W 1297A

PLANTING AND MANAGING BLUEBERRIES FOR RESIDENTIAL PRODUCTION IN TENNESSEE

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Blueberries can be an excellent crop for residential areas because they are a long-term small fruit crop that can be productive with reasonable management. However, proper selection of blueberry type and cultivar will be essential to ensure the crop is well suited to the climate (see W-895A: Selecting Blueberries for Residential Production in Tennessee). Likewise, site selection and preparation as well as plant management are crucial and can even be more important over the life of the residential blueberry planting than cultivar selection. A residential blueberry planting is a long-term investment that can thrive for many years with proper preparation, selection and care.

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Plant management		Prune in late winter/ early spring		Remove fruit buds for first 2 years		Harvest as needed year 3 and beyond						
Nutrient management			Fertilize first at bud break		Second fertilization 6 weeks after bud break		Third fertilization 12 weeks after bud break	Don't fertilize after early Aug.	Check Soil pH and amend as recommended			
Water management				Irrigate as needed to provide 1-1.5" week								
Pest management						Scout for insect pests and net to protect fruit from wildlife				Manage voles		
Growth stage	Dormant	Coming out of dormancy	Bloom, pollination and fruit set		Fruit fill and picking				Bud initiation	Going into dormancy		

Selecting Blueberries for Residential Production

The three main types of blueberries commonly grown in Tennessee are rabbiteye, northern highbush and southern highbush. The rabbiteye blueberry, native to the southeastern US, is a good type for residential production because it is slightly more adaptable in terms of soil and water conditions. Northern highbush, which is actually shorter when mature than rabbiteye, is native to northeastern areas of the US where higher chilling requirements are needed. This type bears fruit earlier in summer than rabbiteye but is more sensitive to drought or sub-optimal soil conditions and often performs best in cooler parts of Tennessee and with irrigation.

The southern highbush type are complex hybrids bred to have earliness of yield like northern highbush but have lower winter chilling requirements for shorter and warmer winters. Only the southern highbush cultivars with the longest (more than 500) chill hours should be considered for planting in Tennessee. Southern highbush blueberries require much of the same attention to pH and soil moisture management as northern highbush. A fourth minor type of blueberries on the market for residential growers are dwarf types with genetics from lowbush blueberries. Many of the dwarf or container blueberries with a compact habit and often smaller fruit size have a lowbush blueberry influence and would be expected to have lower total yields. More details about climatic requirements, pollination and specific cultivar characteristics of these three types to support gardeners in blueberry selection decisions can be found in Selecting Blueberries for Residential Production in Tennessee (W-895A).

Preparing for Residential Blueberry Production

Poor selection and/or preparation of sites are common reasons for a lack of success in residential blueberries. Blueberries require soils with pH levels between 4.5 and 5.3 because acidic soil conditions are crucial for nutrient uptake and growth. Soil sampling will be important to become aware of the soil pH and nutrient levels and obtain recommended soil amendments. Elemental sulfur is an example of a soil amendment that is used to lower soil pH, but the biological aspects of its use require time, so this product needs to be added several months to a year before planting.

Good soil drainage combined with access to moisture is critical, and productive sites often have sandy or more coarse soil with high organic matter. Blueberries don't have deep root systems or root hairs, so irrigation is often used to provide steady access to moisture.

Many Tennessee sites have soils that drain poorly due to high clay levels or compaction or higher than ideal pH levels. If amending over time is not possible or desirable, using raised beds or containers can be a great alternative. These could be more permanent raised beds or containers as well as berms that allow increased drainage and the opportunity for amendment. Growing substrates are often based on a high percentage of composted pine bark to provide good drainage. Peat moss can also be a component in the mix to increase the water holding capacity but use caution because high levels of peat can retain too much moisture.

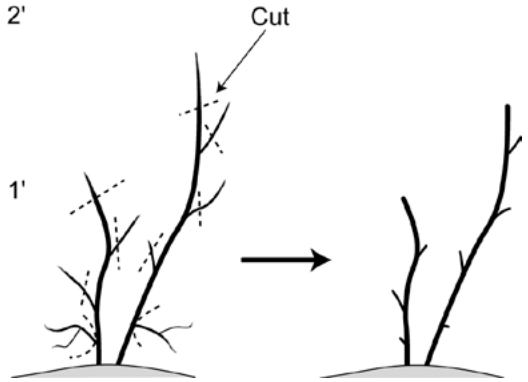

Figure 1. *At planting, remove low limbs and twig-like smaller limbs. Cut the tips out of remaining shoots to remove buds. Typically, 50-60% of the top growth is removed at planting. Image is from UGA publication C946 and used with permission.*

While blueberry plants will grow in partially shaded sites, these should be avoided for best production. Sites that face south typically warm up earlier in the spring and can encourage early blooming. This can put plants at additional risk for bloom damage from spring frosts. So, to limit spring frost risks consider more north facing locations and sites with a slight elevation to support drainage of cold air away from the plants.

Blueberry Plant Establishment

Blueberry plants can be purchased bare root or in containers. Bare root plants are typically planted dormant in the late winter or early spring. When purchasing bare root plants, order from a reputable nursery that provides vigorous and healthy plants. Two-year-old plants that are at least 12-24 inches tall are ideal selections because smaller plants can prove difficult to establish. Do not let bare root plants dry out prior to planting. Also be aware that blueberry roots are one of the few crops that are brown in color when healthy and alive. Container grown blueberries can be planted in a wider range of seasons. However, fall or early spring planting would be beneficial to encourage root growth prior to stressful summer conditions.

Rabbiteye blueberries are typically planted at an in-row spacing of 5 to 6 feet between plants, while highbush blueberries are typically planted with 4 to 5 feet between plants. Make sure to dig a hole large enough to spread out the roots. Do not add fertilizer directly to the planting hole because blueberries are salt sensitive, and roots can be easily burned. In fact, many times it is not necessary to fertilize the plants in the first year if soil was properly amended prior to planting. Also, do not amend the planting hole alone. If amendments are used, the whole planting area should be amended because pine bark or other organic materials added only to the planting hole will discourage root exploration into the surrounding soil. Trim any broken or damaged roots from bare root plants and disturb roots of container-grown plants to encourage soil exploration and prevent circling. Plant in the soil or container at the same level the plant was grown in the container and firm the soil around the roots. Be sure to water in well.

Before or just after planting, prune the plant to support upright growth. Remove any small or low growing branches as well as crossing branches or any damaged branches. It is common for one-third or one-half of the top growth to be removed in this process. Also remove any blooms or small fruit. Fruit buds are found near the tips of stems and are rounder than the slender leaf buds. Removing the blooms to prevent fruit production is practiced in the first, second and sometimes the third year after planting to encourage root and shoot growth that will support strong fruit production in subsequent years.

Blueberry Site Management - Watering and Fertilizing

Providing water is essential for good blueberry production especially in the first year or two as they become established because they have shallow roots and a lack of root hairs. Plants prefer 1 to 1.5 inches of water a week but may need more than this in raised beds and/or containers that drain rapidly and during hot summer seasons. Maintaining adequate soil moisture is critical during fruit fill but also in late summer and fall as buds are set for the next year. Good water management will support plant growth as well as fruit size and production.

Mulching blueberry plants can be an asset in terms of reducing soil moisture loss as well as reducing weed growth. Natural

Table 1. *Blueberry fertilization recommendations for rabbiteye plants (adapted from Krewer and NeSmith, UGA Extension Fruit Publication 01-1)*

Age of Plant	Plant Height	Tablespoons of fertilizer per plant per application (2 Tablespoons = 1 ounce)			Number of applications per year
		10-10-10	*12-4-8*	*21-0-0*	
2 years	2 feet	2	1.5	1	3 to 4
3 years	2.5 feet	3	2.5	1.5	3 to 4
4 years	3 feet	5	4	2	2 to 3
5 years	3.5 feet	6	5	3	2 to 3
6 years	4 feet	7	6	4	2 to 3

mulches such as pine bark or pine needles can be used at depths of 4 to 6 inches. Use caution with wood chips or hardwood mulches as they have the potential to increase soil pH as they break down. Weed control will be important because blueberries do not compete well with grasses and other weeds for water and nutrients. One option that can reduce weed competition and lower soil moisture loss is the use of a groundcover as mulch. A woven plastic groundcover can last for several years and has been proven beneficial in Tennessee trials.

Blueberry plants are native to regions with relatively low fertility soils, so it is important to not overfertilize. In many sites with adequate levels of potassium (K) and phosphorus (P), fertilization mainly consists of additions of nitrogen. Blueberry plants take up nitrogen in the form of ammonium best, so avoid nitrate fertilizers as much as possible. Ammonium sulfate (21-0-0) is useful for delivery of nitrogen without increasing soil pH. If P and K are needed, then 10-10-10 or 12-4-8 can also be used as complete fertilizers.

Applications of fertilizer should be made at bud break and then at approximately six-week intervals through the spring and early summer. Spread the fertilizer on the soil evenly around the plants and water in to lower the risk of salt burning the plant. Fertilization should not continue past the beginning of August to support the plant in reducing growth rate heading into fall dormancy.

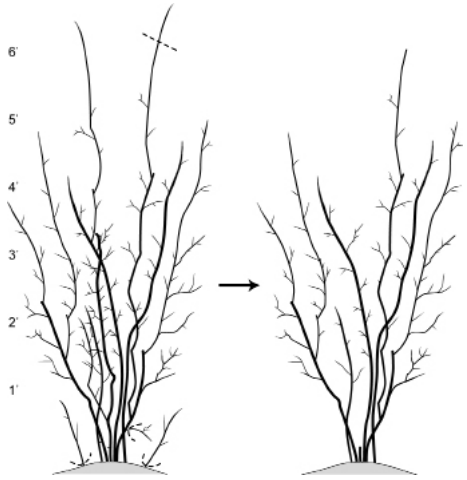

Figure 2. *For larger, mature rabbiteye blueberry bushes, cane renewal pruning is done in the late winter or early spring. One to three of the oldest canes (aim for about 20% of canes) are removed to renovate the canopy and keep younger, more productive stems. Small limbs close to the ground can be removed and canes over 6 feet or so tall can be tipped. Image is from UGA publication C946 and used with permission.*

Blueberry Plant Management- Pruning and Training

Blueberry plants consist of perennial stems that grow and then branch to produce new growth across multiple years. When the plants are young, the goal is to prune weak or low stems and select vigorous upright stems that will form a good structure from the plant. As the plant ages, the goal is to rejuvenate the plant by removing older stems to support the production of younger stems. Over time this branching method of growth results in small twiggy growth. Older, twiggy woody shoots tend to produce fewer and/or smaller fruit after a few years, so older stems are removed over time to enable new vigorous shoots to receive high levels of sunlight to promote high fruit production. It is common for many gardeners to prune infrequently or prune too lightly, which limits fruit production.

Most pruning of all types of blueberries in Tennessee takes place in late winter or early spring while the plants are dormant. In the first and second year after planting (when the plant has been in the ground for a year or two), remove weak or low stems and any fruit buds to push stem growth that is foundational for future production. Fruit buds are found at the tips of stems and are rounder than the more slender and narrow leaf buds found

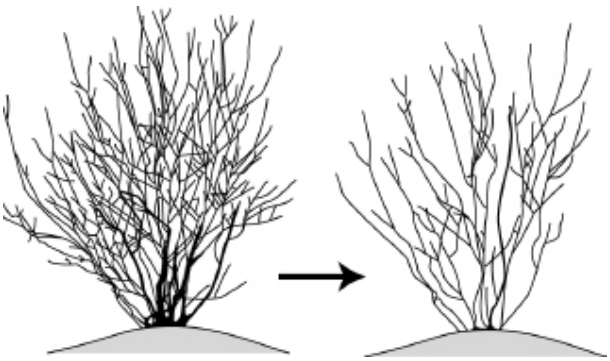

Figure 3. *For mature highbush blueberries, a similar ~20% cane cane renewal pruning is done in the late winter or early spring. Low branches are also removed and very twiggy branched growth in the top of the plant can be reduced to improve light penetration and increase berry size. Image is from UGA publication C946 and used with permission.*

lower on the stems. Removing blooms or small berries is also an option for new growers who may not be sure of the differences between leaf and fruit buds. If the plant is healthy and vigorously growing, fruit buds/berries can be left on in the third or fourth year. As the plant comes into production, the goal in pruning is to leave upright vigorous stems with good spacing to enable light to reach as many leaves as possible.

Rabbiteye blueberries are taller and more vigorous in their growth habit than highbush. Rabbiteye pruning will focus on maintaining a height that is comfortable for picking while highbush pruning will focus on removing older, weak, low growing or twiggy canes. Once a plant has come into production (around 4 to 6 years after planting), pruning becomes a process of renewal as each year one or two canes, or approximately 20 percent of the older canes, are removed to provide room for younger canes to receive sunlight and grow and produce. With this focus on yearly removal of older canes, the canopy of both highbush and rabbiteye blueberry plants will be renewed approximately every five years.

Blueberry plants can produce for 20 or more years if well cared for. Pruning is important to maintain plant health as well as fruit production. For older blueberries that have not been pruned consistently, selective removal of older (20-25) percent of canes each year will rejuvenate the bush. Another important element will be reducing the overall height of the plant (especially rabbiteyes) as needed to return it to a reasonable picking height. So, some cuts higher in the plant may be needed as well.

Blueberry Pest Management

Diseases in blueberries are not usually a concern, but highbush blueberries do have some issues with stem diseases. These are less common with rabbiteye types. Careful pruning and sanitation are important tools to reduce the impact of both stem diseases including twig blights and also fruit fungal diseases, such as mummy berry. It is good practice to remove pruned branches and fallen fruit from beneath the plants to prevent the buildup of these diseases.

Leaf feeding insects or sap sucking insects are a possibility, but the most damaging insects are those that feed on the fruit. Fruitworms can be an issue early in the summer as caterpillars feed on young berries. Additionally, spotted wing drosophila fruit fly is becoming an issue for many small fruit growers, especially for soft skinned fruit that matures in mid-summer or later. Details on managing disease and insect pests of blueberry plants can be found in UT Extension publication PB1622: Disease and Insect Control in Home Fruit Plantings.

Common issues for residential blueberries		
Cane blight While diseases are usually not a serious issue with blueberries, there are multiple pathogens that can result in cane blight. Sometimes there will be dieback from the tips of the canes but there can also be cankers on the stems or canes that are killed all the way to the ground. Careful pruning is an important step in cutting out any diseased canes or tips. Moisture stress or cold damage can increase these disease issues. Selecting cultivars with some resistance and maintaining good soil conditions (pH and adequate moisture) are some of the best practices to avoid cane issues.		University of Georgia Plant Pathology, University of Georgia, Bugwood.org
Iron Deficiency Proper pH management is crucial for blueberries, and one of the most common issues is leaf chlorosis from iron deficiency. The iron deficiency is actually caused by pH levels that are too high, (above 5.3-5.5) so reducing pH in the soil or growing area as well as monitoring soil nutrient levels are needed.		Ansel Oommen, Bugwood.org
Spotted wing Drosophila This non-native fruit fly has become one of the biggest pests of small fruits. The fruit fly larvae shown on the right developed from an egg that was deposited directly through the skin of the fruit. One of the best methods for reducing this pest issue in home blueberries is timely picking to prevent overripe and soft fruit available for the adult fruit fly to lay eggs into. There are also spray options to control adult fruit fly populations but timing is important to be sure the adults are present.		Frank Hale, University of Tennessee, Bugwood.org

Wildlife issues are often some of the most damaging issues for blueberry growers. While mulches provide many benefits to blueberries, they can attract voles, which commonly feed on blueberry roots. The benefit of mulches is typically worth the risk of vole damage, but vigilance is needed to prevent damage. Frequent, close mowing of grass between rows and around the planting may discourage voles from entering the planting because it exposes them to predators. Deer and other wildlife can damage young plants, so caging or protection may be beneficial for good establishment. Bird feeding on fruit can also be a serious issue, requiring netting or other means of protection when the plants come into production. Begin bird control practices prior to when fruit begins to turn blue so birds are excluded before they establish a feeding pattern.

Harvest

Highbush blueberries ripen in May to June while rabbiteye blueberries harvest period is typically between July to August. Fruit color is a sign of ripening but not the only indicator because berries will increase in sweetness even after turning blue. In a home planting, delay picking for a few days after blue coloration has been achieved and look for the full development of the natural waxy coating that will make the fruit appear slightly white. Ripe berries also pull away relatively easily from the stems. If well protected from birds and wildlife, blueberries can be picked every five to seven days. Be aware that when fruit is very near ripe, rain can lead to cracking in some cultivars, so picking might need to be more frequent. Also, if the spotted wing drosophila fruit fly is present, more frequent picking can reduce its negative impacts.

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