Blueberry Production for the Home Garden

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Blueberries are an excellent choice for a home fruit crop when the plants growing requirements are met. The fruit is attractive and flavorful and can be processed or eaten fresh. Blueberries can be frozen, canned, preserved as jams or dried for use as a substitute for raisins. The fruits are healthful providing vitamins, minerals and pigments such as anthocyanins. When consumed in appropriate quantities, anthocyanins may help prevent or slow down the development of certain diseases. The blueberry bush itself is very attractive. Beautiful pink or white flowers in the spring attract many pollinators and the fall leaves often are a brilliant red or crimson. Some cultivars are low and spreading, while others are weeping or erect and almost treelike. These variations in plant structure allow the home fruit growers to utilize them in edible landscaping and wildlife habitats. Blueberries are naturally more adapted to eastern Oklahoma.

Site Selection

Full sun is needed for the best yields. Excellent soil drainage is essential. In low lying areas with poor drainage, raised beds (6 to 15 inches high) are highly recommended. Areas prone to frost should be avoided. A site on a slight, northward-facing slope helps prevent spring frost injury and gives some protection from drying southwest winds in summer.

Deep, well-drained sandy loam soils with added organic matter are ideal. A pH of 4.5 to 5.2 is best for optimum plant nutrition. If soil pH is too high, sulfur may be added to lower the soil pH. See (Table 1). For in-between numbers and soil types, estimate as needed, or consult the local Extension office for assistance. Very high pH soils will be difficult to lower and keep at the necessary levels. This is why many homeowners have gone to raised beds filled with azalea soil mix, which has the right pH for blueberries.

Table 1. Pounds of sulfur per 100 square feet to lower soil pH one unit.

Soil Texture	*lbs/100 sq. ft.*
Sand	1.0 to 1.5
Loam	2.0 to 3.0
Clay	3.0 to 4.0

Newly cleared land may be planted. All weeds should be removed before planting, as blueberries do not compete well for nutrients due to their lack of secondary root hairs. Blueberries need between 1 to 3 inches of natural rainfall or irrigation per week, depending on temperatures and evaporation rate. High-quality water with low salt or lime contents must be available for a successful planting. The pH of the irrigation water should be acidic to prevent raising the soil pH with each irrigation.

Soil Preparation

Submit a soil sample six months to one year before planting. Soil pH and major nutrients, especially phosphorus and potassium, should be modified as needed before planting. Prepare the soil by tillage to give a weed-free planting area. Planting a green manure crop, such as rye or wheat, the fall before planting blueberries and tilling it under in the spring is recommended. This will add beneficial organic matter.

Plant Selection

There are three basic types of blueberries for Oklahoma. They are highbush, rabbiteye and southern highbush. All three grow well in Oklahoma, depending on the location and the cultivar.

Highbush blueberries (*Vaccinium corymbosum*) grow 3 to 23 feet tall and vary in their chilling requirement from 400 to 800 hours. Chill hours are logged as temperatures between 32 F and 45 F. They generally ripen in May and June and perform best in northern Oklahoma. For best yields, two or more cultivars should be planted together, making sure that bloom time overlaps.

Rabbiteye blueberries (*V. ashei*) grow 4 to 19 feet tall and vary in their chilling requirement from 100 to 650 hours. They ripen from late May to early July. They grow best in central and southern Oklahoma and are more heat tolerant than highbush types. Rabbiteye blueberries are divided into pollination groups A, B, C and D. To get the best fruit set and largest fruit, varieties that bloom at the same time should be

planted together. Therefore, if a variety is pollination group B, it will be best to plant it near another variety also in group B.

Southern Highbush (*V. corymbosum* x with other species such as *V. darrowi*) are intermediate, between highbush and rabbiteye in most respects. Their genetic background is quite variable; therefore, the cultivars also vary in their adaptability. Southern highbush are somewhat self-fertile, but to increase yield plant, plant more than one cultivar with overlapping bloom periods. Southern highbush can be grown throughout the state, depending on their chilling requirement and resulting budbreak and bloom time.

Early, mid-season and late-season fruiting cultivars can be planted (Table 2). Ripening dates may vary by as much as two weeks (earlier or later), depending on the weather. Berries will ripen one to two weeks later in northern Oklahoma than in southern Oklahoma. Purchase plants from a reputable nursery. When the plants arrive, check the plants for evidence of diseases and insects (use a magnifying glass). If the plants are infested or infected, return them.

Propagation and Planting

Softwood cuttings taken from healthy, vigorous mother plants may be rooted in a shaded mist bed. Homeowners can try this with unpatented cultivars. Media using sand, peat moss and rice hulls (when available) works well for rooting. The media needs to be able to hold the cuttings up, provide moisture and allow oxygen to the newly forming roots.

Blueberries may be planted in the fall after growth has stopped, or in the spring before growth has resumed. February or early March is a good time for planting blueberries in most areas of the state. Plant rabbiteye plants 5 to 6 feet apart, highbush 3 to 4 feet apart and southern highbush 3 to 5 feet apart within rows, depending on the vigor of the cultivar. Rows should be spaced the width needed for equipment. This is usually a minimum of 10 feet.

When planting, make sure the holes are about twice the size of the root ball. Add one-third cubic foot of thoroughly dampened peat moss to each hole, mixing it with the native soil. Keep root systems of bare-root plants covered with damp

Table 2. Blueberry cultivars for Oklahoma. As berries per cup increases, fruit size decreases. Range indicates the southern and northern limits of the variety, based on USDA plant hardiness zones. Letters in parenthesis indicate pollination groups.

Variety	*Ornamental Value and Type of Bush*	*Berries per cup*	*Pounds per bush*	*Ripens*	*Range*
Highbush					
Blue Chip	Good, upright	65	15	middle	7b 6a
Bluecrop	Excellent, upright	65	15	middle	7a 4a
Bluejay	Good, upright	76	15	early	7b 4a
Blue Ray	Excellent, upright	60	15	middle	7a 4a
Darrow	Good, slightly spreading	57	11	middle	7a 5b
Duke	Good, upright	65	15	early	7b 4a
Earliblue	Good, upright	75	8	early	7a 4b
Elliott	Very good, upright	75	15	late	7a 4a
Reka	Good, spreading	65	15	early	7a 4a
Patriot	Good, upright	49 - 60	15	early	7a 3b
Spartan	Good, upright	60	10	early	7a 4a
Southern Highbush					
Legacy	Good, upright	65	12	middle	8a 6a
O'Neal	Good, spreading	50	7	early	9a 7b
Ozarkblue	Good, upright	65	12	middle/late	8b 6a
Summit	Good, upright	65	12	middle	8b 6b
Rabbiteye					
Alapaha	Good, upright	72	15	early	9a 6b
Austin	Good, upright	72	16	early	9a 6b
Blue Suede	Very good, upright	72	12	early	9a 6b
Brightwell (C&D)	Moderate, spreading	77	11	middle	9a 7b
Climax (B&C)	Good, spreading	77	15	middle	9a 7b
Ochlockonee	Very good, upright	65	15	very late	9a 6a
Powderblue (D)	Very good, upright	77	11	late	9a 7b
Premier (C & D)	Good, upright	77	12	middle	9a 7b
Snowflake (C&D)	Moderate, upright	77	15	early	9a 7b
Summer Sunset	Excellent, upright	70	10	early	9a 6b
Tifblue (D)	Good, upright	77	16	middle	9a 7b
Vernon	Good, upright	65	15	middle	9a 6b
Woodard	Good, spreading	72	12	middle	9b 7a

sawdust, hay or peat moss while preparing to plant. Do not fertilize until about two weeks later. If bare-root plants are used, one-third to one-fourth of the top growth should be removed at planting time. This balances the plant and helps prevent lodging from high winds. If the root balls of container-grown plants are entwined, loosen them before planting to encourage the roots to grow outward. Plant at the depth they were growing in their pots. After planting, tamp soil around plant to remove air spaces, then water thoroughly.

Nurturing

Blueberries are perennial shrubs. New canes develop from buds on the old wood each year and cultivars send up new cane suckers. Flower buds for the next year are formed in the weeks immediately after harvest has ended. Therefore, it is important for next year's harvest to keep the plants watered, fertilized and weeded after harvest. The last fertilizer application should be given by August 1 because the plant must go into dormancy before the first hard freeze. In winter, check for potential crop load by looking at the number of flower buds (they are round); and leaf buds (they are pointed and usually located below the plump flower buds).

Mulching: Blueberries should be permanently mulched with 4 to 6 inches of well-aged organic material such as pine bark, sawdust or rice hulls. Mulch helps control weeds, conserves soil moisture, helps prevent winter injury to the base of the plants, helps control unwanted suckers and promotes growth of the blueberry root system.

Irrigation is necessary for good plant establishment and survival. A drip irrigation system is recommended. Apply 1.5 to 3 inches of water per week. These requirements may be higher when conditions are windy. If the root systems are allowed to dry out, the peat around the roots will not re-wet easily, so the plants could die before water becomes available to them again.

The higher watering rate should be used on very sandy soils, and the lower rate on loamy soils. Keep in mind these requirements will vary according to the weather. Rabbiteye blueberry bushes may be quite large and often ripen their fruit after the summer heat has arrived in Oklahoma. With conditions of low humidity and dry winds, their water use may be considerably more than mentioned above. If bushes are allowed to dry out between watering, fruit may crack and rot.

Excess water may cause roots or even the entire bush to die. Blueberry roots are extremely susceptible to root rot and water-borne pathogens such as *Phytophthora*, therefore, good drainage is essential to excellent blueberry health. http://www.ces.ncsu.edu/depts/pp/notes/Fruit/blueberryinfo/phytophthora.htm

The natural habitats of wild blueberries include the half sand, half organic matter soils of coastal North Carolina, and the rocky steep slopes of Beaver's Bend State Park in southeastern Oklahoma. Both of these environments are high in organic matter, very well drained and receive relatively high rainfall. Cultivated blueberries require more water than wild blueberries because gardeners are trying to produce a higher-than-natural yield of larger sized fruit.

Water stress (too much or too little) will reduce fruit size and yield. It may also reduce flower bud formation and delay ripening. Leaves of flooded or drought-stressed plants become dark red with brownish margins and often die.

Table 3. Ounces of fertilizer per plant per application.

Year	*Urea*	*[$(NH_4)2SO_4$]*	*S-coated Urea*
1	0.5	1	0.7
2	0.5	1	0.7
3	0.4	0.8	0.4
4, etc.	1	2	1.2

From Patten, K. 1990. Plant nutrition and fertilization. In Texas Blueberry Handbook, Texas Agricultural Extension Service, p. 8-9.

Fertilizing: Use ammonium nitrogen, urea, sulfur-coated urea, ammonium sulfate or cottonseed meal to fertilize blueberries. Fertilizer sold for azaleas or rhododendrons also is excellent for blueberries. Apply nitrogen in small applications—at budbreak, bloom, after fruit set and once a month until August. Small frequent fertilizer applications is preferable to larger amounts, as blueberries have no secondary root hairs and are shallow-rooted. If desired, a slow-release nitrogen formulation could be used and would help prevent excessive losses by leaching.

Apply fertilizers uniformly around the drip line of the plant, but never near the base of the plant. Fertilizer application stimulates plant growth, increases berry size and boosts total production. Fertilizers and rates are listed in Table 3. If another fertilizer is used, be sure to calculate the proper amount to use.

Pruning

Summer pruning is done to remove broken and diseased branches. Pruning for size control may be needed. Use pruners or a hedge clipper to prune immediately after the seasons harvest is finished. Cut the sides of the bushes back to narrow the rows to a convenient width. Also, cut the tops of the bushes back to about eye level. Do not prune later in the summer because fruit buds will also be removed with the wood. Selective summer pruning for size control allows bushes to branch, which in turn increases the bearing area of the plant and may substantially increase yields.

If disease is evident, sanitize the pruning equipment by dipping it in a 10 percent chlorine bleach solution after each cut. If no disease is apparent, sanitize between plants. Remove pruned wood from the field. Do not prune if heavy dew or rain is predicted because the dampness can help spread diseases between plants.

Winter pruning involves removal of dead, diseased and dying canes; thinning of healthy canes; and tipping of canes being left. February is the best time for winter pruning. First, remove dead, diseased and dying canes. Second, remove canes growing the wrong way through the middle of the plant, and canes that stick out from the plant, making it too wide. Third, thin healthy canes to allow for air circulation and easy picking. Leave 6 to 10 main branches per plant. Try to keep the base of the plant narrow to make harvesting and weed control easier, but let the bearing part of the plant grow so it is not shaded. In other words, do not prune the plants into a strict "V" shape. The plants should be narrow at the bottom, but wide in the middle and on top. Fourth, tip remaining canes at a convenient picking height if this has not been done earlier.

Be sure to leave enough fat, round flower buds for production, and a few extras in case of frost.

Spring pruning may be needed to remove excess fruit in some years. Cut fruit clusters off with pruners to leave a crop that the plant can successfully ripen.

Pest Control

Bird control: It may be necessary to cover bushes with bird netting when harvest nears. Netting should be put out before the first berries begin to ripen. Reflective tapes and moving balloons also may help deter the birds.

Spraying for insects and diseases may also be necessary. Pay attention to the health of your plants daily. Scout for insects and look for diseases.

Insect pests include:

1. Plum curculio is a beetle whose larvae infest fruit.
2. Sharp-nosed leafhopper, which carries blueberry stunt disease.
3. Black army cutworm, a caterpillar that cuts petioles and fruit stalks.
4. Flea beetles, which can seriously damage foliage.
5. Bagworms are caterpillars that spin webs and feed inside.
6. Blueberry maggots are fly larvae that live inside the fruit.
7. Spotted Winged Drosophila is a fruit fly that lays eggs in maturing fruit. Larvae hatch and eat the fruit.

Diseases of blueberries include:

1. Stem canker, which may girdle branches. It is controlled by pruning.
2. Root rots, controlled by good drainage.
3. Blueberry anthracnose, controlled by planting resistant varieties.
4. *Botrytis blight*, or gray mold, partially controlled by pruning and by removal of infected material.
5. Mummy berry, controlled by removing infected material.

Winter Protection

Fully dormant blueberries can withstand Oklahoma winter temperatures. However, large row covers or similar materials may be used if spring frost threatens at budbreak and bloom and during fruit set.

Harvesting

To focus on developing the plant structure, blueberries should not be allowed to bear fruit until their third or fourth leaf. Although blueberries will flower in their second leaf, allowing them to bear fruit at this time is detrimental to the health of the plant. Plants allowed to bear fruit too early may set many fruit, but grow few leaves to support them, resulting in unpalatable berries. If the fruit is not removed, the plants may die from stress. Some cultivars of blueberries are prone to overfruiting at the expense of leaf formation.

As blueberry fruit enlarge, they begin to develop a deeper blue-black color. When the berries appear ripe, a taste test is the best indicator of when to pick. Some varieties will retain the stems on the fruit, while others do not. If the stem does not come off with the fruit, the stem scar on the fruit may be dry or wet (torn open). Dry stem scars are less susceptible to infection by fruit rots after picking than wet stem scars.

Harvest fruit in the morning and refrigerate the berries. Berries will usually remain in good condition for several days to a week with the proper humidity and storage temperature. Quickly freeze the berries by washing them, patting them dry, then placing them on a cookie sheet to freeze. When frozen, put them into a freezer bag. They will keep for months this way, especially if placed in a deep freeze.

Other Information Sources

Free publications

BAE-1511 Drip irrigation systems
PSS-2207 How to get a good soil sample
PSS-2750 Guide to effective weed control
HLA-6005 Mulching garden soils
HLA-6007 Improving garden soil fertility
HLA-6222 Home fruit planting guide
CR-6243 Weed management in small fruit crops
HLA- 6259 Small fruit fertilization and maintenance schedule
HLA-6708 Mist propagation systems and humidity chambers for the nursery and greenhouse
EPP-7450 Safe use of pesticides in the home and garden
L-220 Plant disease and insect diagnostic laboratory

Grower's Guides

http://extension.uga.edu/publications/detail.cfm?number=C946
http://mtngrv.missouristate.edu/assets/publications/B44GrowingBlueberries.pdf
Hartmann's Plantation, Inc. 1990. Northern & Southern Growers Guide. Grand Junction, Michigan.

Books

Baker, M.L., K. Patten, E.W. Neuendorff, and C.G. Lyons. (1990). Texas Blueberry Handbook: Production and Marketing. Texas Agricultural Extension Service, College Station, TX. About $15.

Childers, N. F. and Paul Eck *(2006) Blueberry Culture: Blueberries for Growers, Gardeners, and Promoters. Rutgers Univ. Press. About $56*

Galletta, G.J., and D.G. Himelrick, editors. (1990). *Small fruit crop management*. Prentice-Hall, Inc. New Jersey. About $55.

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