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Gardening in South Dakota



Growing Raspberries

in South Dakota

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Raspberries can be eaten fresh; incorporated into breakfast cereals, yogurts, or salads; baked in muffins or pies; preserved for jelly, jam, or syrup; or used in numerous other ways. They are a good source of vitamin C and contain high levels of fiber. They also contain high levels of phytochemicals, such as ellagic acid, gallic acid, and rutin, which are non-essential nutrients that are believed to reduce the risk of chronic diseases such as cancer.

All raspberries belong to the genus *Rubus* and are brambles (thorny plants of the genus *Rubus*). Raspberries have a perennial crown and root system, but the canes (the aboveground stems) are biennials, meaning they live for only two growing seasons. During the first season, the new canes, called *primocanes*, are produced from the roots and crown of the plant. New primocanes are produced each year from each plant, so fruit production continues year after year. After primocanes overwinter, they are called *floricanes*.

Raspberry Types

Raspberries are classified by whether they fruit in the summer season or in the fall season. Summer-fruiting types produce leaves and set the buds on the primocanes the first season, and then produce fruit mid-summer the following year on the floricanes; the floricane then dies. Plantings typically produce a small crop in their second season and a full crop after that.

The flowering buds of fall-fruiting raspberries (also called *primocane-fruiting type*) will set fruit towards the tops of the primocanes in the late summer/early fall. If the canes are left to overwinter, they will produce a smaller second crop on the lower portion of their floricanes the next July. Although two crops can be obtained (fall then summer) from this type, using only a fall-harvest cropping system is recommended. Growing only for the fall harvest reduces disease and cold-hardiness problems and can extend the life of the planting. Plantings of either fall- or summer-fruiting raspberries will typically remain productive for 15 to 20 years.

Red raspberries and yellow- or amber-colored raspberries (*Rubus idaeus*) initiate shoot buds from the roots at random locations. Yellow-fruit raspberries are simply color variants of the red and are grown the same as red-fruiting types. Red raspberries may be either primocane- or floricane-fruiting types; available yellow raspberries are all primocane-fruiting types. The yellow cultivars are more prone to fruit discoloration due to disease or mechanical damage.

Black raspberries (*Rubus occidentalis*) are summer fruiting and have the same cane growth cycle as red raspberries; however, new primocanes in black raspberries are initiated from crown buds at the cane base. Purple raspberries are a hybrid from crosses between the red and black species and are summer-fruiting types. Most black raspberry varieties do not survive South Dakota winters well, as they are damaged by temperatures below -15°F. Black raspberry cultivars tend to be susceptible to anthracnose, have smaller berries and lower yields, and are pruned differently than red types. Purple raspberries are intermediate between the black and red in hardiness and other characteristics, and may be grown in the mid- to southern areas of the state (damaged by temperatures below -20°F). Purple raspberries ripen a little later than reds and blacks, and their fruit is generally better for preservation than for fresh use.

Planting

Raspberries should be planted in early spring once temperatures stay above 20°F. Plant bareroot stock when soil temperatures reach 45°F in a location that receives full sun and has good drainage. In heavy soils, plant into a raised bed (6" to 10" high). Be sure to plant into a weed-free strip that is 3' to 4' wide. There are few herbicides labeled for use in raspberry plantings, so perennial weeds need to be controlled a year in advance of planting. Raspberries may be grown in rows or in hills. Plant red and yellow raspberries 2' to 3' apart and allow

them to develop a solid row 1' to 1½' wide. Spacing between rows should be adjusted to accommodate cultivation equipment, but spacing is generally 8' apart in commercial plantings.

A raspberry "hill" refers to a cluster of canes, not a mound of soil. Black and purple raspberries are more easily maintained in separate hills, because they produce canes from crown buds rather than suckering, like red and yellow raspberries. Space plants 4' to 6' apart in a hill system and confine them to 2' diameter hills. Some purple cultivars sucker more readily and may be more easily maintained in a hedge row.

Trim the cane off at the height of 6" and set red raspberries into a shallow hole so the highest root is 1" to 2" below ground. Spread the roots laterally, then fill with soil, and water so the soil settles. Place dormant black and purple transplants in the hole so that the tips of the crown are about 2½" below the soil surface. Tamp soil carefully to avoid damaging buds. Water after planting to sufficiently settle the soil around the new roots.

Always plant quality disease-free and winter-hardy cultivars. Avoid planting in areas where strawberries, potatoes, tomatoes, sunflowers, or alfalfa were grown in the past 4 to 5 years, as these crops and raspberries are susceptible to *Verticillium* wilt, a soil-borne disease. Although good air circulation is suggested to reduce disease problems, excessive wind can cause cane injury or decrease fruit set, so moderate wind protection is recommended.

Watering

Good drainage is critical for brambles; brambles are prone to root rots and should not be planted on poorly drained soils. Use trickle irrigation or hand watering at the base of the plant to reduce foliar and fruit disease potential. Raspberries need 1½" to 2" of rainfall a week throughout the growing season. Avoid excessive irrigation, as it may result in soft fruit and increased vulnerability to disease. Decrease watering in later summer and early fall to help the plants harden off and lessen potential winter damage. After raspberries are dormant in fall, irrigate once more before winter.

Soil and Nutrient Conditions

Have a soil test done the fall prior to planting and amend to adjust the soil pH, phosphorus, potassium, and organic matter, if necessary. Raspberries can tolerate a wide range of soil pH, from 5.8 to 7.5. Soil organic matter of 3% to 4% is best for raspberries. Incorporate phosphorus into the soil if soil test indicates phosphorus is below 25 ppm, and incorporate potassium if soil potassium is below 100 ppm. Do not apply commercial fertilizers at the time of planting, as new raspberry roots are very sensitive to fertilizer salts.

A few weeks after planting, apply 2 to 4 tbsp. (use the lower rate on heavy soils high in clay) lawn fertilizer (33-0-0 or similar strength) around each plant, several inches away from the base of each plant. If using fertilizer sold for lawns, be sure it does

not contain herbicide! If the soil pH is higher than 7.2, use ammonium sulfate (21-0-0-24S) instead, at a rate of ¼ c. per plant. For larger plantings, use 2 to 3 lbs. of 33-0-0, or 3-4 lbs. ammonium sulfate, per 100 ft. row.

Once the planting is established, fertilize twice each year. The first application should be before new growth begins, and the second application 3–4 weeks after bud break. Use a 10-10-10 product at ¼ c. per plant (or 5 lb. per 100 ft. row); or if soil tests showed adequate phosphorous and potassium levels, use a product higher in nitrogen (such as 33-0-0), at a rate of 2 tbsp. per plant (up to 2 lb./100 ft. of row). On higher-pH soils, use ammonium sulfate instead, at a rate of 2 tbsp. per plant (1.5 lb. per 100 ft. of row). For fall-fruiting raspberries, delay the second application to early August. Do not apply fertilizer after mid-August, as the canes may not harden off sufficiently for winter.

A yearly application of 3.5 cubic ft. of well-composted manure per 100 sq. ft. of row may be used instead of the applications above. Be sure to avoid manures that contain weed seeds!

Weeding and Mulching

Perennial weeds such as grass and thistle are extremely difficult to control in established raspberry plantings; therefore, soil preparation should begin the year before planting. A combination of cultivation, cover crops, and/or herbicide will help control annual and perennial weeds. **Check labels carefully**, as some herbicides persist and can be harmful to new raspberry plants.

After planting, raspberries may be mulched. Mulch is very beneficial because it retains moisture during establishment, reduces soil heaving in the winter, and increases the organic matter of the soil over time. Apply a 1" to 3" layer of mulch, such as chopped leaves, dried lawn clippings (herbicide-free only), straw, wood chips or shavings, or shredded paper, on the soil surface around the canes. If wood chips or shavings are used for mulch, add ¼ to ½ c. of 33-0-0 fertilizer to avoid nitrogen depletion, as the wood is broken down over time in the soil.

As the raspberries become established, be sure to cultivate a strip at the row edge to prevent weed competition. Avoid cultivating deeper than 2" to 3" to avoid the roots.

Pruning

Training and pruning of red, purple, and black raspberries is slightly different, as they have different growth habits.

Summer-fruiting red raspberries

- Dormant pruning in early spring (March to early April)
 - Remove old floricanes that fruited the previous year (if they were not removed after the leaves of the fruiting canes died in the late summer). If there are disease problems, remove floricanes as soon as they have finished fruiting instead of waiting for the dormant season.
 - Thin the healthy floricanes by removing all but 6 to 8 of

the most vigorous canes (the biggest and healthiest) per linear foot of row or hill. See figure 1.

- Top the canes by removing tips killed by winter injury and by removing spindly growth. Even if alive, the spindly growth generally does not produce high-quality fruit, and makes management more difficult. Do not remove more than ¼ of the total height (unless it is winter damaged), as yield will be significantly reduced.
- If planting does not have support trellis, cut the canes back to about 4' to 5'.
- As primocanes emerge throughout the summer, remove primocanes from the edges of the rows to maintain row width.

Summer tipping of the primocanes for height control is not recommended, as it slows cane development and may cause buds that are developing for next year's crop to break and grow.

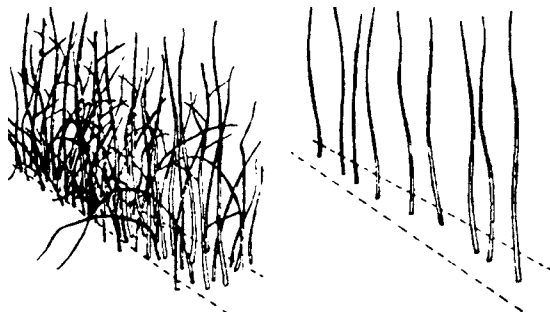


Figure 1. Red raspberries before and after summer pruning. These canes are planted in a narrow hedge row.

Fall/primocane-fruiting raspberries

A fall and summer crop can be obtained from fall/primocane-fruiting raspberries, but it is generally easier using a fall-harvest cropping system:

- After plants become dormant, mow or cut all the canes 1" to 2" above the ground.
- To avoid the spread of disease, remove canes from planting, unless canes are cut and shredded using a rotary mower.
- New canes will emerge in the spring and bear a crop in the late summer/early fall of the same growing season.
- Maintain plant rows at 18" wide with 6' to 9' between the rows.
- Do not prune or tip primocanes. Flowering begins at the tip in primocane-fruiting raspberries. Tipping the primocanes will delay flowering and reduce yield in the primocane-fruiting-type raspberries.

Purple and black raspberries

- Remove 3" to 4" off the tips of the primocanes when they reach a height of 28" to 30" to promote production of lateral branches. Do this multiple times over the summer.
- After harvest, remove spent floricanes to prevent disease spread to new canes.
- When dormant, remove the weak and damaged primocanes,

keeping 5 to 9 canes per plant that have a ½" or greater diameter. See figure 2.

- Head back the lateral branches on the canes. For purple raspberries, the side branches are cut back to form sturdy branches 12" to 18" long.



Figure 2. Purple raspberries before and after dormant pruning.

Trellising

Trellising is recommended for summer- and fall-fruiting raspberries to prevent wind injury. Trellising improves yield and light penetration, and makes picking easier. The fall/primocane-fruiting types fruit at the cane tops, and the heavy fruit load causes the cane to droop toward the ground. Purple raspberries do not require trellising.

The simplest trellis system uses posts with attached single or double wires or twine. Posts should be placed about every 10' to 12'. A simple T-trellis system can also be used (fig. 3). Consider a temporary support or trellising system for fall-bearing raspberries, so it can be removed to make dormant pruning easier.

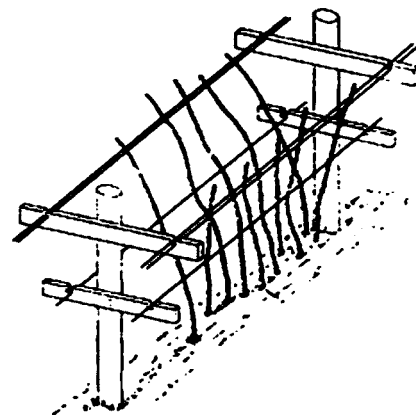


Figure 3. An example of a support system for red raspberries.

Diseases

Good cultural practices will usually reduce insect and disease problems. Removal and disposal of infested canes is sufficient control in most instances, especially if the plants are not watered with overhead sprinklers. A number of diseases affect raspberries. Some common raspberry diseases include phytophthora,

verticillium wilt, anthracnose, and gray mold. By planting certified disease-free plants, destroying wild or abandoned brambles near the garden, and removing weak and diseased plants in established plantings, you can reduce the spread of disease. After harvest, remove and destroy canes that have fruited and died, and remove weak primocanes; this will help improve air circulation through proper thinning and pruning.

Insects

Some common raspberry pests include aphids, raspberry cane borer, mites, sap beetles (picnic beetles), and tarnished plant bug.

Aphids will generally feed on the tips of tender young canes or on the underside of leaves. In the home garden, numbers can be reduced by hosing them off with a strong stream of water.

The raspberry cane borer punctures the stem tips of the canes in order to lay eggs. This causes cane tips to wilt. Once hatched, grubs bore down the cane and eventually kill it. To control, prune 5" to 6" below the wilted tips, and then destroy the prunings. Red-necked cane borers typically appear in the early summer. Once dormant in the fall, cut out and destroy canes with abnormal swelling; these swelled canes can indicate the presence of the borer larvae.

Mites will feed on the underside of leaves, typically during a hot, dry season. Mites are more likely to attack water-stressed plants, so maintain adequate moisture. A miticide can be used during the season, while a dormant spray can be used during the dormant season. Use pesticides strictly in accordance with the label requirements. Raspberries have a very short time from flowering to fruit ripening (~21 days), and it is critical to avoid chemical applications near harvest.

Sap beetles are the largest cause of insect damage on raspberries. Sap beetles are attracted to all types of overripe fruit and quickly become a nuisance when ripe fruit is left in the planting. Frequent picking will help reduce the amount of overripe fruit and decrease the planting's attractiveness to the beetles.

The tarnished plant bug feeds on developing berries and can deform berries. Adults overwinter in debris and weedy areas; maintaining weed control can help reduce pest populations.

The Asian lady beetle can become a pest in fall/primocane-fruiting raspberries, as the beetle looks for alternative food sources as soybean fields dry out and looks for hibernation spots as night temperatures drop. The beetle causes damage by feeding on fruit and by releasing alkaloid on the berry that alters the berry's flavor.

Harvest & Storage

Harvest raspberries when they are shiny with well-developed color and can be easily removed from the receptacle. Fruit should be harvested every 2 to 4 days. Once the planting is 3 years old, expect about 6 to 9 lbs. per plant for summer-fruiting red raspberries, 3 to 4 lbs. per plant for fall-fruiting raspberries, and 3 lbs. per plant for purple raspberries.

Raspberries should be cooled immediately after picking and before storage. Fruit should be stored in shallow containers, as berries are fragile and multiple layers of berries will smash the bottom layers. Fruit storage temperatures should be maintained between 32°F and 36°F with 90% to 95% humidity. Fruit may be frozen immediately for maximum quality. Do not wash fruit before fresh storage; wash immediately before use. Red and purple raspberries that have been immediately cooled may be refrigerated for up to 7 days, while yellow raspberries will only store for 3 days. To reduce condensation contributing to molding, fruit should be cooled before covering.

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