four-Cane Kniffin trellis.

the only buds that are left on the vine in cordon systems. If you trained 'Thompson Seedless' to, say, a low-wire cordon, you would get a lot of leaves and no fruit. The most commonly employed training system for this cultivar is head training (Figure 6.6). Head training involves tying the main trunk to a vertical post.

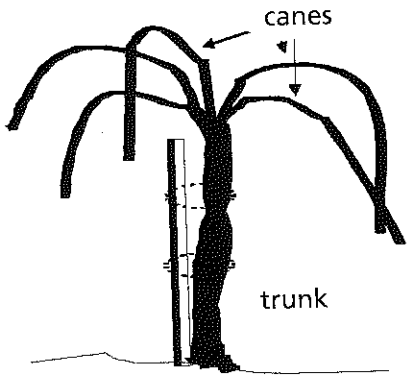


Figure 6.6. Head training.

Another common training system is the Geneva Double Curtain (Figure 6.7). This system is good for extremely vigorous vines since it allows the plant to achieve its potential yield in a relatively

small space. Weaker growing vines would not fill such a large trellis system.

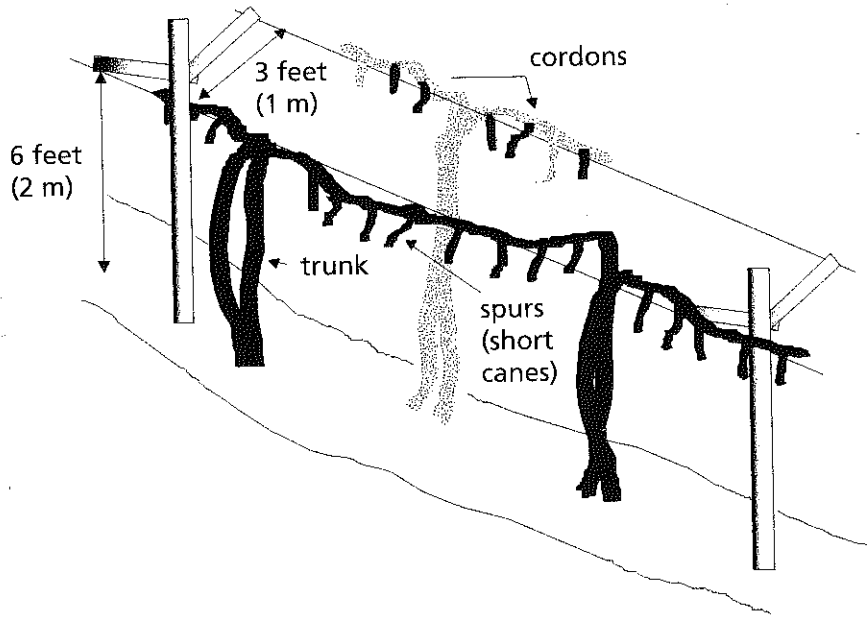


Figure 6.7. Geneva Double Curtain.

Harvest and Postharvest

Grapes should be harvested when they taste good or are ready for wine making. The first criterion applies to table grapes. You will notice that they change color (a stage called verasion) several weeks before they obtain maximum sweetness. The eastern seedless cultivars will develop not only sugars but all sorts of complex flavors as well. Remember to be patient and let the grapes hang, unless you see rot beginning and fear losing them. They will pucker your mouth for some time after they color.

Grapes for wine making need to obtain a sugar content of 22 percent (measured on the Brix scale) to ferment to an alcohol level of 10 to 12 percent, which is normal for table wine. Unfortunately,

varieties should have four to five feet between them. For vigorous varieties allow six feet between plants. Muscadine varieties grow very vigorously and should be planted up to twenty feet apart in the row.

The space between rows will be determined primarily by what equipment, such as garden tractors, need to pass between the rows and which trellis system you have chosen to use (more on trellising later). Eight to nine feet between rows is often used in small home vineyards, but up to twelve feet between rows may be needed if larger equipment is to be used.

Once the vines have been planted, water them in well to insure that no large air spaces remain around the roots to dry them out. Trim the vine so that only two buds are left to send out new shoots.

Special Grape Growing Terms

Before details of trellis design, training and pruning of the various types of grapes is discussed in upcoming chapters, it is helpful to have an understanding of the related terminology. For some reason, grape growing, more than other fruit culture, has a vocabulary all its own. Once you understand these commonly used terms, you will find it easier to apply the cultural practices. These terms include:

Arms. Arms are the main branches of the trunk. Canes or spurs are borne on the arms.

Bud. A bud is a dormant, undeveloped, compressed shoot. It is formed in the axil of each leaf.

Cane. A mature, woody shoot containing buds after leaf fall. One year old fruiting wood.

Canopy. The canopy is the total leaf-shoot complex of the vine.

Cordon. Cordons are extensions of the trunk. Their growth is usually horizontal. They can bear arms, shoots, or canes.

Cluster. A group of flowers or fruit developing at certain nodes.

Curtain. The portion of the canopy which has had the shoots positioned according to a selected training system.

Fruiting Spur. The basal portion of a cane, usually pruned to less than six buds.

Head. The top of the trunk including the short upper arms.

Internode. The portion of the cane or shoot between nodes.

Lateral. A side shoot or cane.

Node. The thickened part of the shoot where the leaf and compound bud are located.

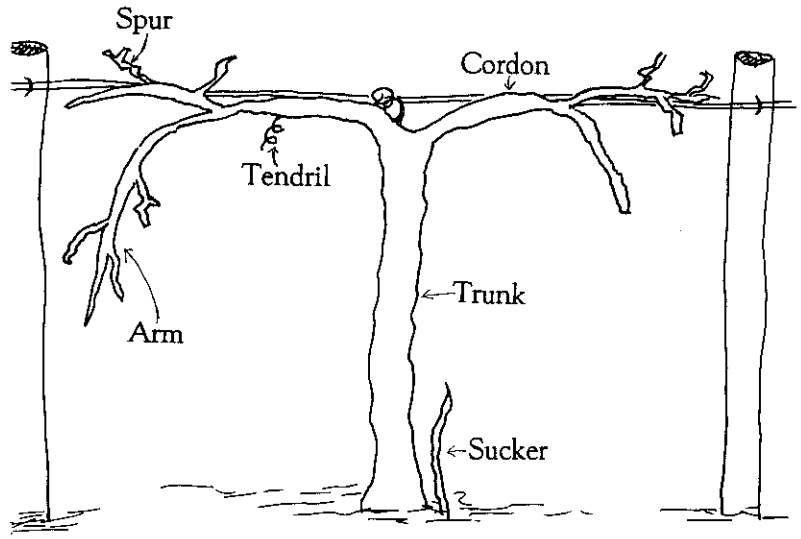


Figure 78. *Parts of the grape vine*

Renewal spur. A cane cut back to one or two buds meant to replace and renew an older spur or cordon.

Shoot. The green growth originating from a bud, arm, cane, spur, cordon or trunk in the spring. The shoot always bears leaves. It may also bear fruit.

Sucker. A shoot that develops from an underground bud.

Tendril. A twining, modified curly shoot that holds onto anything it touches. Occurs opposite a leaf.

Trunk. The trunk is a permanent, above-ground, vertically growing stem. Vines may have more than one trunk.

Vigor. The rate and amount of growth of the vine.

Vine size. The weight of the cane prunings.

Trellis Design Fundamentals

Healthy grape vines put out many feet of vegetative growth each season and as a result require some type of support to keep the vines and developing fruit off the ground. For the home gardener growing only a few grape vines, an arbor can be used as a support structure. However, if half a dozen or more vines are to be grown, it is likely

they will be planted in rows as a mini-vineyard. This will call for the use of a trellis to support the vines.

Building a trellis for the home vineyard is a long-term investment which involves a commitment of both time and money. Constructing a sturdy trellis is well worth the initial effort to save many headaches later. The trellis should be strong enough to support heavy, fruit-laden vines with minimal sagging of support wires. All trellis systems include the major components of end posts, line posts that are spaced along the row, and one or more wires to support the vines.

The primary function of end posts is to provide an anchor for the trellis wires. They also provide a point from which the wires can be tightened when necessary. Since they are under considerable tension, end posts need to be heavy and well anchored. They should be at least nine feet long and five inches in diameter. Sometimes

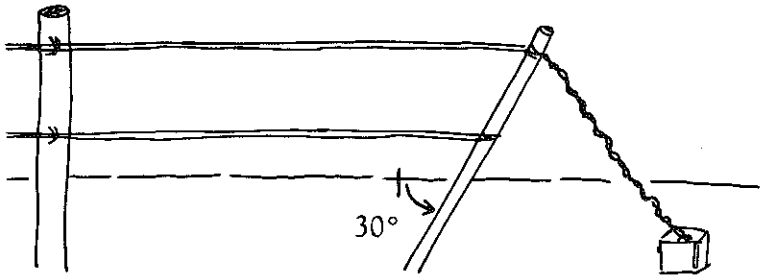


Figure 79. *Anchoring trellis end posts*

used utility poles are available and can be used. Treated posts will last the longest, but rot resistant cedar posts are an alternative for the gardener who does not want to use chemically treated materials.

End posts should be set three to four feet deep in the ground, anchored, and braced as shown in Figure 79. For maximum stability, the end post should be sunk into the ground angled away from the trellis at thirty degrees.

Line posts supporting the trellis wires should be sunk into the ground two to two and a half feet. They should be at least three inches in diameter and eight to nine feet long. In the past wooden posts have been used and are still popular today. In some systems metal posts (such as those used for livestock fencing) are being used. The metal posts are easier to handle, but more subject to bending once the trellis is fully weighted with fruit. Where metal posts are

used, it is a good idea to still use wood for every third or fourth line post. Spacing between line posts will vary depending on the vine spacing chosen. Typically the posts are spaced twenty to twenty four feet apart. Three vines, eight feet apart, between posts twenty four feet apart works well. Posts should not be further than twenty four feet apart, however, or sagging of the cordon wires will occur.

The trellis wire supports the actual cordons. Wire is available in several gauges or weights. The lower the gauge number, the thicker the wire. Generally the top wire on most trellises should be number 9 wire. Number 10 or 11 wire is adequate for most lower wires. When possible, use galvanized wire. It causes less chafing on the vines and is more durable over time. A three wire trellis is versatile and easy for the home gardener to construct. Fence staples are used to position the wires on the windward side of the line posts. Staples should be tight enough to hold the wires in place but still allow the wires to be tightened. The wires should be placed so that the top wire is five and a half to six feet above the ground and the lowest wire is two and a half to three from the ground. The third wire is positioned midway between the top and bottom wires. The wires are fastened to the end post by wrapping them twice around the end post and twisting the end of the wire back around itself several times.

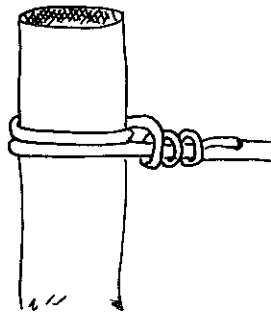


Figure 80. *Anchoring the end posts*

Vine Training Systems

Numerous vine training systems have been developed, all with the goal of increasing sunlight exposure to the vines. This in turn encourages higher production of top quality grapes. Some of the training systems have also made picking and pruning easier and faster. Some systems are best suited to certain climates or vine growth habits. Those systems that promote vigorous renewal of bearing wood are generally most successful in northern climates. In warmer climates, where cold damage to the cordons is not a great risk, systems that don't require aggressive growth work well. Which system to use will vary with each garden's conditions and the varieties being grown. The most practical training systems for home gardens are discussed in this section.

Typically, the trellis is installed at the time of planting or within the first year of vineyard growth. Once the trellis hardware is in place, training of the vines can begin. One should differentiate at this point between training and pruning of the vine. Training is mainly the practice of positioning and selectively removing unnecessary vegetative growth in the early years of vine establishment. Through training, the vine becomes a strong supporting structure for the future production of fruit.

Pruning, on the other hand, is the annual removal of nonproductive and excess vegetative growth. Its purpose is to facilitate regular annual cropping by encouraging growth of new wood. Regular pruning also leads to maximum production of high quality fruit.

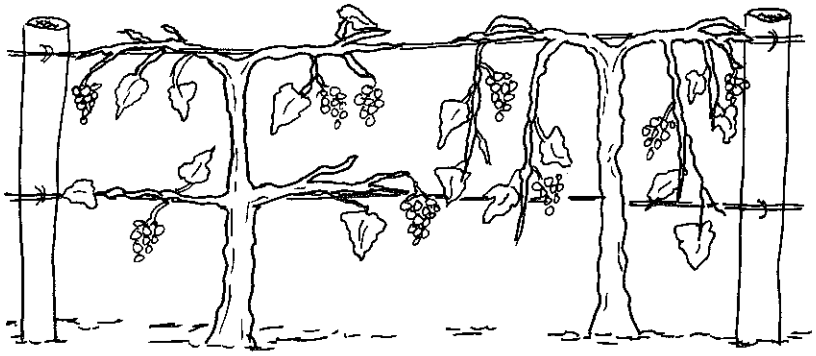


Figure 81. *Four Arm Kniffen and Single Curtain Cordon systems*

The **Four Arm Kniffen** system has traditionally been used in vineyards and is one that most people will recognize. In this system, the trellis has two wires. The cordons are trained parallel to the wires horizontally in both directions. This system works well for varieties of moderate vigor. Low vigor varieties are sometimes trained to a similar system using six arms on three wires. High vigor varieties grown on the four arm kniffen system tend to have poor production on the lower cordons due to excessive shading by the upper cordons.

The **Single Curtain Cordon** system is quickly becoming popular. A simple system to understand, it requires minimal labor. Cordons are trained in either direction along a single high wire. As shoots and spurs grow they are positioned to hang vertically. Many of the hybrid varieties produce well when trained to this system.

The **Fan** system is useful for growing tender varieties in colder climates. One or more trunks are grown to a foot in height. Once the head is formed, shoots grow upright to the upper wire. As they grow, the shoots are positioned, as the name suggests, to a fan shape in a fan formation. This system allows for easier winter protection of the short trunk and good renewal of fruiting canes.

Finally, some grape varieties are **head trained.** This system involves no trellis. Rather, a strong stake is used to support each vine trunk. Four arms that develop at the head are allowed to cascade downward in an umbrella fashion. Each arm is pruned back to fruiting spurs of two to three buds each. The following season four or five symmetrically placed canes are selected and also pruned back to become fruiting spurs. In subsequent seasons, additional spurs up to a maximum of a dozen on a vigorous vine, are developed. As old spurs become less productive, they are removed and new spurs developed to take their place. Head training is best adapted for use in long season, warm climate areas and varieties that fruit primarily from their basal buds.

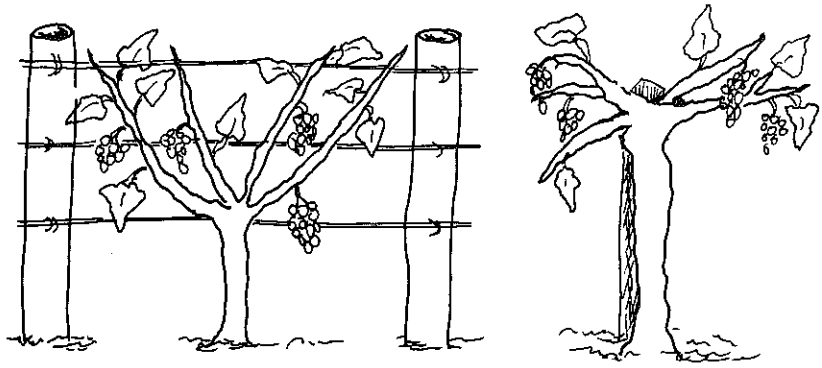


Figure 82. *Fan and Head-training grapes*

Pests and Diseases

Grapes are host to numerous insects and diseases. Not all of these pests are problems in all parts of the country, nor, fortunately do they all occur every season. It pays, however, for the gardener to be on the look-out for them before problems become severe.

GRAPE VARIETIES FOR COLD AREAS OF COLORADO

Insufficient variety test data prevents specific recommendations relative to exact location and hardiness. However, the following varieties should be considered as general recommendations for many parts of Western Colorado..

Discussion

Vitis labrusca varieties are hardier than *V. vinifera* varieties, while the French hybrids *(V. vinifera* hybrids) are somewhere in between. In the case of *V. vinifera,* winter freezes may kill the wood or the buds on the canes.

Vinifera types should be planted only in areas where 170 frost-free days are the rule. As an average, American grape varieties will mature in about 160 frost-free days provided summer heat is adequate.

Wine Grapes	**Fruit Color**	**Additional Comments**	
Vitis vinifera			
White Riesling	White		
Chardonnay	White		
Sauvignon Blanc	White		
Merlot	Red		
***Vitis vinifera* hybrids**			
Seyval Blanc (Seyve-Villard 5276)	White	Possible in Cool Areas	
Vidal Blanc	White		
Chancellor	Red		
DeChaunac	Red	Possible in Cool Areas	
Chambourcin	Red		
Aurora	White	Possible in Cool Areas	
Baco	Red		

Table Grapes	**Fruit Color**	**Fruit Size**	**Seedless**	**Other Uses**
Vitis vinifera				
Perlette	White	Medium	Yes	R, P, J
Black Monukka (Monukka)	Red	Medium	Mostly	

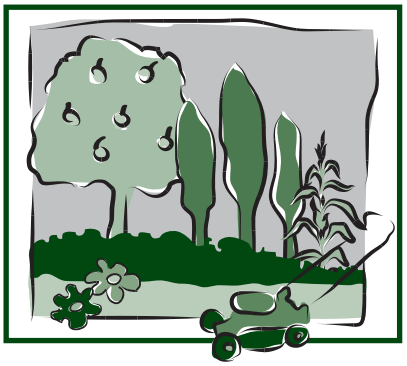
Flame Seedless	Red	Large	Yes	R, P, J
Vitis vinifera hybrids				
Himrod	White	Large	Mostly	R, P, J
Lakemont	White	Medium	Mostly	
Suffolk Red	Red	Medium	Mostly	R, P, J
Glenora	Blue	Medium	Mostly	R, P, J
Canadice	Red	Medium	Mostly	R, P, J
Vitis labrusca				
Niagara (White Concord) (4)	White	Large	No	P, J
Concord	Blue-Black	Medium	No	P, J
Golden Muscat	Golden	Large	No	P, J

Notes:

- (1) Varieties recommended by Colorado State University, Orchard Mesa Research Center staff.
- (2) for cooler regions in the Tri River area all listed table grape varieties except Lakemont are recommended.
- (3) other uses include:
  - (R) Raisin
  - (P) Processing for jams & jellies
  - (J) Juice
- (4) Not as winter hardy as Concord.

Colorado Grape Growers Guide, Bulletin 550A, Colorado State University Extension
Grape Growing, Weaver, 1976, John P. Wyley & Sons, New York.
Wines & Vines Magazine, (Published monthly except December) 703 Market St., San Francisco, CA 94103
Growing Grapes in Minnesota, 1978, available from: Carolyn Barrett, 6133 Oaklawn Ave., Edina, MN 55421
Grape Vine Nutrition & Fertilization in the San Joaquin Valley, Priced Pub. 4087, Agricultural Sciences Publications, University of California, 1422 Harbour Way South, Richmond, CA 94804.

Colorado State University
Extension



Raspberries for the Home Garden

Fact Sheet No. **7.001** Gardening Series | **Fruits and Vegetables**

by J. Reich, H. Hughes and J.E. Ells*

Selected varieties of red and yellow raspberries (*Rubus idaeus*) may be successfully grown in Colorado at elevations up to 8,500 feet. Colorado's climate is not especially favorable for bramble fruit production, and only red and yellow raspberries are recommended for general cultivation. Several varieties of blackberries can be grown in the lower-elevation areas of the state. Purple raspberries, boysenberries, loganberries and dewberries require special winter protection and are not recommended for Colorado. Black raspberries are not currently recommended, but new varieties suited to Colorado conditions should be available by 2012.

Types

There are two growth-types of raspberries: summer-bearing and fall-bearing. Summer-bearing varieties produce flowers and fruit on canes that are in their second year of existence. In Colorado, they typically produce ripe fruit throughout the month of July. Fall-bearing varieties produce flowers and fruit on canes that are in their first year of existence. In Colorado, they typically produce ripe fruit from early-mid August until freezing night temperatures occur. The traditional varieties are biennial summer-bearers. This means that a given cane will grow vegetatively in its first year, followed by fruiting on that cane in its second year. Fall-bearing raspberries fruit along the upper portions of canes in their first year of growth. These canes may overwinter and produce a light summer crop on their lower portions, but this is at the expense of a reduced fall crop.

Varieties

Recommended summer-bearing red raspberries include Nova, Killarney, Boyne, Latham, Newburgh and Titan. Recommended fall-bearing raspberries include Autumn Britten, Anne (yellow-fruited), Polana, Jaclyn, Joan-J (nearly thornless), Himbo-Top, Redwing, August Red, Heritage, Fall Red, Fall Gold (yellow-fruited) and September.

Based on Colorado State University tests, fall-bearing types seem best adapted to the Front Range. However, the summer-bearing varieties Nova and Boyne have also performed well on the Front Range. Both fall-bearing and summer-bearing varieties do well on the Western Slope.

Soil Preparation

Red raspberries grow in most garden soils if they have ample organic matter and adequate drainage. For summer-bearing raspberries in good garden soil, apply only a maintenance amount of fertilizer: 4 pounds of ammonium sulfate and 2 pounds of treble superphosphate per 1,000 square feet. However, if the soil has not produced a good garden, have it tested before planting. If soil is not tested, apply 8 pounds of ammonium sulfate and 4 pounds of treble superphosphate, 1 pound of zinc sulfate, 1 pound of iron chelate and 10 bushels of organic matter per 1,000 square feet. Work these in before planting. For fall-bearers, increase the amounts of fertilizer by 50 percent. If soil pH is above 7.0, a significant amount of the organic matter added should

Quick Facts

- Of all bramble fruits, only red and yellow raspberries are recommended for general cultivation in Colorado.
- Blackberries are considered marginal, due to inadequate hardiness, but some varieties can be successful.
- Red raspberries grow well in most garden soils that are amply supplied with organic matter and adequately drained.
- Bramble plants are perennials, but their canes are either annual or biennial structures.
- Plant only true-to-name, disease-free stock from reputable sources.
- Twenty-five feet of row should produce 15 to 20 pounds of raspberries per year.

www.ext.colostate.edu

J. Reich, Colorado State University Extension horticulture agent, Boulder County; H. Hughes, Colorado State University professor, and J.E. Ells, Colorado State University Extension vegetable crop specialist and associate professor (retired), horticulture and landscape architecture. 8/2011

be sphagnum peat as this will help lower the pH in the rooting zone.

Maintain soil fertility with a spring application of 4 pounds of ammonium sulfate and 2 pounds of treble super phosphate per 1,000 square feet. Scatter among the canes and cultivate into the soil.

Apply enough water to maintain a moderate moisture level in the root zone. Withhold water after the first frost to help harden off the plants. A late November watering reduces winter drying.

Planting Raspberries

Red and yellow raspberries are commercially propagated by rooted suckers. These can easily be purchased from a variety of online and mail-order sources. They are typically sold as "handles." A handle consists of a 12-18 inch section of a dormant cane with a large root mass attached. Plant them in the spring, 2 to 3 feet apart in rows 5 to 10 feet apart, depending on how much pathway space you desire and the width of any cultivating equipment that may be used. After planting, cut the tops to within 4 to 6 inches of the ground. Soak bare-root plants in a bucket of water five hours to overnight to help them get prepared for planting.

After one or two years, suckers fill in the row to form a hedge of canes. During dormant-season pruning, thin the resulting collection of canes so that you leave five to six of the strongest canes per linear foot. The hedgerow should not be more than 2 feet wide at ground level.

Trellising

Trellising is advisable for all bramble crops in Colorado. Without some type of support, canes will flop and sprawl in such a way as to make weed control and harvesting much more difficult (and prickly). Stretch a wire on either side of the hedge row, 3 feet above the ground. This wire confines the canes to the hedge row. To make them stand erect, you may have to tie the canes to the wire with soft twine. See Figure 1.

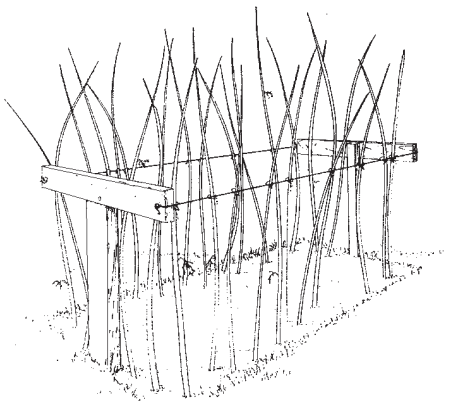


Figure 1: Raspberry trellis with dormant canes secured to wires.

Pruning

Remove the spent floricanes of summer-bearing varieties by cutting them off at the ground after they bear fruit. Dispose of these canes – they often harbor insects and disease. In the spring, remove the dead, weak and small canes. Remove winter-killed tips of the remaining canes. Mow or cut the canes of fall-bearing varieties to ground level after the fall harvest. New canes will be produced in the spring.

Winter Protection

To obtain a crop of summer-bearing raspberries in many areas of Colorado, it will be necessary to protect the canes during the winter. This does not appear to be necessary for the varieties 'Nova' and 'Boyne,' as they appear to have adequate winter hardiness in all but the coldest locations. For all other summer-bearing varieties, follow these steps. Sometime after November 1, lay the canes down in one direction and hold them in place with a shovelful of soil on their tips. Plow or shovel a shallow furrow along each row and roll the soil over the canes. In early April, use a pitchfork to lift the canes out of the soil. Put the soil used to cover the canes back into the furrow.

The advantage of fall-bearing varieties is that winter covering is not needed -- the canes are mowed off after harvest. However, if a summer crop is desired from these canes, they must be protected as described for summer-bearing raspberries.

Yield

By the third year, a 25-foot hedge row of red raspberries should yield 15 to 20 pounds of fruit per year under optimum conditions. After this, it is likely that productivity will decline gradually. After eight to 10 years, relocate the bed, starting with new stock.

Disease and Insects

Raspberries can be affected by a wide range of diseases and insects, as are most cultivated plants. You can avoid most of these problems for several years by purchasing only quality, true-to-name, disease-free raspberry varieties. This typically means mail-ordering bare-root plants. These should be planted mid-April through early May.

It is not uncommon, during hot, dry weather, for raspberries along the Front Range to be infested with spider mites. The mites themselves are not always obvious, but their presence is indicated by tiny yellow spots on the leaves, which eventually turn bronze and/or brown. The most effective way to avoid mite problems is to maintain healthy plants. This means applying a balanced fertilizer at least once a year, in May. Many plantings will benefit from additional fertilizer in June and July. In addition, make sure plants are adequately watered. Drought-stressed raspberry plants are a great place for spider mites to feed and breed. It is also important to prevent the planting from becoming too dense, as an overcrowded planting makes life easy for mites. This can be achieved most effectively by removing the thinnest, weakest canes, thereby allowing more light and air to reach the center of the planting. Regularly watering the foliage during hot weather will also help control mite populations.

Insecticides tend to be ineffective against mites, and their use often makes mite problems worse by killing a variety of beneficial, predatory arthropods. If a spray is desired, best results are often achieved with a "summer weight" (2%) application of horticultural oil.

Raspberry cane borers can be an important pest in Colorado. Symptoms of this pest include a sudden wilting and drooping of the tops of canes. The white larvae of the borer, if left uncontrolled, burrow downwards through the center of the cane and kill it. Management in the home garden is best achieved by removing the affected canes at the first sign of

damage. Depending on location, mid-May through June is when these pests tend to do their damage. If caught early enough, while the larvae is still near the tip of the cane, the undamaged portion of the cane may be saved, allowing it to produce fruit.

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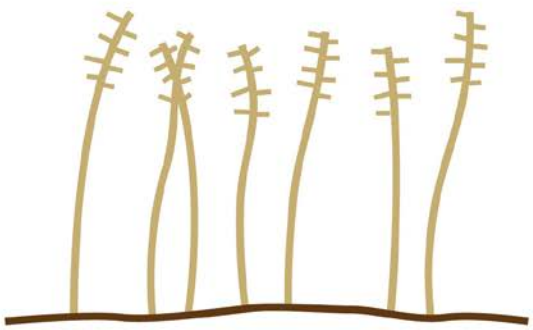
"Fall Bearing" Raspberries

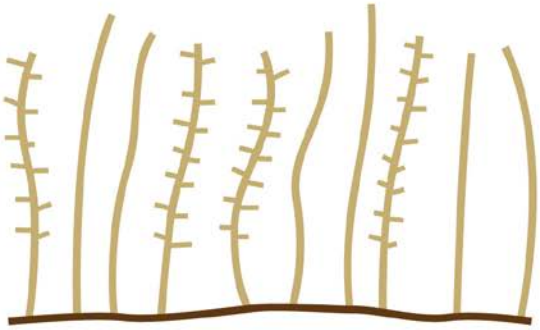
Primocane Raspberries (set fruit on first-year canes)

"Summer Bearing" Raspberries

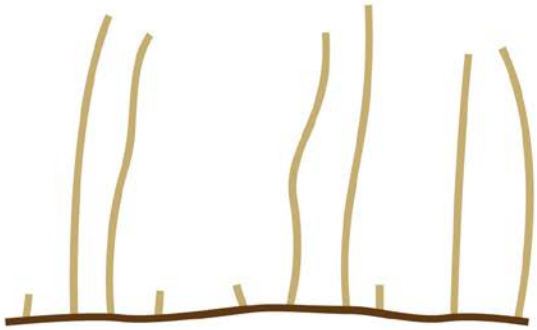
Floricane Raspberries (set fruit on second-year canes)



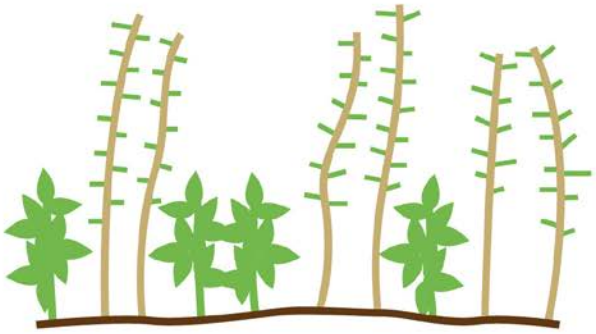
Mid-Winter (pre-pruning)



Late Winter (after pruning)

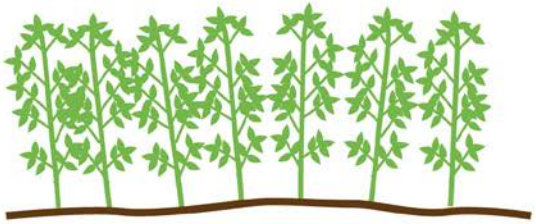


Spring

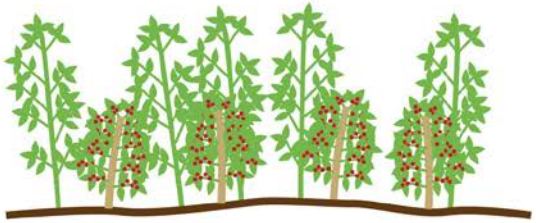


"Fall Bearing" Raspberries

Primocane Raspberries (set fruit on first-year canes)



[completely mowed down the previous winter]

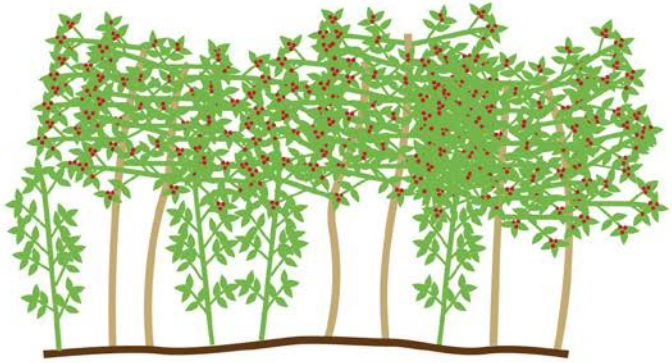


[only pruned halfway down the previous winter]

July

"Summer Bearing" Raspberries

Floricane Raspberries (set fruit on second-year canes)



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Serviceberry in the Garden

Kristan Crouch, Student, ***Tiffany Maughan***, Research Associate, and ***Brent Black***, Extension Fruit Specialist

Summary

Serviceberry (*Amelanchier* spp,), also known as juneberry, saskatoon or shadbush, is considered a large shrub that can be grown as a small tree. It is native to North America, and is adapted to many areas of Utah. White flowers appear in early spring, with yellow to red foliage in the fall. The fruit is a berry-like pome, and resemble small blueberries. When ripe, they are dark red, purple or almost black in color. They are primarily harvested for juice, jellies, jams and pies, but can also be eaten fresh. Serviceberries are cold hardy to zone 3, adapt to a range of soil types and may have desirable ornamental qualities.

Recommended Varieties

Amelanchier alnifolia var *pumila* is a naturally occurring dwarf variety that is native to the western United States. It will often stay quite small, only about 3 feet high and wide, and produces small round berries. There are several cultivars that have been selected for fruit production and will do well in the home garden (Table 1). Serviceberry availability at local nurseries can be limited, but many online companies carry serviceberry plants. Care should be taken to only order from reputable nursery companies. Another option is to propagate serviceberries on your own. One of the easiest and most effective methods of propagation is by digging up suckers from a healthy established plant and transplanting them to the desired location. This should be done in the spring before bud break, and the shoots should be pruned back to about 2 inches. Serviceberries seeds will not grow true to parentage, and hardwood and softwood cuttings have only limited success.

How to Grow

Soil: Serviceberry is tolerant of a variety of soil types and pH levels, but prefers well-drained sandy loams and loams. However, it will also do well in silt loam as long as adequate drainage is provided. Clay soil can cause root rot problems, so till organic mulch into the soil before planting and consider

Table 1. Recommended serviceberry cultivars.

Cultivar	Size at maturity	Comments
'Honeywood'	12' x 9'	Very productive, clusters of medium-large fruit. Minimal suckering. Ripens mid-season.
'Northline'	10' x 6'	Heavy producer, medium sized berries with excellent flavor and few seeds. Can produce many suckers. Ripens early to mid-season.
'Pembina'	12' x 8'	Productive with smaller, very flavorful fruit. Low sucker production but vigorous plant.
'Thiessen'	15' x 12'	.Very high yielding with large fruit. Ripens late-season.
'Regent'	6' x 6'	Smallest of the recommended varieties, little suckering. Small, mild-flavored fruit.
'Martin'	13' x 9'	High-yielding, large fruit. Ripens late-season.
'Parkhill'	12' x 8'	Well-suited for home growers or you-pick operations because the fruit ripen over a long period. Ripens mid-season. High-yielding

raised beds to avoid these issues. Sandy soils need to be properly irrigated to maintain moisture and nutrient uptake.

Soil Preparation: Soil testing can help determine the appropriate amendments to add to the site before planting. Apply any deficient nutrients, as indicated from testing results, to the planting area and till into the soil.

Plants: Serviceberry shrubs range in size from 6 feet tall and wide to 30 feet tall by 20 feet wide, depending on the cultivar. It is important to choose the appropriate cultivar to fit the planting site and the desired fruiting requirements. Serviceberry is self-fruitful and bloom typically occurs between early and late May, depending upon the location and weather. Flowers will appear before or at the same time as leaves. Full sun is required for maximum harvest potential. Serviceberry plants are adaptable to partial shade, but will suffer from reduced yields.

Planting and Spacing: Planting in the spring or fall is ideal for serviceberry, as it allows root systems to establish before summer heat becomes an issue. For most online nursery companies, bare-root plants are more commonly available than containerized plants. Both will establish well, but bare-root plants will need more frequent irrigation for the first 2 weeks. Before planting, prepare a hole twice the width and the same depth as the container or roughly the same depth and somewhat wider than the roots of the bare-root plant. Immediately after planting, water heavily to settle the soil around the roots and to remove air pockets. Applying mulch around the plant will help keep the soil moist between watering and keep weeds down. Spacing should be based on the cultivar and should leave sufficient room between shrubs to allow sunlight to penetrate the canopies when full growth has been achieved.

Irrigation: During the first season, irrigate at an interval that will keep the soil moist, but not wet. Depending on rainfall and temperature, irrigate about two times per week. For the next few years, maintain a bi-weekly watering program that will apply about 30 inches of water over the season. This can be reduced if there is significant rainfall accumulation. Although established serviceberry plants can survive with little water, to achieve maximum yield and more desirable fruit, irrigation is needed. Additional irrigation may be necessary when hot, dry conditions are prevalent. It is best to water at the base of the shrub, in order to keep the canopy dry and reduce the chance of disease. This may be accomplished with a drip system or deep watering with a hose. It is also advisable to maintain a mulch bed around the base of the shrub instead of sod, as sod has very different watering requirements that conflict with that of serviceberry.

Fertilizer: Applying 4 ounces of an all-purpose fertilizer, such as 16-16-16, in the spring as the plant comes out of dormancy, should supply sufficient nutrients for the growing season and will maximize growth. If phosphorus and potassium are

shown to be readily available in a soil test, a nitrogen only fertilizer can be applied instead. Adjustments to a fertilizer program should be determined by plant growth, harvest yield and leaf color.

Pruning: Pruning is needed to maintain an open canopy, which allows for sufficient light penetration and air movement. The best time to prune is in the late winter or early spring, before new growth appears. Pruning also helps rejuvenate the shrub and promotes higher fruit yields. For the first 3 years, only prune out weak or damaged branches. After 3 years, when the plant is in production, pruning should become more vigorous to encourage new growth and to keep the plant size manageable. Flowers develop on stems that are 2 to 4 years old, and this should be kept in mind while pruning. Removing about one third of old growth from the shrub yearly will help maintain enough young fruiting wood for good fruit production. Similar to apple, serviceberry plants are prone to biennial bearing. This is when a large crop one year is followed by a very small crop load. If careful crop load management is practiced this effect can be minimized.

Problems

Pests and Diseases: Birds are probably the worst threat to serviceberry crops, as they seem to enjoy the fruit even more than we do. One of the most effective control options is to drape the branches with bird netting in order to protect ripening fruit. Aphids, spider mites and bark beetles can also be a problem. Dormant oil applied in the spring, just before bud break, can help control overwintering pests. Frequent scouting throughout the year should be done to monitor pest occurrence.

Entomosporium leaf and berry spot is one of the most common diseases of serviceberry plants. Symptoms include small, angular brown discolorations on the leaves, often with a yellow ring around the spot. Utah's low humidity helps keep disease occurrence low, but in rainy years or if over-watered, it can still be a problem. Keeping an open canopy through proper pruning, removing leaf litter in the fall and avoiding irrigation techniques that would wet the leaves will help control for *Entomosporium* leaf and berry spot. Infected fruit will have gray spots and will be disfigured. Prune out diseased wood 12 inches below the infected section and sterilize the shears between each cut. Maintain an open canopy to aid in preventing disease occurrence. Saskatoon-Juniper rust can be another problem for serviceberry production. Yellow spots and swellings first develop on leaves and fruit, followed by characteristic yellow, spiky outgrowths from these locations. As the name implies, the life cycle of the rust includes stages on juniper plants. To avoid the disease, it is best to avoid planting serviceberry next to juniper plants. One chemical control option is a broad-spectrum fungicide (ex. Funginex 190 EC). Powdery mildew will also infect serviceberry shrubs. Look for a white dust on the leaves and stems. Early detection and pruning out of diseased shoots as well as planting resistant cultivars are the best control options.

USU Extension provides guidelines for home orchard pest management, as well as weekly fruit tree pest advisories that can be helpful in disease and pest identification and management and are available at your county agent's office or at http://utahpests.usu.edu/ipm/htm/subscriptions.

Weeds: Keeping weeds clear from around the serviceberry plant is important for achieving maximum yields. Applying a mulch around the base of the shrub can help keep weeds to a minimum. Another option is shallow cultivation to kill weeds, but care should be taken not to till deeper than a few inches in order to avoid damaging the serviceberry roots.

Harvesting, Storage and Use

The berry-like pomes usually ripen in late June through July. It is best to wait until two-thirds of the fruit is ripe before harvesting. Serviceberries continue to ripen after harvesting and should be refrigerated quickly to avoid spoilage. Early pickings that are somewhat less ripe are higher in acid and the more mature fruit have a higher sugar content. If using the fruit for jellies, jams and pie fillings, wait until fully ripe to ensure peak flavor and sweetness. However, the fruit is softer at this stage and can be damaged easily during harvest. It is best to pick by hand early in the morning, when the fruit is dry and cool. Remove damaged or diseased fruit and wash to clean. Fruit should be dry before refrigerating or freezing.

Productivity

Newly planted serviceberry shrubs will not produce heavily for the first 2 years. They will usually begin to bear fruit when 3 to 5 years old and reach full production at 8 years. Once established, some of the highest yielding cultivars will produce 10 pounds per plant. A well-maintained plant can produce fruit for 20 years.

Nutrition

Serviceberry fruit are high in fiber, iron, calcium, magnesium and manganese.

Resources

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Colorado State University Extension

Colorado Master Gardener[sm] Program

CMG GardenNotes #233

Calculating Fertilizer Application Rates

Outline: Steps to calculating fertilizer application rate, page 1
Fertilizer application rate table, page 3

Steps to Calculating Fertilizer Application Rate

Example is for a 40-foot by 100-foot lawn area, using a 20-10-0 fertilizer

1. Calculating size of area to be fertilized

__ ft. long X __ ft. wide = ____ square feet

Example:

40 feet X **100** feet = **4000** square feet

2. Calculating fertilizer application rate

$$\frac{\text{__ lb. nutrient per ____ sq. ft.}}{\text{__ \% nutrient in fertilizer}} = \text{__ pounds fertilizer / ____ sq. ft.}$$

Example:

$$\frac{\textbf{1} \text{ lb. nutrient per } \textbf{1000} \text{ sq. ft.}}{\textbf{20\%} \text{ nutrient in fertilizer } (.20)} = \textbf{5} \text{ pounds. fertilizer / } \textbf{1000} \text{ sq. ft.}$$

3. Calculating pounds of fertilizer to apply

lawn or garden area		application rate		pound of fertilizer per garden or lawn
____ sq. ft. / garden or lawn	X	___ pounds fertilizer / ___ sq. ft.	=	__ pounds fertilizer / garden or lawn

Example:

4000 sq. ft. / lawn	X	**5** pounds fertilizer / **1000** sq. ft.	=	**20** pounds fertilizer / lawn

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- Colorado Master Gardener *GardenNotes* are available online at www.cmg.colostate.edu.
- Colorado Master Gardener training is made possible, in part, by a grant from the *Colorado Garden Show, Inc.*
- Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating.
- Extension programs are available to all without discrimination.
- No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.

Revised October 2014

Colorado Master Gardener℠

Table 1. Fertilizer Application Rate Table

Because soil test recommendations for any given soil do not exactly match a fertilizer, select a fertilizer that gives comparative amounts of nitrogen, phosphorus and potassium as recommended by the soil test. In fertilizer application, it is most important to match the nitrogen requirement and compromise some for the phosphorus and potassium. The amount of fertilizer to apply that will give the recommended amount of nitrogen can be obtained from the following table:

Amount of Fertilizer to Apply Based on Actual Nitrogen Recommendations

Nitrogen Rate:		**0.1 pound nitrogen Per 100 square feet**	**0.2 pound nitrogen. per 100 square feet**	**1 pound nitrogen per 1,000 square feet**
Fertilizer Grade		pounds fertilizer to apply per 100 square feet	pounds fertilizer to apply per 100 square feet	pounds. fertilizer to apply per 1 000 square feet
45-0-0 (urea)		0.2	0.4	2.2
37-3-3		0.3	0.5	2.7
36-6-6		0.3	0.6	2.8
33-0-0		0.3	0.6	3.0
32-4-4	32-3-10	0.3	0.6	3.1
30-4-4	30-0-10	0.3	0.7	3.3
28-3-3	28-4-6	0.4	0.7	3.6
27-7-7	27-3-3	0.4	0.7	3.7
25-5-5	25-3-12	0.4	0.8	4.0
24-8-16	24-0-15	0.4	0.8	4.2
22-4-4	22-6-3	0.5	0.9	4.5
21-0-0	21-3-12	0.5	1.0	4.8
20-20-20	20-4-8	0.5	1.0	5.0
19-19-19	19-11-12	0.5	1.0	5.3
18-6-12	18-3-6	**0.6**	1.1	5.6
16-8-8	16-4-8	0.6	1.3	6.3
15-15-15	15-5-5	0.7	1.3	6.7
13-3-9	13-25-12	0.8	1.5	7.7
12-12-12	12-4-4	0.8	1.7	8.3
10-10-10	10-20-10	1.0	2.0	10.0
10-5-5	10-10-20	1.0	2.0	10.0
6-12-12	6-2-0	1.7	3.3	16.7
5-10-10	5-10-5	2.0	4.0	20.0

Example: If the N (nitrogen) recommendation is for 0.1 lb. N/100 sq. ft. and the fertilizer grade selected has a ratio of 18-6-12 (column 1), apply 0.6 lb. of this fertilizer per 100 sq. ft.

Note: 2 cups (1 pint) of dry fertilizer weighs about 1 pound.