

# The author

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Blueberries require acid soils, and a soil pH between 4.5 and 5.2 is ideal.



# Growing Blueberries in the Inland Northwest & Intermountain West

**Blueberries** are among the most popular fruits for home and market gardening. Both highbush and lowbush blueberries are native to North America and are used fresh or processed as jams, syrups, compotes, fruit leathers, and pastries. Blueberries are firm and hold their quality well both on the bush and in refrigeration. The fruits are easy to freeze and retain their quality when frozen. Blueberry crops can be harvested two to three years after planting and reach maximum production in six to eight years.

Besides producing fruit, blueberries are attractive in landscapes. The compact bushes are easy to prune and produce brilliant red foliage in autumn. The fruit attracts birds and other animals, making blueberries valuable in wildlifeattracting landscapes. Depending on the cultivar, mature bushes range from 18 inches to 10 feet in height.

# Selecting a site

Sites with cool, moist, well-drained sandy loam and silt loam soils containing around 3 percent organic matter are best for blueberries. Coarser soils dry out too easily, and clay soils inhibit root growth and encourage root rot. Muck soils and boggy areas are unsuitable for blueberries unless the high water table is 14 inches or more below the soil surface. On some sites, increasing soil drainage with buried drain tiles can improve blueberry production.



Blueberries require acid soils, and a soil pH between 4.5 and 5.2 is ideal (pH 7.0 is neutral). However, blueberries can be productive on sites where the pH is as high as 6.0. Blueberries suffer from iron chlorosis on alkaline soils (pH greater than 7.0), which are common in southern Idaho and are scattered throughout the state. Commercial blueberry production in alkaline areas is not practical.

Full sun exposure is required to develop good fruit flavor and maintain high yields.

Soils having pH values between 5.5 and 6.0 can be acidified by incorporating sulfur into the soil one or two years before planting blueberries. Soil acidification is not cost effective for large sites or when soil pH values are above 7.0. For small scale production on sites with heavy soils, poor drainage, or alkaline soils, blueberries can be grown in raised beds or containers filled with potting mixes or amended soil, as discussed later in this publication.

Alkaline irrigation water also creates problems for blueberries. If your irrigation water is alkaline, regularly apply an acidifying fertilizer, such as ammonium sulfate (21-0-0). Because of aluminum toxicity problems, aluminum sulfate is not recommended for blueberry production. Fertilizers formulated for acid-loving plants are available for commercial and home gardeners. Also, salty water (greater than 0.1% salts) can damage blueberry roots and leaves.

Full sun exposure is required to develop good fruit flavor and maintain high yields. While blueberries will survive in partial shade, they become tall, spindly, and unproductive, creating bushes that are unattractive, weak, and unable to tolerate snow loads.



Blueberries are among the most cold-hardy fruits, but there are differences in cultivars (cultivated varieties). The most cold-hardy blueberries tolerate temperatures of -35°F or below, and many cultivars survive temperatures between -20 and -25°F.

Healthy, properly pruned highbush blueberries tolerate moderate snow loading without serious damage. Where snow loads are excessive, either half-high or lowbush blueberries should be grown.

Rabbiteye and southern highbush blueberries are not cold hardy enough for Idaho. Recommended cultivars are listed in table 1.

# Recommended cultivars

While hundreds of blueberry cultivars are available, not all are suited to Idaho growing conditions. Since some blueberry cultivars produce more and larger berries when cross pollinated, plant at least two different cultivars together. Bluecrop is an exception and can be grown alone. For large-scale production, plant alternating blocks of ten rows each of two or more cultivars. Place one or two bee hives per acre during bloom to ensure good pollination and fruit set. For U-pick operations or for a steady supply of fruit from home gardens, plant several cultivars that ripen at different times.

Any of the listed cultivars are suitable for northern, westcentral, and southwestern Idaho. For east-central and southeastern Idaho, consider only the most cold-hardy cultivars. In cold areas, insulation provided by snow cover is important to prevent freezing injury, for winter injury can occur during cold winters when there is little or no snow. The half-high cultivars Friendship, Northcountry, Northblue, and Northsky are the most cold-hardy available and are small plants that produce lower yields than high-



bush cultivars. In hardiness tests, they survived temperatures between -35 and -45°F. Best survival occurred with 12 inches of snow cover. Survival decreased with snow coverage of either more than or less than 12 inches.

Table 1 lists cultivars in order of ripening, beginning with the earliest. The actual date of ripening depends on the site, weather, and cultural practices. The berry size of most cultivars decreases during the latter part of the harvest. Cultivars are rated according to the U.S. Department of Agriculture Plant Hardiness Zone Map. The lower the plant's hardiness zone rating number, the more cold hardy it is. To reduce the likelihood of winter injury, select cultivars rated one or two zones hardier than your site whenever possible.

Idaho's range of hardiness zones goes from 2b, which is -40 to -45°F, to 7a, which is +5 to 0°F. To find out the hardiness zone of where you plan to plant your blueberries – so you can make appropriate cultivar selections – ask your local nursery, Cooperative Extension office, or check out the web site of the U.S. National Aboretum: http://www.ars-grin.gov/ars/Beltsville/na/hardines.html.

# Preparing your site and planting

Eliminate all weeds. Quackgrass, thistles, and other perennial weeds that have rhizomes (underground stems) are especially troublesome.

Have your soil tested to determine the pH and concentrations of nitrogen (N), phosphorus (P), potassium (K), and magnesium (Mg). If the pH is less than 4.2, add limestone or dolomitic limestone to increase the pH to between 4.2 and 5.5. If the pH is above 5.5, add elemental sulfur to reduce the pH. Your soil test report should tell how much sulfur or lime to add.



If the magnesium concentration is less than 0.25 millequivalents per 100 grams of soil, apply 500 pounds per acre of either potassium magnesium sulfate (sul-pomag) or magnesium sulfate (epsom salts). For small plots, add 1 pound per 100 square feet of bed of either of these fertilizers. Tables 2 and 3 show how much phosphorus and potassium to add, based on your soil test results.

Both peat moss and bark potting soils are suitable for container culture and amending native soils in raised beds. Your goal should be to create a growing medium which holds moisture but also drains well and has a pH between 4.2 and 5.5.

Have your irrigation system in place and operational before you plant.

Highbush blueberries grow 5 to 10 feet tall with a spread of 4 to 6 feet. For landscape beds, space plants 4 to 5 feet apart. For rows, space the plants 4 feet apart in rows spaced 10 to 12 feet apart. Spacing rows closer can make cultivation and other care difficult and increase cane damage from tractors and other equipment. Some growers using mechanical harvesters create dense hedgerows and increase yields by planting the bushes 2 to 4 feet apart in rows.

Blueberries do not tolerate drought. Have your irrigation system in place and operational before you plant. Blueberries are also attractive to deer. In many parts of Idaho, a deer fence may be required to protect young plants from browse damage. The fence should be in place before planting.

Buy healthy, vigorous nursery stock. Blueberries are available in small pots and as rooted cuttings, but these plants should be grown out in larger containers or nursery beds for at least one season before transplanting into the field.



Cultivar	Hardiness	Height	Height	Height		Fruit		Yield / bush	Comments
	zones <sup>a</sup>	(feet)	Size <sup>b</sup>	Color	Flavor	(pounds)			
Earliblue	5 - 7	4 - 6	M-L	light	good	8 - 15	Earliest ripening blueberry. Upright canes. Hand or mechanical harvesting. For fresh and U-pick markets. Susceptible to phomopsis canker.		
Bluetta	4 - 7	3 - 5	S-M	dark	tangy	10 - 20	Better than Earliblue for cold areas or sites with late spring frosts. Compact. Excellent for landscapes. Large stem scar. Mostly hand harvested.		
Duke	4-7	4 - 6	M-L	light	mild, sweet	15 - 20+	Good for areas with late spring frosts. Heavy, consistent yields. Hand or mechanical harvest. Attractive, firm fruit with good shelf life.		
Spartan	5-7	5 - 6	L-VL	light	tangy, sweet	8 - 12	Large, attractive fruit. Upright canes. Hand or mechanical harvest. Partially resistant to mummy berry. Particularly sensitive to high soil pH.		
Patriot	3 - 7	4 - 5	L	dark	excellent	10 - 20	Cold hardy. Spreading shape requires extra side pruning. Hand harvest. Resistant to root rot and adaptable to wetter, heavier soils than most blueberries. Consistent yields. Popular with home and U-pick growers.		
Bluejay	4 - 7	6 - 7	М	light	mild	10 - 20	Extremely vigorous, fast growing, tall canes. Fruit hangs well after ripening. Hand or mechanical harvest. Fresh or process markets.		
Northland	3 - 7	3 - 6	S - M	dark	sweet, wild	15 - 20 +	Very cold hardy and adapted to high snowfall areas. Tolerates many soil types. Hand or mechanical harvest. For fresh, U-pick, or process markets. Produces numerous suckers and requires more pruning than most cultivars.		
Blueray	4 - 7	4 - 6	L	bright	excellent	10 - 20	A leading U-pick cultivar. Adapted to areas with hot summers and cold winters. Upright. Hand harvest.		
Meader	4-7	5-7	M-L	medium	good	10 - 20	Cold hardy and tolerates heavy snow loads. Tends to overcrop. Hand or mechanical harvest. Fresh or process markets.		
Toro	4 - 7	5-6	L	medium	good	10 - 20	Stocky, compact. Tolerates fluctuating winter temperatures. Consistent yields. Most berries ripen at once. Hand or mechanical harvest. Primarily fresh and U- pick markets.		

# Table I. Recommended blueberry cultivars, listed in order of ripening from earliest to latest.

North- country	3 - 7	1 - 2	S - M	light	wild, sweet	2 - 7	Half-high blueberry. Very cold hardy. Hand or rake harvest. Fresh and U-pick markets. Compact bush to 3 feet in diameter. Excellent ornamental.
Northsky	3 - 7	- <mark> </mark> .5	S	light	wild, sweet	l - 2	Half-high blueberry. Most cold-hardy cultivar. Has survived -45° F, but does best with snow cover. Hand or rake harvest. Ideal for containers and ornamental plantings. Spread of 2 - 3 feet.
Northblue	3 - 7	2 - 3	L	dark	good	3 - 7	Half-high blueberry. Hardy to -35° F, but does best with snow cover. Compact, spreading to 3 feet. Very good fruit quality with good shelf life. Hand or rake harvest. Fresh or U-pick markets. Excellent ornamental
Hardyblue (formerly 16	4 - 7 513A)	5 - 6	М	dark	sweet, spicy	10 - 20	Adapted to heavy soils and a wide range of sites. Hand or mechanical harvest. Fresh or process markets.
Bluecrop	4 - 7	4-6	L	bright	excellent	10 - 20	Leading commercial cultivar in North America. Consistent yields of high quality fruit. Disease resistant. Upright. Hand or mechanical harvest. Fresh or process markets.
Nelson	4 - 7	5-6	L	dark	excellent	10 - 15	Excellent for fresh and U-pick markets. Hand harvest.
Friendship	3 - 7	2	S - M	dark	wild, excellent	3 - 7	Half-high cultivar. Small, compact. Very cold hardy and tolerates heavy snow loads. Noted for wild blueberry flavor. Hand harvest. Fresh and U-pick markets.
Jersey	4 - 7	5 - 7	S - M	dark	excellent	7 - 10	Widely grown. Leading processing blueberry in North America. Hand or mechanical harvest. Ripens late. For areas with long growing seasons.
Elliott	4 - 7	5-7	S - M	light	tart, good	10 - 20	Ripens very late. Only for areas with long growing seasons. Good for areas with late spring frosts. 70 - 80% of fruit ripens at once. Hand or mechanical harvest. Fresh or process markets.

a. Based on the U.S. Department of Agriculture Plant Hardiness Zones.

b. S = small, M = medium, L = large, VL = very large.

Phoenhorus soil test value	Application rate of P2O5				
(parts per million—ppm)	ounces per 100 square feet	pounds per acre			
0 - 1.0	8	100			
1.0 - 2.0	7	80			
2.0 - 3.0	5	60			
3.0 - 4.0	3	30			
4.0 - 5.0	1	10			
Above 5.0	none	none			

Table 2. Phosphorus fertilizer rates based on soil tests.

a. Using sodium acetate as the soil extractant.

To convert  $P_2O_5$  rates to rates of actual phosphorus,  $P = 0.44 \times P_2O_5$ . To determine the amount of fertilizer to apply for various formulations, divide the recommended rate by the percentage of  $P_2O_5$  in the fertilizer. For example, if a fertilizer contains  $10\% P_2O_5$  and the recommended rate is 5 ounces of  $P_2O_5$  per 100 square feet, the amount of fertilizer to apply is  $5 \div 0.10 = 50$  ounces of fertilizer.

#### Table 3. Potassium fertilizer rates based on soil tests.

Potassium soil test value	Application rate of K <sub>2</sub> O			
(parts per million-ppm)	ounces per 100 square feet	pounds per acre		
0 - 50	4	80		
50 - 75	2	50		
75 - 100	1	30		
Above 100	none	none		

a. Using sodium acetate as the soil extractant.

To convert from  $K_2O$  rates to rates of actual potassium,  $K = 0.83 \times K_2O$ . To determine the amount of fertilizer to apply for various formulations, divide the recommended rate by the percentage of  $K_2O$  in the fertilizer. For example, if a fertilizer contains 10%  $K_2O$  and the recommended rate is 2 ounces of  $K_2O$  per 100 square feet, the amount of fertilizer to apply is  $2 \div 0.10 = 20$  ounces of fertilizer.



For quicker production, start with 2- to 3-year-old, 18- to 24-inch tall plants, either bare root or in 1- to 2-gallon containers. The larger the plant, the sooner it will come into production. Keep containerized and bare root plants cool and moist prior to planting.

Blueberry roots spread out to the drip line of the bushes, from the surface to 18 inches deep. Roots respond favorably to high concentrations of soil organic material, but do not fill planting holes with compost or peat moss. The boundary between the amended and native soils interferes with soil water movement and root growth. Instead, till a 6- to 12-inch-deep layer of compost or peat moss into the bed or row thoroughly before planting.

If you till uncomposted sawdust, bark, or wood chips into the soil before planting, add extra nitrogen to prevent the soil nitrogen from being depleted as the organic matter decomposes. As a rule of thumb, add one-half pound of ammonium sulfate for each cubic foot of uncomposted organic material that you add. Extra nitrogen is not generally needed for mulches applied to the soil surface.

Prior to planting, cut off all diseased or damaged roots and canes. Do not shorten healthy canes, but do remove twiggy growth.

Containerized blueberries can be planted any time during the growing season, but early spring or late fall are generally best. Bare root plants should be transplanted as early in the spring as possible after the risk of killing frosts has passed. For bare root plants, dig a hole large enough to spread the roots evenly in all horizontal directions and deep enough to set the plant at the same depth that it grew in the nursery. Water the plants immediately after transplanting. Mulching with sawdust or bark will help keep the soil cool and moist and inhibits annual weeds. Fertilize three to four weeks after spring planting.



# Caring for your plants

### Irrigation

Blueberries do not tolerate either standing water during the growing season or drought at any time. Irrigate often enough to keep the soil moist but not waterlogged. The amount of water to apply will depend on your soil and temperatures. Sprinkler irrigation can be used for blueberries, but may increase leaf and fruit diseases. If you irrigate with sprinklers, water early in the morning to allow the plants to dry off before nightfall. Doing so reduces disease problems.

If possible, apply irrigation water directly to the soil at the base of the plants. Trickle or drip irrigation systems work well both for commercial and home plantings. Ensure that water is applied evenly to all sides of the plants. Strive to keep the soil evenly moist at all times, as irregular watering can cause the berries to crack.

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## Fertilization

Blueberries are heavy feeders. Symptoms of poor nutrition are small, reddish leaves, stunted growth, and poor yields. Excessive nitrogen fertilization results in poor yields and late, succulent growth that is susceptible to winter injury. Blueberries prefer the ammonium, rather than the nitrate, form of nitrogen, and high concentrations of nitrates and chlorides can be toxic to blueberries. Ammonium sulfate (21% N) is popular for blueberries because it adds nitrogen and acidifies the soil at the same time. Most garden centers



	Fertilizer						
Year	Cow or horse manure <sup>a</sup> (pounds)	Poultry or rabbit manure <sup>b</sup> (pounds)	10-10-10 <sup>c</sup> (ounces)	21-0-0 <sup>d</sup> (ounces)			
l (planting)	5 lb	1.5 lb	4 oz	2 oz			
2	7.5	2.0	6	3			
3	10	3.0	8	4			
4+	12.5	3.5	10	5			

#### Table 4. Amount of fertilizer to apply to each blueberry bush.

a. Cow and horse manures contain approximately 0.5% N.

b. Poultry and rabbit manures contain approximately 1.8% N.

c. 10-10-10 represents a fertilizer containing 10% each N, P, and K.

d. 21-0-0 is ammonium sulfate and contains no P or K.

sell acidifying fertilizers that are mixed with water and applied to either the soil, foliage, or both. The amount of nitrogen to apply depends upon the age of the bushes (table 4). Apply fertilizers evenly around the bushes from the canes out to the drip lines.

Uncomposted manure contains high concentrations of salts that can become toxic to blueberries over time. Manure also tends to raise soil pH, making nutrients less available to blueberries. If you fertilize with manures, compost them first, periodically water the bushes heavily to leach out excessive salts, and monitor the soil pH carefully.

#### Pruning

Moderate, yearly pruning is required to keep blueberries productive and healthy. Infrequent heavy pruning results in crowded, unproductive canes. Blueberries are normally pruned in late winter or early spring before new growth starts. For highbush blueberries, remove all small, twiggy



branches when you plant. Little pruning is needed for 2and 3-year-old bushes, but remove dead or diseased wood, twiggy growth, and low-lying canes. During bloom, strip off all blossoms for the first two springs after planting. Doing so helps establish healthy, productive canes and increases long-term yields.

During bloom, strip off all blossoms for the first two springs after planting.

Blueberries produce new canes as suckers that arise from the base or crown of the plant. New shoots are also produced on established canes. One-year-old canes are generally unbranched and have few fruit buds. Canes are most fruitful during their second and third growing seasons. Four-year-old wood becomes weak and unproductive and should be removed. Flowers develop from the fat, round buds on 1-year-old wood. The small, sharp-pointed buds produce leaves and shoots.

To avoid crowding and to keep your bushes young, keep two of the most vigorous suckers each spring and remove all other new canes. A 6-year-old plant should have 10 to 12 canes ranging from one to six years old. For plants 6-years-old and older, remove two of the oldest canes and retain two vigorous suckers each spring. This rotation ensures that all canes are replaced about every five to six years.

On older canes that you keep, cut off the twiggy growth that bore fruit the preceding year and remove all damaged or diseased wood. Remove side shoots that lie close to the ground. Encourage tall, upright plants by removing drooping canes and shoots. Cut 4-year-old and older canes back to vigorous, upright shoots. For ease in care and harvest,



commercial highbush blueberry bushes are usually kept 5 to 7 feet tall. If your plants tend to overbear, cut off some of the flower buds located in heavy clusters.

Note that some cultivars, such as Patriot, naturally sprawl. Be careful not to remove too many canes and reduce yields excessively.

Half-high blueberries, such as Friendship, Northblue, Northcountry, and Northsky, have growth habits that fall between highbush and lowbush varieties. The half-highs need little, if any, pruning for the first ten years after planting. At that time, head back older lateral shoots to main stems, but do not thin out any more than 10 to 20 percent of the canes.



Dormant plant: a - crown area, b - cane, c - sucker, d - pruning cut, e - lateral shoot Lateral shoot: a - flower buds, b - vegetative buds



#### Weed control

Because blueberry root systems are shallow, keep cultivation shallow—not deeper than 1 to 2 inches. Apply 4 to 6 inches of sawdust, bark, or other organic mulch to plantings to control annual weeds. If you have quackgrass, Canada thistles, or other weeds that spread by underground rhizomes and thrive under mulch, pull out by hand or eradicate them with glyphosphate herbicide (available at garden centers under a variety of trade names). During early spring and summer, mulches can prevent the soil from warming up and drying out. Cold damp soils tend to keep iron in a chemical state that is unavailable to plants, leading to iron chlorosis. During early spring, temporarily rake mulches away from blueberry plants to let the soil warm and dry.

Grass and other cover crops are often grown between blueberry rows to control weeds, reduce dust, and improve access during wet weather. When blueberries are grown in landscapes or with cover crops, keep the soil bare for 2 to 3 feet around the bushes.

#### Pest and disease control

Blueberries are relatively trouble free in Idaho. For disease and pest control, the most important steps are to plant healthy nursery-grown bushes and to manage them carefully. Moderate pruning each spring will keep the bushes open and remove diseased and damaged wood. Training the bushes to open shapes and removing crowding branches improves air circulation which decreases bacterial and fungal diseases and provides better access to predators that feed on blueberry pests. Proper fertilization keeps the plants healthy and better able to resist diseases and pests. Irrigating early in the morning or applying water to the base of the plants helps keep the foliage and fruit dry, decreasing disease problems.



Remove two of the oldest canes and retain two vigorous suckers each spring for plants 6-years-old and older.

Dormant oil and fungicide applications in the spring before bud break help reduce pest and disease problems. Pest and disease controls are described in the *Pacific Northwest Plant Disease Control Handbook* and the *Pacific Northwest Insect Control Handbook*, which are available for reference at your county Cooperative Extension office. These and other guides for pest and disease control are described in the For further reading section at the end of this publication.



#### For further reading

Unless otherwise noted, the following publications are available from Agricultural Publications at the address on page 17.

Compendium of Blueberry and Cranberry Diseases. 1995. Available from the American Phytopathological Society, 3340 Pilot Knob Rd, St. Paul, MN, 55121-2097.

Pacific Northwest Insect Control Handbook. Annually revised.

Pacific Northwest Plant Disease Control Handbook. Annually revised.

Highbush Blueberry Production (PNW 215) \$10.00

Pruning Highbush Blueberries: a Grower's Guide, VTP 002. This videotape is available from Publication Orders, Extension and Station Communications, Oregon State University, 422 Kerr Administration, Corvallis, OR 97331-2119. Phone 541-737-2513.



# Gardening publications from the University of Idaho

Strawberry Production: Overview (CIS 931) 50¢
Specialty Farming in Idaho: Is It for Me? (EXT 743) \$1.00
Specialty Farming in Idaho: Selecting a Site (EXT 744) \$1.00
Berry Varieties for Idaho (EXT 739) \$2.00
Insects and Mites Destructive to Berries (CIS 628) 50¢
Diseases of Raspberries in Idaho (CIS 789) 35¢
Selecting Grape Cultivars and Planting Sites in Idaho (CIS 1043) \$1.00
Growing Strawberries in the Inland Northwest and Intermountain West (BUL 810) \$2.50
Growing Raspberries and Blackberries in the Inland Northwest and Intermountain West (BUL 812) \$2.50

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Gardening Notes



Gardening Notes

*Market gardeners, home gardeners* here is a crop beautifully suited to the Inland Northwest and bordering regions in eastern Washington, northern Idaho, Montana, Wyoming, and Utah.

*Growing Blueberries* gives you the information you need to plan, plant, and raise healthy blueberry plantings in a market garden or backyard bed. Learn about cultivars whose succulent berries you'll never see in a supermarket, despite their surpassing flavor. Read about the routine, nonchemical practices that will bring heavy crops and keep your plants nearly pest free.



### Did you know?

By growing several cultivars, you can select varieties for your hardiness zone and enjoy fresh berries for an extended production period.

Blueberries are available in small pots and as rooted cuttings, but these plants should be grown out in larger containers or nursery beds for at least 1 season before transplanting into the field.



Blueberries are relatively trouble free. For disease and pest control, the most important steps are to plant healthy nursery-grown bushes and to manage them carefully.

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BUL 815

Published June 1999

\$3.00