



Texas Fruit and Nut Production

Blueberries

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Blueberries are truly an American fruit, with several species native to North America. They are relatively easy to grow when given acid soils and the right growing climate. The best blueberry for Texas is the rabbiteye blueberry (*Vaccinium ashei*). It is grown commercially in East Texas, where the humid woodlands are typical of native rabbiteye blueberry habitat.

A single rabbiteye blueberry plant can produce 15 pounds of berries per year (Fig. 1), and the berries are easily marketed. Their popularity is growing because of the fruit's high concentration of antioxidants, which are thought to help prevent cancer and heart disease.

Rabbiteyes are an excellent choice for organic or Earth-Kind® orchards, because they have few serious pests, need little fertilization, and are native to the southeastern United States. The Earth-Kind program uses research-proven organic and traditional gardening techniques to maximize production while protecting the environment (<http://aggie-horticulture.tamu.edu/earthkind/>).

Varieties

Rabbiteye blueberry varieties differ in ripening date, productivity, and fruit size, with some bearing from dime-to nickel-size fruit.

Rabbiteyes bloom in the spring. The date that the flowers appear is affected by the number of hours below 45°F that an area receives in a year, or *chill hours*, and warming spring weather. The varieties that need the fewest chill hours typically bloom and set fruit early; they are most likely to be injured

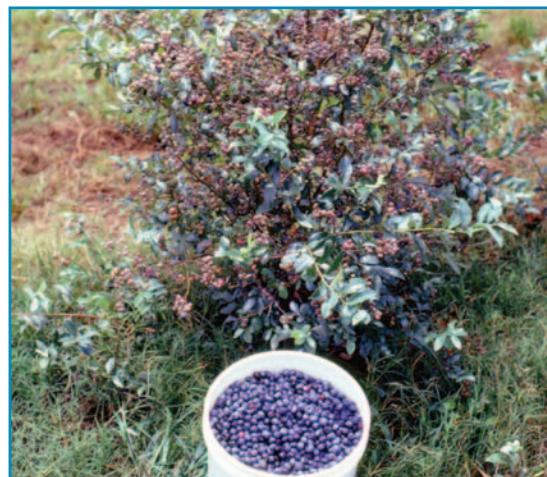


Figure 1. A mature rabbiteye blueberry bush can produce 15 pounds of berries per year. An orchard can produce 9,000 pounds per acre per year.

Table 1. Recommended rabbiteye varieties for Texas

Variety	Chill hours	Pollenizers	Harvest season	Comments
<i>Prince</i>	350	Climax, Brightwell	Mid May–early June	New variety for very early marketing; high risk of frost damage
<i>Woodard</i>	350	Climax, Premier	Mid/late May–early June	Older variety; excellent quality; softer fruit; home variety
<i>Brightwell</i>	400	Austin, Premier	Early June–early July	Partially self-fertile; blooms with 500s; fruit sensitive to wet conditions and splitting; medium–large fruit
<i>Climax</i>	450	Austin, Premier	Late May–early June	Concentrated ripening season; small–medium fruit
<i>Alapaha</i>	500	Austin, Premier	Late May–early June	Vigorous plants; medium-sized berries
<i>Austin</i>	500	Climax, Premier	June	Productive; medium–large berries; less firm than some
<i>Premier</i>	550	Austin, Alapaha	Late May–early June	Medium–large berries; young limbs are too limber to fruit heavily
<i>Vernon</i>	550	Austin, Premier, Alapaha	June	Good productivity and vigor
<i>Powderblue</i>	600	Tifblue, Brightwell	Late June– late July	Medium-sized, light blue fruit; good production
<i>Tifblue</i>	650	Brightwell, Brightblue	Late June–July	Small–medium berries are tart if not fully ripe; self-fertile
<i>Ochlockonee</i>	700	Powderblue, Brightwell	July	Very vigorous, productive plants; medium–large fruit

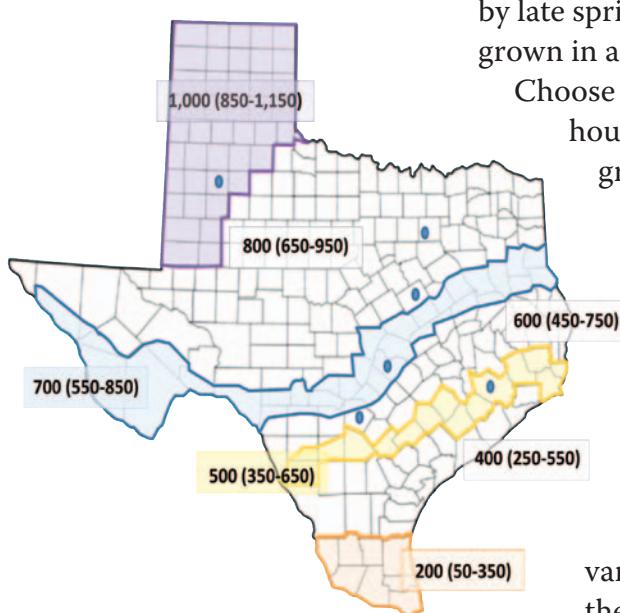


Figure 2. Chill hours for Texas counties.

by late spring frosts. Higher chill varieties may not yield well if grown in areas that do not receive enough chill hours (Fig. 2).

Choose varieties that have a chill requirement within 150 hours (above or below) of the average chilling for your growing area. Buy them from a reputable nursery.

With proper management, commercial blueberry plantings in Texas can yield from 5,000 to 9,000 pounds per acre per year. If you want a longer harvest period, plant early, mid-season, and late-ripening varieties.

Most rabbiteye blueberry varieties need a pollenizer variety planted nearby to produce the maximum amount of fruit. A few varieties, such as tifblue, are somewhat self-fruitful (Fig. 3). To ensure that each variety is pollinated, choose pollenizers that bloom in the same part of the season as the main variety being grown (Table 1).

Soil and climate

Rabbiteye blueberries are calcifuges—plants that do not tolerate alkaline soil or water. They will not thrive unless the soil pH is in the range of 4.0 to 5.5. Some growers have tried to grow rabbiteyes on alkaline soils by lowering the soil pH with acidic media or fertilizers. The plantings often fail because of the complexities of soil chemistry. Commercial growers should plant rabbiteyes on soil that has a naturally favorable pH.

To determine the pH of your soil, have a sample tested. Soil testing is available from the Texas A&M AgriLife Extension Service Soil, Water and Forage Testing Laboratory (<http://soiltesting.tamu.edu/>). For more information on soil testing, see *Testing Your Soil: How to Collect and Send Samples*, available at <https://agrilifebookstore.org>.

Blueberries may produce satisfactory yields if planted in containers or raised beds with mixtures of peat moss and pine bark. Rabbiteyes respond favorably to mulch, which prevents soil drying and moderates root temperatures.

The soil should drain well because rabbiteye roots are shallow and fibrous. Sandy soils are ideal for growing blueberries. However, drip irrigation should be provided in these soils because the plants are not drought tolerant. Do not plant blueberries on heavy clay soils that have poor internal drainage, which will cause root decline and poor vigor.

Late spring frosts can occasionally damage rabbiteye flowers. To reduce the risk of crop damage, plant on a site that is not lower than the surrounding topography. Commercial growers may also need to protect the plants with irrigation sprinklers, row cover material, or plastic-covered high tunnel greenhouses.

Spacing and planting

Most plants reach mature size in 7 to 8 years, when they will be 15 feet tall and 10 feet wide. The bush will consist of many trunks that develop from the crown (base).

Three months before planting new blueberries, use glyphosate herbicide to kill all the grass and weeds in the row, and cultivate the soil to loosen tight areas. In low, flat areas, raise the beds to direct surface water away from the plants.

Before setting out the plants, thoroughly incorporate $\frac{1}{4}$ to $\frac{1}{2}$ bushel of organic matter per plant at each planting spot. Because

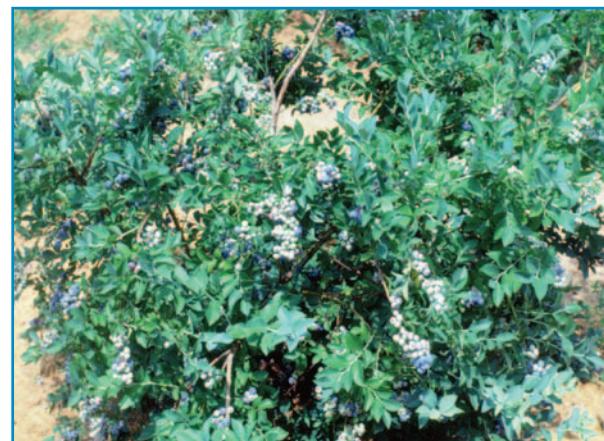


Figure 3. A 4-year-old Tifblue blueberry plant early in the ripening period.

of their acid-forming properties, shredded pine bark and peat moss are good sources of organic matter to use with blueberries.

Space the plants at least 6 feet apart in rows that are at least 12 feet apart. More space can be left between the rows of hedge-row plantings that are harvested by machine (Fig. 4).

Set bare-root or container-grown plants at the same depth at which they grew in the nursery, and water them soon after planting. Cut back the tops of bare-root plants by half while the roots are establishing. Lighter pruning may be sufficient for container-grown stock.



Figure 4. Blueberry plants should be spaced 6 feet apart in rows at least 12 feet apart.

Fertilizer and mulch

Rabbiteye blueberry plants do not produce the root hairs that are needed to take up water and nutrients. Instead, they depend entirely on a fungus that acts as root hairs for the plant. The plant provides nourishment for the fungi called mychorrhizae.

When rabbiteye blueberries are planted in an unsuitable soil or irrigated with unsuitable water, the fungi usually die, and the blueberry plant exhibits many symptoms of nutritional deficiencies.

This type of rooting deficiency cannot be corrected by adding these nutrients.

Rabbiteye blueberries are sensitive to excessive fertilizer and to some types of fertilizer. Instead of one high-dosage feeding, apply fertilizer two or three times a year at low rates. Organic and slow-release synthetic fertilizers are preferable for this reason.

Avoid fertilizers that contain nitrate forms of nitrogen, which may slow plant growth. Instead, use fertilizers with nitrogen in the form of urea or ammonium. Check the fertilizer package to determine the form of nitrogen that it contains. The most effective and most commonly used nitrogen fertilizer for blueberries in Texas is ammonium sulfate (21-0-0).

Soils can become too acidic over time if fertilized with ammonium sulfate. Urea-N fertilizers are less acidifying with repeated use.

Do not fertilize newly planted blueberry plants with nitrogen until the plants have established. If the plants are well watered and appear to be thriving, apply $\frac{1}{2}$ to 1 ounce of 21-0-0 fertilizer

per plant in the summer of the planting year. If the plants do not grow vigorously, wait until the second season to fertilize.

Beginning the second year after planting, fertilize the plants with 21-0-0 at a rate of 1 ounce per year of plant age, up to a maximum of 8 ounces per plant per year for those 8 years old or older. This rate should put the annual nitrogen application at or near 60 pounds of nitrogen per acre per year for orchards with 605 bushes per acre.

Broadcast the fertilizer evenly around the plant, avoiding concentrations of fertilizer in small areas. Good times to fertilize rabbiteyes are late winter to early budbreak (the beginning of bud growth) and early summer after harvest is complete.

Have the soil tested before planting and every third or fourth year thereafter to determine whether it needs other nutrients. Texas soils vary tremendously from site to site, and deficiencies in other macro- and micronutrients can hinder blueberry production. Regular soil testing will also track changes in pH that could reduce growth and production.

Mulch is vital for growing blueberries, especially during the first 2 years of establishment. It helps acidify the soil, control weeds, conserve soil moisture, and moderate soil temperatures. Apply a layer of mulch 4 to 6 inches deep over an area of 2 feet or more outward from the plant crown.

Appropriate mulches include peat moss, pine straw, pine bark, leaves, and grass clippings (Fig. 5). Do not use barnyard manure, which has a high salt content. Some weeds will grow through the mulch; remove them by hand or with a contact herbicide targeted to grass.



Figure 5. Pine-straw mulch in a mature rabbiteye orchard.

Irrigation

The irrigation water for blueberries must have little to no calcium bicarbonate. There are no cost-effective methods of removing calcium from water. Rabbiteye plants are also extremely sensitive to sodium.

Apply water according to the season, plant size, and soil texture. Plants bearing developing fruit are most sensitive to dry soils. The initial spring watering should be relatively light; once in full growth, give 1-year-old plants about $\frac{1}{2}$ gallon per day.

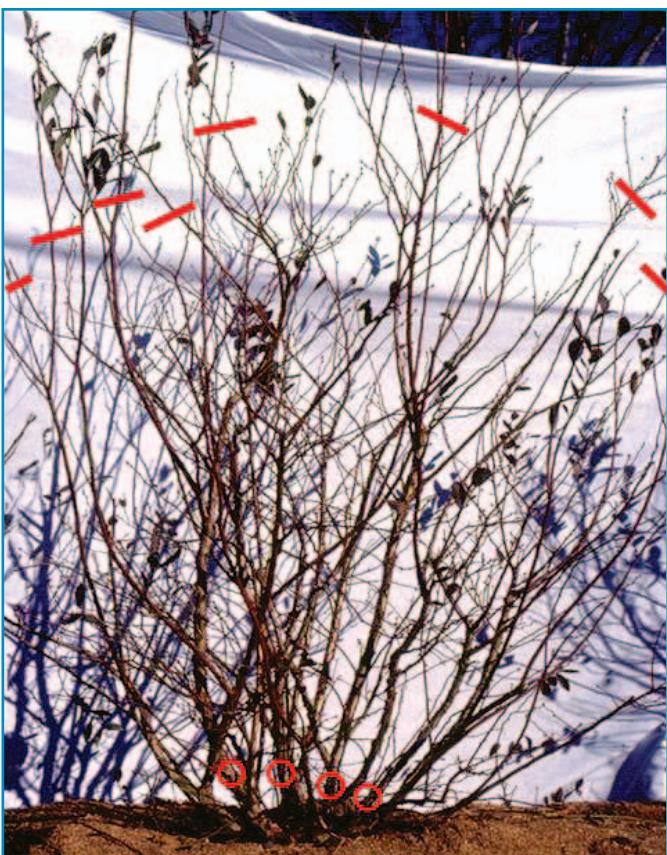


Figure 6. A dormant blueberry plant. The lines indicate where to prune to reduce height; the circles show where to make cuts to thin the number of older trunks in the plant.

A successful strategy in many areas is pick-your-own blueberry marketing.

In most Texas locations, the harvest season extends from May through July, depending on the varieties grown. Because rabbiteyes ripen unevenly within a fruiting cluster, pick individual berries over a period of 4 to 6 weeks (Fig. 7).

The berries do not ripen further after harvest; for maximum flavor and minimal bitterness, allow them to ripen on the bush.

Insect pests, diseases, and birds

The main fruit-attacking insect is the blueberry maggot. Diseases caused by fungi include mummy berry, botrytis blight, and anthracnose, or ripe rot (Table 2). Birds are a major problem in many areas, requiring special protective measures such as netting and noise makers.



Figure 7. Typical size of Climax fruit and variability of maturity stages.

Double the rate during the second year, adding a gallon per plant each year to a maximum of 5 gallons per plant per day, or 35 gallons per week. Light-textured soils (sands) hold less water and dry out more quickly; for them, irrigate more often and for shorter periods.

Pruning

Rabbiteye blueberries need occasional pruning. Head back (thin out) the lower limbs to keep the fruit from touching the soil. Also thin out any overly vigorous upright shoots several feet from the ground to keep the center of the bush open and to keep the bearing area within reach.

As the trees begin to age and form thick, gray branches, begin thinning about 20 percent of the branches at ground level every year. This thinning encourages new, productive shoots to emerge from the crown area, keeping the plant younger and smaller (Fig. 6).

Harvest

Blueberries may be harvested by hand or by machine. Most of the fruit grown in Texas is picked by hand and sold for fresh consumption.

Table 2. Insect and disease problems of rabbiteye blueberries

Problem	Photo	Symptoms	Prevention treatment	Comments
<i>Anthracnose (ripe rot)</i>		Excessive amount of rotting fruit during and after harvest; leaf spotting and defoliation	Harvest fruit promptly and move it into cold storage quickly	Sometimes infects developing leaves in warm, wet weather, and then infests more fruit in successive harvests
<i>Blueberry maggot</i>		Small larvae (worms) infest the berries, which decay and drop before or during harvest	Monitor annually with yellow sticky traps to identify when eggs are being laid on maturing fruit and to accurately time insecticide spray applications where the pest has become established	The adult is a small fly with black and white speckling
<i>Botrytis blight</i>		A powdery decay of flowers; small fruit	Apply fungicide during bloom	Spurred by cool, wet weather; frost-damaged flowers are more susceptible; damage may be hard to distinguish from frost injury
<i>Mummy berry</i>		Developing fruit is off-color and wrinkled or shriveled (mummies)	Destroy fallen fruit mummies with cultivation and copper sprays to the tree and soil surface in late winter. In orchards with serious problem, spray fungicide from when flower buds swell until petals fall; usually 1 or 2 sprays are needed	A fungal disease that infects leaf petioles, then small twigs and branches, then flower stigmas

Photos courtesy of George Philley, *Texas Plant Disease Handbook*, (mummy berry); James Theuri, University of Illinois Extension (botrytis blight and blueberry maggot adult and larva); and William Turechek, Cornell University (anthracnose).

For more information

Visit these websites for further information about growing rabbiteye blueberries:

<http://aggie-horticulture.tamu.edu>

<http://www.extension.org/blueberries>

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