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# **Red Raspberry Culture Guide for Northern Idaho**

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Caneberries, or brambles as they are often called, are nutritious small fruits. The most common members of the group are red and black raspberries and blackberries. Yellow and purple raspberries are caneberries of lesser importance. In northern Idaho, red raspberries are the most popular caneberry although all are grown to some extent. All caneberries belong to the genus *Rubus*.

The cultural information in this publication is intended to assist those who now grow red raspberries for home use and individuals who are interested in commercial raspberry production. Varietal recommendations are based on the results of trials done from 1981 to 1985 at the University of Idaho Research and Extension Center at Sandpoint.

# **History and Botany**

Rubus idaeus L., the red raspberry, has been cultivated since 1771. Most production in the Northwest is for processing into fruit juices and concentrates, jams and jellies and individual quick-frozen products. Production for fresh market sales is usually limited to areas near population centers because raspberries are highly perishable and shelf life is only a few days.

Raspberry roots usually live for 10 years or more before cane vigor and yields begin to decline. Canes live for 2 years. One-crop or summer-bearing raspberries grow vegetative primocanes during the first year and flowering and fruiting floricanes during the second year. Everbearing raspberries produce fruit on a portion of the first-year cane while the remainder of the cane bears fruit during the second year. This characteristic results in both summer and fall crops, but total yields are somewhat less than one-crop varieties.

# **Site Selection**

Pacific Northwest coastal climates, with cool summers, little rain during harvest and relatively mild winters, are ideal for raspberries. East of the Cascades, good yields and quality can be achieved with winter-hardy varieties. Roots will tolerate below-zero temperatures, but canes can be damaged by dry winter winds. Growers should choose a site with some slope to provide air drainage and cold protection. Avoid frost pockets. Deep, loamy soils with good drainage are better than heavy, wet soils. Wet soils may lead to increased risk of soil diseases and root suffocation. Dry soils will require irrigation. Animal manures and crop residues should be incorporated into the soil to help improve its physical condition. Noxious perennial weeds, especially quackgrass, thistle and tansy, should be completely eliminated before raspberries are planted. Till the site well in advance of planting to achieve the best results. If the site is an old hay field or pasture, raise spring oats for a year or two before planting raspberries.

### Varieties

Canby and Sumner have been recommended where winter-hardiness is essential. Haida, Chilcotin, Nootka and Skeena, developed in British Columbia and released in 1978, are winter hardy and have been recommended for commercial production.

Raspberries reportedly grow very well throughout northern Idaho. Most plantings are found in home gardens and backyards, however, and almost none are grown commercially. Little is known about the varietal origins of these plots. In most cases, growers obtain planting stock from a friend, neighbor or relative. While growers often are satisfied with their individual selections, the lack of a standard product poses the problem of assuring quality for potential commercial marketing.

One objective of the Sandpoint R&E Center is to investigate agricultural enterprises with potential high profits as alternatives to the traditional grain and livestock industries of northern Idaho. Small fruits, especially raspberries, could fit ideally into this strategy of diversification. For this reason, we planted and observed raspberry trials at Sandpoint from 1981 through 1984.

These tests included 15 varieties grown principally across the northern United States. Boyne, from the Alberta prairies, and Skeena appeared to have the best survival and vigor. Skeena was especially flavorful, firm and easy to pick. Skeena yielded 3 to 4 tons per acre in 1986 and a little over 4 tons per acre in 1987. Nootka, also from Canada, performed acceptably. Newburgh, Taylor, Sentry, Hilton, Latham, all from eastern and midwestern origins, and the Canadian variety Chilcotin may be less reliable because of lower survival and vigor. The varieties Willamette, Citadel, Reveille and Southland died 1 or 2 years after planting. Canby and Sumner were not available for these trials, but they currently are planted at Sandpoint in a test that also includes the new varieties Comox, Chilliwack, Festival and Nordic.

In summary, the varieties that have been tested enough in our region to justify recommendation include Boyne, Canby, Nootka, Skeena and Sumner. All except Sumner are somewhat susceptible to root rot and should not be planted on poorly drained soils. Sumner could be grown more safely where root rot is a possibility. Canby, Nootka and Skeena can be harvested mechanically. No single variety has every desirable trait and no faults; however, with certain precautions, growers can expect reasonable performance with varieties that have tested successfully in northern Idaho and northeastern Washington. Varietal characteristics are summarized in Table 1.

#### Planting

We strongly recommend planting stock that is certified to be free of viruses. Planting material, either root suckers or tissue-cultured plants, should be inspected for disease and insect infestation. Plants obtained from a neighbor may be suitable but the risk of introducing pests should be measured against the benefits. The initial investment in raspberries is substantial but the crop can be productive for at least 10 years. The potential profitability of raspberries can be nullified by planting poor quality stock.

Growers should plant dormant suckers and roots rather than tender, actively growing canes from the current season growth. To increase the success of transplanting, handle the materials carefully to avoid losing the smaller roots. Roots can be dipped in a mud slurry or wrapped in a wet burlap "jellyroll" to reduce root drying. Use canes  $\frac{1}{4}$  to  $\frac{3}{6}$  inch in diameter or root cuttings of random length and  $\frac{1}{16}$  to  $\frac{3}{16}$  inch diameter. Tissue-cultured plants are sold and planted as whole transplants.

Raspberries can be planted in hills spaced 2<sup>1</sup>/<sub>2</sub> to 4 feet within the row, or in hedgerows where plants are individually lined out at 8- to 12-inch spacing. Rows should be 8 to 10 feet apart, even wider for machine harvestings. One acre requires 1,361 plants when rows are 8 feet apart and spacing within the row is 4 feet.

Set dormant stock in the field as soon as soil and climate permit because early planting will promote good first year growth and improve yields during the year after planting. Tissue-cultured plants that have been reared in a greenhouse may be tender and may require special care before planting to prevent cold weather damage. As an alternative, planting could be delayed until after the last frost.

Set planting stock in firm, moist, well-prepared soil. Plants can be set in a plowed furrow or in holes or by using a mechanical transplanter. Dig the hole large enough to spread out the roots. The base of the cane should be about an inch below the soil surface when finished. Root cuttings should be planted about 2 inches deep in portions weighing about 2 ounces. Set tissue-cultured plants deep enough, usually 3 or 4 inches, to assure good establishment.

#### **Fertilization**

The best raspberry crops are produced by canes with large diameters and short internodes. Hills with 8 to 12 canes each 6 to 8 feet tall are ideal. Nitrogen (N) is the most important nutrient affecting plant vigor. Several other elements are also needed and should be applied according to the results of soil tests.

Varieties differ in vigor, so nitrogen requirements may not be the same for all varieties. Cane growth should guide N fertilization. Band or broadcast the fertilizer at a rate

Table 1. Red raspberry characteristics for varieties grown at home or commercially, and tested at the University of Idaho Research and Extension Center, Sandpoint, 1981-84.

| Variety   | Origin              | Date          | Hardiness        | Berry characteristics                                 | Maturity          | Uses                                    | Remarks   |
|-----------|---------------------|---------------|------------------|---|-------------------|---|---|
| Boyne     | Manitoba            | 1960          | Very hardy       | Medium sweet and size,<br>juicy, aromatic             | Midseason         | Fresh and<br>processed                  | Susceptible to anthracnose, mosaic virus  |
| Canby     | Oregon              | 1953          | Very hardy       | Large, firm, bright red, juicy                        | Midseason         | Fresh market, good freezer              | Grown inland Northwest but untested<br>at Sandpoint; susceptible to root rot    |
| Chilcotin | British<br>Columbia | <b>1978</b> . | Hardy            | Large, bright red, firm,<br>high yielder              | Midseason         | Fresh and processed                     | Susceptible to aphid-borne viruses and root rot.                                |
| Hilton    | New York            | 1965          | Hardy            | One of the largest, firm,<br>high quality, productive | Late<br>midseason | Fresh and processed                     | Compact bush, requires less space   |
| Latham    | Minnesota           | 1970          | Very hardy       | Large, firm, tart flavor, at-<br>tractive, productive | Late              | Fresh and processed                     | Susceptible to mosaic and powdery mildew  |
| Newburgh  | New York            | 1929          | Very hardy       | Large, firm, light red, ex-<br>cellent flavor         | Late              | Home garden and commercial              | Tolerates poor soil conditions and some viruses                                 |
| Nootka    | British<br>Columbia | 1978          | Hardy            | Medium, firm, dark red, vigorous growth               | Midseason         | Processing,<br>machine pick             | Resist aphid-borne viruses; susceptible to root rot                             |
| Skeena    | British<br>Columbia | 1978          | Hardy            | Large, firm, bright red, ex-<br>cellent flavor        | Midseason         | Fresh and<br>processed,<br>machine pick | Susceptible to root rot; tolerant to fruit rot.                                 |
| Sumner    | Washington          | 1956          | Hardy            | Medium-to-large, firm,<br>medium red, intense flavor  | Late              | Fresh and processed                     | Grown in inland Northwest but untest-<br>ed at Sandpoint; tolerates heavy soils |
| Taylor    | New York            | 1935          | Moderately hardy | Very large berries, firm, excellent flavor            | Late              | Home garden and commercial              | Susceptible to mosaic viruses   |

of 40 to 60 pounds N per acre shortly after planting (about 1 pound actual N per 1,000 square feet). Once berries are established, apply about twice as much N during annual fertilization. Apply animal manure, if desired, in late fall or winter. Avoid applying N too late in the growing season because of the risk of freeze damage to tender canes. Plants must become dormant in cold climates to prevent winter injury.

Phosphorus (P) is essential for early root development of raspberries. In northern Idaho, soils containing volcanic ash will nearly always be P-deficient when tested. At less than 4.0 parts per million P, apply about 90 pounds of  $P_2O_5$  per acre (about 2 pounds per 1,000 square feet). Banding 4 to 7 inches on each side of the row and 3 to 6 inches deep is a more efficient way to apply this element than broadcast applications.

Sulfur (S) often is lacking in northern Idaho soils and can be applied at 30 pounds of S per acre (about <sup>3</sup>/<sub>4</sub> pound per 1,000 square feet). Sulfur fertilizers can be broadcast before planting and incorporated by disking or precipitation. Gypsum is a suitable S source and also supplies calcium (Ca). Borated gypsum also supplies boron (B). Potassium (K) and magnesium (Mg) deficiences as determined by soil tests can be corrected by using muriate or sulfate of potash for K and magnesium sulfate for Mg. If micronutrients like zinc (Zn), manganese (Mn) and iron (Fe) are deficient, use foliar nutrient sprays. These elements are generally adequate in most northern Idaho soils.

If the soil pH is less than 5.6, use dolomitic limestone to raise the pH to a range of 5.8 to 6.5. Raspberries grow best on slightly acid soils. Lime products should be broadcast over the surface and incorporated by plowing or harrowing.

Granular fertilizers can be replaced or supplemented by liquid (soluble) fertilizers used with drip irrigation. Careful study is necessary to gain the most benefits from liquid fertilization. Water must be filtered to keep the emitters from plugging, and salinity should be tested. Growers should consult specialists for assistance.

#### Cultivation

Normally, raspberries are mechanically cultivated between rows, and weeds in the rows are controlled by hand labor or herbicides. Some growers prefer a permanent sod between rows, especially those who use mechanical harvesters. A permanent cover will require mowing, but soil compaction and muddiness are minimized.

When cover crops are used, the following are important concerns: (1) Choose a grass perennial that will persist for many years, (2) Band fertilizer close to the raspberries and avoid the cover crop, (3) Maintain adequate soil moisture as berry size increases, (4) Mow cover crops short during preharvest and (5) Wait until canes are established before seeding the cover crop. Cover crops may promote rodent problems unless rodent control measures can be practiced. Growers should carefully consider cover crop alternatives.

#### **Training and Pruning**

Dormant transplants should be cut back to 3 or 4 inches high at planting. About 3 to 5 canes will grow during the first year. New shoots will grow in and between the rows during the second year. Canes between the hills should be removed although they can be allowed to fill in the rows for machine harvesting. Only 3 to 4 canes per linear foot should be allowed to grow between hills.

Trellises should be installed during the fall of the first year or the next spring. Space wooden posts 25 to 30 feet apart and attach 2, 3 or 4 No. 10 or 12 galvanized wires. Alternatively, install steel posts at 20-foot spacings. The single top wire of a 3-wire trellis should be located  $4\frac{1}{2}$ feet above the ground. Tie fruiting canes (floricanes) to the top wire as they are pruned. The two bottom wires are attached with hooks or nails so they can be lifted out over new canes (primocanes) to pull them in and prevent breakage. On highly productive soils where canes require more support, use a 4-wire trellis. Cross arms can be used to support canes further, though crossarms are not suitable for machine picking because the harvester straddles the trellised row.

Canes taller than the lower wire should be tied to it after the first season of growth. Floricanes can be cut off close to the soil as soon after harvest as possible. Remove all weak, spindly canes. Tie primocanes to the top wire but don't "top" or cut them back until late winter or after the risk of severe freeze passes. Canes then can be tipped back to 5 feet.

#### Irrigation

Raspberries generally ripen during July at Sandpoint. Varieties differ, with some classified as early, mid-season or late ripening. Rainfall is usually adequate from the resumption of growth in the spring until flowering. About 1 inch of water per week is needed as berries form, enlarge and ripen. Moisture should also be sufficient to assure maximum growth of primocanes for the next year.

A sub-irrigated soil may supply enough moisture to meet the berry crop's needs, though the same soil may drain poorly, delay tillage and promote root diseases. If the soil requires supplemental moisture, irrigation can be supplied by overhead rotary sprinklers or variations of above- or below-ground drip systems. Furrow irrigation can be used with proper timing to avoid interference with cultural or harvesting operations. Overhead sprinklers are simple to use, but such systems may knock berries from canes and could increase the risk of fruit rot. Any general water applications also will cause the area between rows to become muddy or soft. Drip systems have several advantages, especially water conservation, but they are more expensive to buy and install. Excess salts are usually not a problem in northern Idaho.

#### Harvesting

In the coastal Northwest, raspberries are picked by hand or by machines that straddle the row. Berries are picked by hand in the inland Northwest but machines would also be justified with large acreages. Machine-picked berries separate easily from canes that are erect and generally unbranched. The major portion of the commercial raspberry crop is processed into juice concentrates, purees, preserves and jams. Machine-picked berries constitute the chief source of supplies needed for the process industry. The fresh market is supplied by hand-picked berries or graded, machine-harvested fruit.

Color, flavor, firmness, shelf-life, acidity and sugar content are important berry characteristics for market interests. Quality evaluations of berries grown at Sandpoint were conducted by commercial processors. The results showed that Skeena was generally acceptable although its red color may be a little lighter than is preferred for juices. Flavor, firmness and shelf-life of this variety were very good.

Berries should be picked early in the day and chilled to 38° to 40°F if they are to be shipped or stored. They can be frozen individually and then bulked in containers if pre-chilled at these temperatures.

#### **Pest Control**

Raspberries are susceptible to a number of diseases and insects. Spur blight, cane blight, anthracnose, root rot and wilt occasionally attack them in northern Idaho. Viruses stunt plants and cause reduced vigor and yield. The best control of these diseases is to practice good sanitation by eliminating diseased plants or to choose a new site. Obtaining replants from a neighbor's stock that appears to be healthy may be cheaper; however, latent viruses and soil-borne diseases could be introduced. Obtain certified, virus-free stock inspected for diseases. Fruit rots and powdery mildew can cause losses during wet or humid weather. Dense foliage and poor air circulation increase and intensify outbreaks. Sprinkler irrigation should be limited during periods of moist weather.

Fruitworm, cane borer and crown borer are insects that damage raspberries. They can be controlled by good sanitation and pesticides. Destroy wild caneberries near cultivated plantings because they are a possible source of pests. Prune dead canes close to the soil and remove or destroy infested raspberry debris from pruning operations.

Weeds can seriously interfere with the early growth and establishment of raspberries unless weeds are controlled by cultivation, herbicides or both. They are less competitive after berries enter full production.

An assortment of chemical products is available for controlling pests. Alternatively, good sanitation, use of inspected, pest-tolerant planting stock and appropriate tillage practices can produce effective pest control.

## Outlook

Per capita consumption of raspberries in the U.S. is only about  $1\frac{1}{2}$  ounces, a rate much less than the use of most

edible agricultural products. The popularity of new blended drinks containing raspberry extracts has demonstrated the potential for exploiting the culture of this tasty small fruit.

Home gardeners in northern Idaho have been quite successful in growing raspberries. Opportunity exists for commercial production in the region, but not all landowners will have the necessary resources. Costs to set up for raspberry production are relatively high, but good financial returns are possible. Potential growers are cautioned first to develop cultural skills and then manage their operations knowledgeably to help assure success. Berry farmers in northern Idaho may find also that the long distances to major processing markets are a significant cost factor. Fresh and processed markets in the Rocky Mountain West, however, are inadequately developed at present and represent an important potential for berry sales.

# Other Information Sources

- PR 227 The Agricultural Research and Extension Center at Sandpoint, Idaho, 1984 Annual Report
- PR 230 The Agricultural Research and Extension Center at Sandpoint, Idaho, 1985 Annual Report
- CIS 628 Insects and Mites Destructive to Berries
- CIS 789 Diseases of Raspberries in Idaho
- CIS 815 Northern Idaho Fertilizer Guide: Blueberries, Raspberries and Strawberries
- Source: Agricultural Communications Center, Ag. Publications Building, Building J40, Idaho Street, University of Idaho, Moscow, Idaho 83843.

#### **Washington Publications:**

- EM 3803 Raspberry Commercial Production Guide
- EB 0700 Small Fruits for Home Gardens
- PNW 176 Commercial Red Raspberry Production
- Source: Bulletin Department, Cooperative Extension, Cooper Publications Building, Washington State University, Pullman, WA 99164-5912.

#### **Other Publications:**

- FB 2165 Growing Raspberries. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402
- Berry Production Guide, 1987. Available from The Publications Office, Ministry of Agriculture and Food, Parliament Buildings, Victoria, BC. V8W 2Z7, Canada
- Enterprise Budget for PYO Raspberries, by Charles R. O'Dell, Western Fruit Grower 106(2):38-39. 1986.

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