

## **SPECIALTY CROP PROFILE: BLUEBERRIES FOR THE UPPER PIEDMONT AND MOUNTAIN REGIONS - PART 1**

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### **INTRODUCTION**

As a small fruit crop, blueberries are a good fit for the diversified small farm and direct marketing operation. Interest in this nutritious and versatile berry is on the increase, as consumers discover its flavor and uses in fresh and home baking recipes. High in anti-oxidants and vitamins, blueberries also have a long post-harvest shelf life as compared to other small fruit, and freeze well for future use, and are well-received in direct market settings (Fig. 1). Additional value-added commercial uses include jams and jellies, and specialty wines.

Fig. 1. Blueberries for sale at local farmers market



Botanically, blueberries are diverse, and the commercial types represent several different species. They are members of the Vacciniaceae, a sub-family of the Ericaceae family that includes many acid soil adapted plants such as azaleas and rhododendrons. Because of unique soil requirements, blueberries are naturally adapted to well-drained, but nutritionally poor organic sands. In this country important areas of commercial production include southern New Jersey, southwest Michigan, and the Carolina coastal plains. Blueberries can be successfully grown in mineral (clay, loam mix) soils, but the crop can be a special challenge for growers out of the natural adaptation zones, which includes most of the piedmont and mountain areas of Virginia. Careful site and cultivar selection, and proper cultural practices are critical to ensure success.

As with most small fruit crops, blueberries are labor and management intensive, and require considerable initial investment, particularly in plants. A long-term crop that may be in the field for up to twenty years, blueberries require several years to establish, and first harvests will not start until the third or fourth season, with full production reached by years 6-8. On a small scale, fieldwork can be done by hand, or mechanization is available for specific tasks such as fertilizer application, mulching and spraying. During establishment, appropriate fertility, irrigation, weed, insect and disease control are critical. Development of a sound knowledge of the crop and its biology, and the pests and problems affecting it is essential for success.

For the grower that pays attention to cultural details, is patient and has access to a ready market, blueberries represent significant per acre income returns. Mature plantings may yield up to 6000 lbs/acre (or more), assuming good growing conditions and management. With the right marketing strategy and sales, gross can exceed \$5,000/acre, and net returns can be \$3,000/acre or more.

**SITE SELECTION AND PREPLANT CONSIDERATIONS**

Best sites include gentle slopes that provide both surface water and air drainage. Late spring frosts can damage blueberry blossoms, and a sloped location allows freezing, colder air to drain to lower areas. Though flowers are tolerant to mild frosts, low areas and known cold air pockets should be avoided, especially for early flowering cultivars.

In most cases, the grower has little choice in selection of soil types. Where possible, sites with significant clay content should be avoided, with ideal soils ranging from silt loam to sandy in texture. Sandy soils with low native exchange capacity (or low native fertility) with at least 2-3% organic matter are preferred. As a species, blueberries are intolerant of waterlogged soils, and internal drainage is critical regardless of soil type. Heavy soils with good internal drainage can succeed, but sites in which water stands for extended periods after rainfall should be avoided. Questionable drainage can be improved by planting on raised beds or ridges, or by tile installation.

Of equal importance to soil type is the native soil pH. Blueberries require acidic soils, with an ideal range of 4.5-5.2. Agricultural sulfur can be used to amend or drop the pH. The amount applied is dependent on how much change is needed based on a pH soil test, and the soil type (see table).

Depending on the native pH of the soil, and its buffering capacity (resistance to change), this process can take time. In many cases, it is economically unfeasible to drop pH in soils with high exchange and high base saturation (high pH) levels. In general, soils with a native pH of 6.0 or less can be amended successfully, however the closer to the ideal range, the better. Application of sulfur should be done at least a year ahead of planting, and requires thorough incorporation into the soil profile. Amounts added greater than 400lbs/acre should be split between a fall and spring application. A second soil test should be taken before planting to determine if the target pH was reached. Additional sulfur can be applied just before plants are set. Soils, depending on native pH and buffering capacity, will over time return to original equilibrium status. Thus for the life of the planting, soil pH should be monitored. Keeping the pH reaction downward after planting is accomplished by judicious use of acidifying nitrogen fertilizers and topdressing of sulfur in extreme cases.

Table 1\*. Approximate amount of sulfur (pounds/acre) to lower soil pH to 4.5

	Soil type		
Current pH	Sand	Loam	Clay
5.0	175	530	800
5.5	350	1050	1600
6.0	530	1540	2310
6.5	660	2020	3030

\* taken from Highbush Blueberry Production Guide, NRAES

Based on a soil test, pre-plant phosphorus and potassium can be broadcast and incorporated with early pH amendments. Both nutrients should be added to build to "moderate" soil levels as indicated in most soil testing formats.

Additional pre-plant activities include site weed assessment and management. The field should be surveyed for perennial weeds that will become more problematic to manage in the future. It is more economical and easier to eradicate weeds using non-selective herbicides prior to planting, than after the plants are set. In general, approved post-plant herbicides for blueberries have poor activity on established deep-rooted perennial weeds. Planting the field to a grain crop such as corn, wheat or soybeans will also help to reduce future soil insect and weed problems. Be careful using herbicides on these crops with carryover potential, such as atrazine. A cover crop, such as rye, vetch or buckwheat can help to build soil tilth. Cover crops should be plowed down at least 3-4 weeks prior to planting to allow for decomposition.

Two final considerations for site selection include proximity to water source for irrigation, or the capacity to develop irrigation, such as drilling a well or digging a pond. Ease of access for pick your own (PYO) customers is also a key concern if you plan to market in this fashion. The site location should be easily accessible, with an ample parking area near the field.

#### **FIELD LAYOUT AND FINAL PREPARATION**

Following cultivation of the site, raised ridges 4-6 in. high and 4 ft. wide should be formed. Ideally rows should be oriented north and south for maximum light exposure. In some poorly drained sites, perpendicular arrangement of rows across slopes may result in pooling of water, and rows should be aligned with the slope. Row spacings of 10-14 feet on center should be made to accommodate equipment and allow for mature plant size. Rows should break every 200 feet with a drive row or cross-walk for U-pick customer convenience.

When available, pre-plant supplemental organic matter additions should be made, either as a directed application over the row and incorporated with a tiller, or in the planting hole as plants are set. Sphagnum peat moss, well-decayed sawdust or bark mulch are good choices. Peat used directly in the planting hole should be well wetted, or it may cause future moisture stress in the root zone.

Blueberry cultivars vary in flowering dates and maturity period. Similar maturity cultivars should be planted together for best cross-pollination, in alternating blocks of 2-4 rows each. Blocking of cultivars by maturity period also keeps the harvest progressing in an orderly fashion, and makes direction of customers an easier task.

#### **PLANT AND CULTIVAR SELECTION**

For the piedmont and mountain regions, northern highbush blueberry is the species of choice. The southern highbush types are more adapted to lower and mid elevation piedmont and coastal regions. They are a more soil adaptable, faster growing and quicker producing alternative to the northern highbush blueberries. They are also more heat and drought tolerant due to their native and rabbiteye genetics. As a negative, they tend to break bud and mature early, and are less cold hardy. Southern highbush performance is not well documented in the state, and growers should proceed on a trial only basis. But by all indications, they may be the blueberry of choice for many Virginia piedmont microclimates. Southern highbush should not be confused with rabbiteye blueberries, which are best adapted to the lower piedmont and coastal plains regions of the state, and should not be planted in the upper piedmont and mountains.

Cultivar selection and locating a reputable nursery source is an important pre-plant task that should begin during the preparation year. Time spent adequately researching the characteristics of cultivars will pay off in the future. Plant growth and fruiting habits, fruit size, maturity period, flavor and disease resistance are important varietal characters to assess. Blueberry plants are sold as either bare-root or containerized stock, with two-year old plants most common. Depending on the planting date, orders should be booked in advance. Planting of bare-root stock should be scheduled as early as possible in the spring (Feb-March), while containerized plants can be set in the fall (Sept-Oct.), in all but the coldest elevational regions. Most smaller growers opt for more expensive containerized plants which offer increased survival and earlier production.

Information about cultivars is available from a number of sources, and your local VCE agent may have information about local experiences. You can also gain insight by visiting with other growers and nurserymen, as well as reviewing extension publications. An excellent regional guide is "Highbush Blueberry Production Guide", NRAES-55, which can be ordered through Virginia Cooperative Extension.

Top cultivar suggestions include:

<b>Maturity</b>	<b>Northern Highbush</b>	<b>Southern Highbush</b>
<b>Early</b>	Collins, Duke, Earliblue	O'Neal, Reveille, Cape Fear
<b>Mid</b>	Bluecrop, Blueray	Blueridge
<b>Late</b>	Jersey, Herbert	-----

Next time: Planting, care, harvest and marketing.

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