



Environmental Horticulture Notes

EHN 88

GROWING BLUEBERRIES IN THE SACRAMENTO REGION

Blueberry plants are very attractive bushes worthy of planting in the home landscape. The plants display a profusion of white or pink blossoms in the spring, and the foliage is glossy green in summer and turns outstanding red, orange, or yellow colors in autumn. Blueberries are also a popular, delicious fruit with well-established health benefits. Growing blueberries does involve some challenges, but with good planning, soil preparation and proper care, you can grow blueberries successfully in the Sacramento area. The following information focuses on blueberries in the home garden; some information is relevant to commercial production as well.

SPECIES AND VARIETIES

The three types of blueberries most commonly grown in the United States are northern highbush, rabbiteye, and southern highbush. Of these, the southern highbush varieties perform most reliably in the Sacramento area.

- **Northern highbush** blueberries (*Vaccinium corymbosum*) are native to the Northeast. They are widely grown in the northern tier states and southeastern Canada, and have high chilling requirements (800 to 1000 hours per year).
- **Rabbiteye** blueberries (*Vaccinium ashei*) are native to the southeastern part of the country and thrive in hot, humid weather.
- **Southern highbush** blueberries are hybrids from crosses between northern highbush varieties and native southern species, mainly *Vaccinium ashei* and evergreen *Vaccinium darrowi*. Southern highbush cultivars have lower chilling requirements (150 to 800 hours per year) than northern highbush varieties, greater tolerance to higher summer temperatures, and somewhat greater drought tolerance.

The varieties that grow and produce most successfully in our area are the southern highbush types; most of the northern highbush varieties do not tolerate our hot summers and do not get enough chilling hours, but some grow satisfactorily in most years and are used commercially.

Blueberry plants need a certain number of hours with temperatures below 45 degrees in winter (called chilling hours) if they are to grow well and bloom normally in the spring. If the plant does not receive enough chilling hours, the flower buds may fail to develop, leaves may appear later than usual, and the bloom period may be extended. The result is that little or no fruit may be produced that year. Over the past 12 years, accumulated chilling hours in the Sacramento area ranged from 600 to 1129 hours annually. In half of those years the chilling hours were below 800, the minimum requirement for most northern highbush varieties. To insure the most consistent fruit production, southern highbush blueberries are the suggested varieties to plant.

Highbush blueberries are self-pollinating but fruit set will increase and berries will be larger if two or more varieties are planted. Consider planting several varieties that ripen at different times to provide a long harvest season. At the Fair Oaks Horticulture Center, harvest of early-season blueberry varieties begins in May, and harvest continues into July with the mid- and late-season varieties. Some varieties feature large berries that are best for fresh eating and desserts, and others feature small fruit that are best for baking. Blueberries also freeze well. Allow at least two plants per family member.

CULTURAL PRACTICES

Blueberries, like most woody plants, will grow in most soil types (sand, loam, or clay), but to thrive, blueberries require very specific soil conditions. They require acidic soil (with a pH of 4.5 to 5.5) that is well-drained, porous, and high in organic matter, conditions not found naturally in the Sacramento area.

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PREPARING THE SOIL

Blueberry plants are long lived, so it's important to give them growing conditions that will allow them to thrive and produce high quality fruit. The first step is to perform a soil test, or at least check the soil pH (inexpensive soil pH test kits are available at nurseries and garden centers). If your soil isn't naturally suitable for growing blueberries, you need to modify it.

Incorporate Organic Matter—In their native habitat, blueberries grow in soil that is higher in organic matter than most of the soils in our area. Organic matter improves soil aeration and drainage, and most importantly, provides food for soil microorganisms and other forms of soil life. Organic materials such as well-composted pine bark, fir bark, oak leaves, or pre-moistened peat moss are good amendments. Yard debris compost may be used, but it often has a pH of 7 or higher. Pre-moistened peat moss is a good material—its low pH will also help acidify the soil—but be aware of the environmental concerns regarding harvest and transport of the product. If undecomposed material is used, such as wood chips or leaves, do not plant for at least one or two months to allow the material to break down. If sawdust, wood chips, or other high-carbon amendments are added, be sure to add some nitrogen at planting because these materials can tie up nitrogen in the soil for the first year. Apply 4 to 6 inches of organic matter over the planting area and thoroughly incorporate it into the soil.

Acidify the Soil—Poor plant growth resulting from high soil pH is a common problem when growing blueberries in our local soils. Even if there is ample iron available in the soil, if the soil pH is not acidic enough, blueberry plants are unable to take up enough iron for normal growth. The resulting iron deficiency causes smaller than normal leaf growth and leaves that are yellow or pale green except for prominent green veins. Leaves may also develop brown edges as a result of soil pH that is too high.

To acidify the soil for blueberries, add soil sulfur (elemental sulfur) to the surface of the soil and gently incorporate it thoroughly and evenly into moist soil. This is important for the soil bacteria to gradually convert the sulfur to dilute sulfuric acid over a period of weeks or months, thereby reducing the soil pH. Organic matter can be incorporated at the same time as the sulfur. Preferably, this should be done six months to one year prior to planting because soil bacteria are slow to break down the sulfur. Test the soil pH at planting and every year thereafter to be sure it remains acidic. If additional sulfur is needed in later years, side dress or very lightly incorporate additional sulfur into the soil.

Present pH	Desired pH			
	6.0	5.5	5.0	4.5
7.5	3.5	4.5	6.0	7.0
7.0	2.0	3.5	5.0	6.0
6.5	1.0	2.5	4.0	4.5
6.0	—	1.0	2.5	3.5

This chart shows the number of pounds of elemental sulfur needed to lower the pH of 100 square feet of loam soil to a depth of 6 inches. For sandy soil, reduce the amount by one-third; for clay soil, increase the amount by one-half.

PLANTING AND SPACING

Plant blueberries where they will receive at least six hours of sun; however, they may benefit from some afternoon shade in our hot summer conditions.

Blueberries are shallow rooted. The roots occupy a space about 3 or 4 feet wide; therefore, the soil should be dug this wide and at least 1 foot deep, 2 feet deep if drainage is poor. If hardpan is present in the top 2 feet of soil, it must be broken up or else water will not drain properly and roots will not grow. Alternatively, use raised beds or mounds to provide adequate drainage and soil for root growth.

Blueberries are often planted during the dormant season (mainly December and January) and spring when they are most available at nurseries, but potted plants can also be planted anytime. They should be planted on a small mound or berm if the soil is poorly drained. Plant the blueberry so that the soil line on the trunk is at or slightly above the ground level; planting too deep can smother the plant. If the plant is older and root-bound, the outer roots should be loosened or pulled away before planting. After planting, irrigate and cover the soil

with 4 to 6 inches of mulch, preferably fir or pine bark chips, pine needles, or well-composted softwood sawdust. Blueberries should be spaced 3 feet apart for a hedge, or 4 to 5 feet apart for shrubs.

FERTILIZING

Blueberries do not require large amounts of fertilizer and are sensitive to over-fertilizing, so observe first whether plants are growing and fruiting well. If fertilizer is needed, rake back mulch, spread fertilizer over the soil without incorporating it, then replace the mulch and water well. Fertilize blueberries with an acidic fertilizer, such as a 10-10-10 formula for azaleas, at the rate of $\frac{1}{2}$ cup per mature plant applied first in early spring as growth starts, and once more in late spring. Organic fertilizers such as blood meal, cottonseed meal, fish meal, and alfalfa meal can be applied instead of the above inorganic recommendation.

WATERING

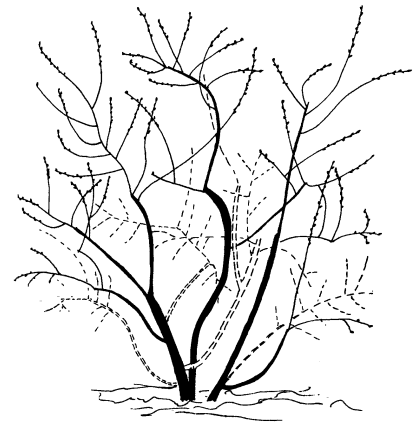
Blueberries require moist but not wet soil. Water is critical during berry development through harvest, and during bud formation in July and August. Irrigate with soaker hoses, mini-sprinklers, or double drip lines (one line on either side of the plant under the leaf canopy) with numerous emitters spaced about 1 foot apart. The amount of water depends upon the type of soil, drainage, and weather, so test soil moisture frequently.

PRUNING

At planting, remove older twiggy growth from the base of plant and leave strong new growth. For the next two years, remove dead, diseased, or damaged branches and spindly growth at the base of the plant. Also remove all blossoms (at least the first year) to prevent fruiting and encourage strong growth.

After the third year, pruning should focus on removing unproductive wood and generating replacement wood with the goal of having a balance of branches that are one to five years old. Prune blueberries in winter when plants are dormant. Follow these steps:

1. cut out dead, damaged, and diseased wood
2. remove small sucker shoots and weak twiggy growth at the base
3. remove low spreading branches that will be shaded, or those branches that will bend over onto the ground with the weight of the fruit
4. remove one or two of the oldest canes each year, cutting back to the ground or to a strong new side shoot
5. if more than two new canes grew from the crown the prior year, remove all but the two healthiest canes at crown level
6. remove weak twiggy wood from the top and outside branches
7. prune out crossing branches
8. if plants overbear, cut back some of the branch tips where most of the flower buds are located
9. prune back extremely vigorous new shoots to encourage branching and fruiting



PESTS

Birds: The amount of damage, type of damage, and effective control methods vary among species of birds. The most effective way to reduce damage is netting. Bird access can be prevented by placing $\frac{1}{4}$ to $\frac{1}{2}$ -inch mesh plastic netting. The netting is best attached to a frame that holds it away from the plant or it can also just be draped over the plants.

The most effective way to frighten birds from an area is to use a combination of noise makers and visual repellents. For details on bird management methods, refer to Pest Note 74152 *Birds on Tree Fruits and Vines*.

Western Flower Thrips: Primary damage includes stippling on fruit, scarred petals, and twisted leaves. The tiny cigar-shaped adult is identified by a black, brownish, yellow, white, or orange body and they have thick, bristle-like hairs at the tip of the abdomen, which other species lack. The larva has a yellow to orange body.

Healthy plants usually tolerate some thrips damage; however, high infestations may justify control. Use an integrated program of control strategies that combine good cultural practices, natural enemies, and/or the use of least-toxic insecticides. Monitor thrips by shaking foliage on a sheet of paper or by hanging bright yellow sticky traps. Vigorous plants outgrow damage; keep plants well irrigated, but avoid excess nitrogen. Knock

off thrips with a spray of water. Conserve naturally occurring populations of beneficials by controlling dust and avoiding pesticide use. Narrow-range oil, azadirachtin, neem oil, and insecticidal soaps can be somewhat effective for temporary reduction if applied when thrips are present and damage first appears. For complete information on identification and management refer to Pest Note 7429, *Thrips*.

DISEASE

Stem blight is a disease caused by the fungus *Botryosphaeria dothidea*. It has caused substantial stem dieback on blueberries in the Sacramento region. The disease is especially severe in young blueberry plants. The fungus enters the plant through wounds, causing rapid death of individual stems or even the entire plant. The most obvious symptom is “flagging”—infected stems wilt so rapidly that the stem does not defoliate before dying, resulting in brown leaves still attached to the stem. Fungicides will not control stem blight. The best way to limit the disease is to promptly prune off infected stems (at any time of year) back to healthy wood, well below the infected area. Take infected prunings away from the site and destroy them.

GROWING BLUEBERRIES IN CONTAINERS

Blueberries can be grown successfully in containers and are attractive patio plants. Most of the blueberry varieties can be planted in containers, although the taller varieties may need more pruning. Compact bush varieties such as ‘Sunshine Blue’ are ideally suited to containers.

Start new plants in five gallon pots, then move up to 20 inch containers in a year or two. Use an acid-based soil mix such as that formulated for azaleas, or prepare a mix of one-third pine or fir bark (¼ inch), one-third coarse peat, one-third potting soil, and about ½ ounce of elemental sulfur per cubic foot of soil. Use an acid-based fertilizer listed for azaleas (similar to a 10-10-10 formula). Split the application into several small doses from February to September.

Blueberries need at least six hours of sun, and may benefit from late afternoon shade in the Sacramento area. If the containers are located on a concrete patio slab, they should be raised above the concrete with “pot feet” or small pieces of tile, broken clay pot, or similar material, and grouped together to minimize the reflected heat.

Keep the soil in containers moist but not wet. Remember that container soil dries out faster than the ground does. Apply a 4 to 6 inch layer of mulch to conserve water and help moderate the soil temperature.

Replace soil with fresh potting mix, and root prune the plant every three to four years in winter. Bear in mind that the soil mixture suggested above is rich in organic matter that will break down over time and lower the soil height. If possible, add fresh soil under the roots rather than on top. Placing soil on top will bury the root crown and possibly lead to crown rot disease.

FOR ADDITIONAL INFORMATION

- Fair Oaks Horticulture Center, Fair Oaks, CA workshop and location information: ucanr.edu/workshops
- Sacramento County UC Master Gardeners: ucanr.edu/sacmg
- *California Master Gardener Handbook*, ANR Publication 3382, anrcatalog.ucdavis.edu/
- UC Fruit and Nut Research and Information Center chilling hours information: fruitsandnuts.ucdavis.edu/chillcalc/index.cfm
- Master Gardeners of Santa Clara County blueberry trial: www.mastergardeners.org/picks/blueberry.html
- *Blueberry Research Launches Exciting New California Specialty Crop*, California Agriculture article, 2005: <http://ucce.ucdavis.edu/files/datastore/391-211.pdf>
- Northwest Berry and Grape Information Network: osu.orst.edu/dept/infonet/

BLUEBERRY VARIETIES

	Bush Height	Ripening Time	Comments	Grown at FOHC*
Southern Highbush	Minimum chilling hours 150 to 600.			
Abundance	4-6 ft.	early-mid season	medium blue; excellent aroma and flavor	X
Cape Fear	5-6 ft.	early season	soft berry; mildly sweet with good flavor	X**
Emerald	5-6 ft.	mid season	mild, sweet flavor; very large berry; low chill hours	
Georgia Gem	5-6 ft.	early season	spicy sweet with good blueberry flavor	X**
Gulf Coast	4 ft.	early-mid season	med-large fruit; tangy good flavor; compact bush	
Jewell	6-8 ft.	early-mid season	high yields; very large, slightly tangy fruit; very low chill hours	
Jubilee	5-6 ft.	mid season	sweet berries	X
Marimba	4-6-ft.	early season	firm berry; excellent flavor; vigorous, upright bush	
Misty	4 ft.	early season	sweet berries	X**
O'Neal	5-6 ft.	early season	sweet and tangy flavor	
Reveille	5-6 ft.	mid season	crisp texture; sweet great blueberry flavor	X**
Sharp Blue	6 ft.	early season	sweet, slightly tangy; evergreen; very low chill hours	X
Southmoon	5-6 ft.	mid season	large, firm flavorful berries; upright bush	X
Springhigh	4-6 ft.	very early	dark blue, medium firm, pleasant flavor	X
Star	5-6 ft.	very early	large berries; pleasant sweet flavor; upright growth	X**
Sunshine Blue	3 ft.	mid season	heavy crop; small, sweet, spicy; evergreen; very low chill hrs	

Northern Highbush	Master Gardeners are testing these varieties for adaptability to our climate. Minimum chilling hours 800 to 1000.			
Blue Ray	5 ft.	mid season	sweet and spicy; intense blueberry flavor	X
Bluecrop	4-6 ft.	mid season	sweet and crunchy berries	X
Draper	5-6 ft.	mid season	medium sized berries; powder blue	X
Duke	5-6 ft.	early season	medium sized berries; mildly sweet flavor	X
Elliot	5-6 ft.	late season	medium sized berries; slightly tart; heavy bearer	X
Liberty	5-6 ft.	early-mid season	delicious flavor and excellent firmness	X
Northland	3-4 ft.	mid season	lots of small, dark blue fruit; wild berry flavor	X
Ozark Blue	4-6 ft.	late season	sweet spicy flavor; crunchy berry; fruit until August	X

*FOHC=Fair Oaks Horticulture Center

**Favorites of tasters at the Fair Oaks Horticulture Center