



GROWING BLUEBERRIES IN YOUR HOME GARDEN

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Growing highbush or cultivated blueberries can be very rewarding. You can eat the berries fresh, make them into pies and other desserts, or freeze, dry, or can them for later use.

In Oregon, the blueberry fruiting season extends from late June through September, depending on the type of blueberry and cultivar. The fruit on each cultivar ripens over a 2- to 5-week period.

The most common type of blueberry grown in Oregon is the northern highbush blueberry. Other types of blueberries include southern highbush, rabbiteye, lowbush, and half-high.

Highbush blueberries are perennial, long-lived (40 to 50 years), deciduous shrubs with a mature height of 5 to 9 feet. Attractive as ornamentals, they progress from a profusion of white or pink blossoms in spring to colorful foliage (fall) and wood (winter). You can grow plants in beds, rows, hedges, or individually. Dwarf and semi-dwarf cultivars (varieties) are available for growing in containers.

Selecting a site

Blueberries require a sunny location for full production. Avoid areas surrounded by trees. Trees can provide too much shade, compete with plants for water and nutrients, encourage birds, and interfere with air movement around the plants. Poor air circulation favors the development of diseases.



Soils

Blueberries have very specific soil requirements. Plants grow best in well-drained, light, sandy loam soils that are high in organic matter and have a pH between 4.5 and 5.5.

Avoid planting on heavy soils that drain slowly. Water standing on the soil surface for more than 2 days during the growing season can damage roots. The soil water table should be at least 14 inches below the soil surface, or roots will suffocate.

If your garden has only coarse, sandy or gravelly soils, pay careful attention to watering and fertilizing.

You can modify many soils that are initially unsuitable to make them suitable for blueberry production (see “Preparing the soil”).

Selecting a cultivar

It's a good idea to plant more than one cultivar. Although most northern highbush blueberry cultivars are self-fertile, cross-pollination produces larger berries. Also, if you plant two or more cultivars that ripen at different times, you'll lengthen the harvest season. To ensure adequate cross pollination, plant more than one cultivar within each type of blueberry you select (northern highbush, southern highbush, and rabbiteye). Within each type, cultivars have sufficient overlap in the bloom period for adequate cross pollination.

Northern highbush cultivars grown in home gardens in Oregon include (in order of ripening): 'Duke', 'Earliblue', 'Spartan', 'Patriot', 'Bluecrop', 'Jersey', 'Blueray', 'Legacy', 'Chandler', and 'Elliott'. See EC 1308, *Blueberry Cultivars for Oregon*, for descriptions of these and other blueberry cultivars.

Preparing the soil

Blueberries require an acid soil, relatively high organic matter content, and good drainage. If your soil is not naturally suitable for blueberry plant growth, you'll need to modify it before planting. Blueberry plants are long-lived, so considerable time and expense in preparing the soil can be justified.

If you plan on growing several plants, it's better to group them in a bed or row than to scatter them around your garden. You'll obtain better results if you prepare an entire bed, rather than digging holes for individual plants and preparing soil to fill the holes. Be sure to eliminate all perennial weeds before planting.

Soil pH adjustment

An acid soil *with a pH between 4.5 and 5.5* is considered ideal for highbush blueberries. Poor blueberry plant growth resulting from soil pH that is too high is the most common problem when growing blueberries in the home garden. In this situation, plants often have yellow leaves with green veins (Figure 1). These symptoms are most likely on younger leaves.



Figure 1. Yellow foliage caused by high-pH soil.

For most soils, the pH must be lowered (made more acidic). Test soil pH a year before planting because acidification, if necessary, takes more than 6 months. (For more information about soil testing, see *Laboratories Serving Oregon: Soil, Water, Plant Tissue, and Feed Analysis*, EM 8677, and *Soil Sampling for Home Gardens and Small Acreages*, EC 628.)

If the pH is between 5.7 and 6.5, acidify the soil by adding finely ground elemental sulfur (S) to the soil before planting. The amount of S needed depends on how much the soil pH needs to be lowered and the soil type.

- To lower the pH from 6.5 to 5.4 in a clay loam soil, apply 3.5 to 4.5 lb S/100 sq ft.
- To lower the pH from 6.1 to 5.4 in a clay loam soil, apply 2 to 2.75 lb S/100 sq ft.
- Heavier soils may require more S for a similar amount of acidification.

It's best to use the lower rate initially, check soil pH again in 6 months to a year, and apply more S only if necessary. Do not apply more than 7 lb S per 100 sq ft at one time.

If the pH is between 5.5 and 5.7, mix in Douglas-fir sawdust and ammonium sulfate fertilizer before planting. These materials will acidify the soil. (See "Incorporating organic matter," page 3.)

If the pH of an organic soil is higher than 6.5, it's usually not practical to acidify it enough for growing blueberries.

In some cases, soil pH is too low for blueberry production. *If the pH of your soil is below 4.0, incorporate finely ground dolomitic limestone at a rate of about 5 to 10 lb/100 sq ft.*

Incorporating organic matter

Before planting, incorporate organic matter, such as Douglas-fir sawdust or bark, to improve soil aeration and drainage. Yard debris compost may be used, but it often has a high pH (above 7.0, compared to pH 4.0 to 4.5 of Douglas-fir sawdust) and can be high in salts.

Spread sawdust over the row to a width of about 3 feet and a depth of 3.5 inches. To aid in decomposition of the sawdust, add 2 lb nitrogen/100 feet of row length (10 lb ammonium sulfate, 21-0-0). Incorporate the sawdust and fertilizer with a rototiller.

Improving drainage

Although blueberries require readily available moisture, they will not tolerate poor drainage. Ideal soils are well drained with a water table 14 to 22 inches below the surface. You often can make poorly drained soils suitable for blueberries by tilling and/or planting on raised beds.

A raised bed 12 to 18 inches high and 3 feet wide usually is sufficient to provide adequate drainage and aeration. Raised beds can be constructed with wood walls, but walls are not necessary if you can form a raised bed (using natural soil and incorporated sawdust) by hilling.

Growing blueberries in containers

You also can grow blueberries in containers. Northern highbush blueberries require a large container such as a wine barrel. Half-high types can be planted in a 10-gallon or larger container. A good planting mix consists of about 80 percent fir bark, 10 percent peat moss, and 10 percent perlite.

Establishing your planting

Planting

Plant healthy 2-year-old plants in October or from March through April. Purchase container-grown plants from a reputable nursery. Space plants 4 to 5 feet apart in the row. Spacing between the rows can be 8 to 10 feet.

Set plants no more than $\frac{3}{4}$ inch deeper than they were growing in the nursery row or container. Planting too deep can smother plants.

Firm the soil well to remove air pockets. Do not fertilize plants when you plant them. Water thoroughly after planting, but don't over water. Prune all branches back by about 30 to 40 percent by removing older wood and keeping nice new whips (new growth at base of plant); this encourages vigorous new growth.

Remove blossoms

Prune off flower buds at planting (Figure 2). Do not allow plants to produce fruit the first season. Be patient! It's important that plants grow well the first year, and flower and fruit production hinders growth.



Figure 2. Fruit buds are "fat" buds on the tip of last year's growth; vegetative or shoot buds are barely visible on the lower portion of the shoot.

Young plants require little pruning for the first 2 or 3 years compared to mature plants, but it is important to limit fruit production the first 2 years. You will have to remove weak portions of the plant and limit the number of fruit buds to ensure that plants grow well.

Weed control

Keep at least a 4-foot area around the plants free of weeds during the growing season. Blueberry roots grow mostly near the soil surface. Thus, to prevent root damage, cultivation must be very shallow and not too close to the plant.

Mulching

Blueberries grow better when mulched. Mulching keeps the soil cool, conserves moisture, adds organic matter to the soil, improves soil structure, and aids in weed control.

After planting, apply a mulch of Douglas-fir sawdust or bark to a depth of 2 to 3 inches. Increase the depth of the mulch to 6 inches over a period of years. You can mulch the entire soil surface (you'll no longer have to cultivate), or you can place a 3- to 4-foot-wide band of mulch in the row.

You may have to apply 25 percent more nitrogen fertilizer on mulched plantings compared to unmulched plantings, depending on how fresh the sawdust is. Fresh sawdust "ties up" nitrogen while it decomposes, so you need to add more for the plants.

Fertilizing

In late April of the planting year, apply 0.2 oz of nitrogen (N) per plant (equivalent to 1 oz of ammonium sulfate fertilizer, 21-0-0, or 0.4 oz urea, 46-0-0). Add the same amount of N fertilizer in early June and in late July. Sprinkle the fertilizer evenly within 12 to 18 inches of each plant, but not directly on the crown or stems.

Ammonium sulfate and urea fertilizers contain no phosphorus (P) or potassium (K). In general, home garden soils have sufficient P and K.

However, if soil or plant-tissue analysis shows a deficiency of either P or K, apply a more complete fertilizer. Use mixtures that contain potassium sulfate rather than potassium chloride; blueberries are very sensitive to chloride. Also, make sure the N is in the form of ammonium, not nitrate; blueberries do not take up nitrate N.

Watering

Blueberries have a shallow, fibrous root system, so they're susceptible to drought injury. A uniform and adequate supply of water is essential for optimum growth. On average, young plants need about 1 inch of water per week. If this amount isn't supplied by natural soil water or rainfall, you must irrigate. Check the soil frequently for adequate moisture and irrigate if necessary.

Checklist for establishing a blueberry planting and taking care of plants the first year

- Select a good site.
- Eliminate all perennial weeds before you plant and before they go to seed.
- Test the soil pH a year before planting.
- Prepare the soil the year before planting:
 - Incorporate organic matter.
 - Modify soil pH if necessary.
 - If the site drains poorly, use tile drains and/or build raised beds.
- Choose cultivars—planting two or more leads to larger fruit and a longer harvest period.
- Plant in the fall or spring.
- Apply 2 to 3 inches of sawdust or other mulch.
- Prune all branches back by 30 to 40 percent.
- Apply fertilizer in late April after planting.
- Keep the planting weed-free.
- Irrigate as needed.

Care of established plants

Adding mulch

Add mulch as required to maintain a depth of about 6 inches once plants are mature. In row plantings, widen the mulched area to at least 4 feet as plants become larger. As a rule, sawdust mulch decomposes at the rate of about 1 inch per year.

Fertilizing

In the second year, apply 0.25 oz of N per plant (1.2 oz of 21-0-0 or 0.55 oz 46-0-0) in April, May, and June. The total amount of N applied per plant will be 0.75 oz. Spread fertilizer evenly around the plant, over an area approximately equal to the spread of the bush. Try not to apply fertilizer to the base of the canes.

In year 3, increase the total fertilizer N applied to 0.8 oz. Divide the total into three equal portions and apply one-third each in April (around bloom time), May, and June.

In year 4, increase to 1 oz per plant. As the planting ages, slowly increase the total N applied to a maximum of 2.5 oz N per plant (12 oz of 21-0-0) in mulched plantings. Continue to split the total into three applications in April, May, and June. In general, you should not fertilize after July 1.

Your visual assessment of plant growth and fruiting can help you know how much to fertilize. If the plants are growing well (10 to 12 inches of new lateral growth each year and new vigorous growth from the base of the bush), leaves look green, and yield is good, there's no need to worry about whether plants are getting enough nutrients. This assumes, however, that you've pruned plants well. Added nitrogen fertilizer will not compensate for poor growth due to insufficient pruning.

Check the soil pH every year or two, especially if growth is poor. If the pH is above 6, you can apply elemental sulfur to the surface of the soil or mulch to slowly acidify the soil and improve blueberry growth. Apply no more than 5.5 lb S per 100 feet of row (3 oz/plant). Higher rates will burn or kill blueberry plants.



Elliott.

Spread the S evenly under the bushes. Water or lightly rake it into the soil or mulch. Measure the soil pH a year later and add more S if necessary.

Ammonium sulfate fertilizers used over a period of years will gradually lower soil pH.

Watering

Blueberries need a uniform and adequate water supply from blossom time to the end of harvest. Moisture demand is greatest from fruit set to harvest (time of greatest fruit growth). Fruit bud formation for next year's crop begins from late July to early August so adequate water is also needed at this time.

Plants need from 1.5 to 3 inches of water a week. Irrigate to supplement rainfall as needed. Irrigate frequently enough to prevent the soil from becoming too dry. However, avoid over-watering the plants, or roots may be killed due to lack of oxygen.

Overhead watering promotes disease. Drip or another form of under-canopy irrigation is ideal.

Pruning

After the third year, you need to prune blueberry plants every winter. The best time to prune is January to early March, when plants are dormant.

The main objectives of pruning are to promote the growth of strong, new wood and to maintain good fruit production. If you prune too little, plants produce too many small berries and shoot growth is weak. Plants have weak, twiggy growth at the end of the season and fail to develop strong new wood for future production. Severe pruning produces fewer, larger berries and more new wood.

If you prune bushes correctly, you'll have a good balance between fruit production and growth of vigorous new shoots. Experience is the best guide on how hard to prune.

A video guide to pruning blueberry plants is available from the Oregon State University Extension Service (*A Grower's Guide to Pruning Highbush Blueberries*, DVD 002).

Blueberries produce fruit on 1-year-old wood (last year's growth). Fruit buds are visible during the dormant season. They are the fat buds at the tip of last year's growth. The small, scale-like buds toward the base of the 1-year-old wood are vegetative buds; they will produce a shoot with leaves next season (see Figure 2).

The best berries are produced on 1-year-old wood that is from 8 to 12 inches long. Short 1-year-old wood (less than 5 inches long) produces a lot of buds, but fruit quality and vegetative growth are poor. We call this type of wood "twiggy."

When pruning, keep in mind the following principles.

- Keep the bush fairly open. Open bushes promote better air circulation (less disease) and good light penetration to improve fruit bud set for next year's crop.
- Mature bushes should have 6 to 12 canes at their base, depending on cultivar or growth habit. After pruning, there generally should be

an equal number of 1-, 2-, 3-, and 4-year-old canes. If you remove the oldest, unproductive canes, and thin to a few of the best shoots at the base (called "whips"), you will be renewing the bush each year.

The following step-by-step system will make pruning easier.

1. Cut out any wood that's dead, damaged, or diseased.
2. Remove whips smaller than pencil size in diameter, but leave larger whips to develop into good fruiting wood next year.
3. Cut out one or two old, unproductive canes (large stems arising near the base of the plant). Fourth-year or older wood with small, weak growth (short laterals or 1-year-wood) is unproductive. Cut these canes back to the ground or to a strong new whip growing near the base.
4. Remove excess whips (or "suckers") and weak, twiggy wood, especially from the top of the plant, to allow light to reach the center.
5. Plants may overbear. This often results in very little new growth of wood and small, late-maturing berries. If this is a problem, remove some of the weakest (thin and short) 1-year-old wood. If necessary, also tip back some of the remaining long 1-year-old wood by cutting off about one-third of the flower buds.

Checklist for taking care of mature plants

- Add mulch gradually over the years to maintain a depth of 6 inches.
- Apply fertilizer in the spring, starting around bloom time.
- Water to maintain a uniform and adequate moisture supply.
- Pick fruit at optimum maturity.
- Prune in January or February.

Some cultivars do not produce many whips from the base of the plant. Instead they produce whips from the base of older canes between ground level to knee height. When you prune these bushes, you will have fewer canes at the base of the plant, but more new growth or renewal wood higher up on the bush. Follow the same principles described above.

Harvesting

Each blueberry cultivar ripens berries over a 2- to 5-week period. A well-managed, mature northern highbush plant will produce from 13 to 18 lb fruit. Berries occur in clusters of 5 to 10.

Don't be too anxious to pick the berries when they first turn blue—they are not yet fully ripe. They'll develop better flavor, become sweeter, and grow about 20 percent larger if you leave them for a few days after they completely turn blue. Pick about once a week or more often in hot weather.

Gently roll berries between your thumb and forefinger, removing fully ripe berries and leaving unripe berries for the next picking. You can collect berries in an open container attached to a belt or cord at waist level. This frees both hands for picking.

You can keep fruit for a week or more in the refrigerator.

Pests

Many species of birds feed on blueberry fruit; they can harvest 100 percent of the berries if you don't control them. Scare tactics such as aluminum plates and strips of foil flapping in the wind have limited effectiveness; birds become used to these devices.

The most effective method of bird control is light plastic netting. You can place nets directly on the plants, but this makes harvesting fruit difficult, and birds can feed on some of the outside fruit by pecking through the netting. As an alternative, you can construct a small wooden or PVC frame over individual plants or groups of plants to support the netting.

In general, insects and diseases are not a big problem for blueberries. The following diseases might occur:

- *Botrytis* (gray mold that kills blossoms)
- *Pseudomonas* (bacterial blight that causes 1-year-old wood to die back in winter)
- Mummy berry, *Anthracnose*, and *Alternaria* fruit rots

Insect pests include root weevils and scale. If insects or disease become a problem, check with your local office of the OSU Extension Service for control recommendations.

For more information

Blueberry Cultivars for Oregon, B.C. Strik and C. Finn, EC 1308.

Pruning Highbush Blueberries (video), B.C. Strik, DVD 002.

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