

Specialty Crop Profile: Blueberries for the Upper Piedmont and Mountain Regions - Part 2

Anthony Bratsch, Extension Specialist, Virginia Tech

PLANTING

Planting of bare-root stock should be scheduled as early as possible in the spring (Feb-March) when the danger of severe frost has passed. Containerized plants can be set in the fall (Sept-Oct.), in all but the coldest elevation regions. Fall planting has the advantage of earlier spring growth and root development through the winter. Spring plantings are often delayed by wet conditions.

Spacing: Highbush types should be set 4-5' apart in the row. Highbush cultivars can vary considerably in mature size, and less compact plants should be provided a wider spacing. Allow slightly more room for southern highbush with a 6' in-row spacing.

Plants should be set at the same depth as they were growing in the nursery, in holes at least twice the diameter of the root ball. Holes can be dug by hand, with an auger, or a furrow can be made down the center of the row. As previously noted, moist peat should be mixed with the soil and used for backfill, using about one pound per plant. A peat band can also be used below the plants, but avoid planting into pure organic matter.

During the planting operation, keep roots moist, especially bare-root stock. Containerized plants should be well-watered prior to setting them out. Irrigation after field setting is critical to success.

Following planting, mulch the row centers with 4-6 inches of sawdust or other organic material. This will help to conserve soil moisture, control weeds, and for fall plantings, helps to reduce the effects of winter frost heaving.

In general bare root plants should have 1/3 to 2/3 of the branches removed to balance top growth with the roots. Leave 1 to 3 strong canes per plant, heading back these canes 50% to a strong bud. Containerized plants need only weak and twiggy growth removed, along with moderate heading cuts. Any flower buds (round/plump) should be rubbed or clipped off. Early fruiting is stressful to young plants, and flower buds should be kept off for the first two years after planting.

Row middles should be seeded with a permanent sod as soon as the planting operation is completed. This facilitates equipment access, and decreases the invasion of weeds into the planting. For most locations, turf-type fescues, perennial rye or orchard grass are good choices.

MULCHING

It has been shown in various studies that mulching, even under irrigated conditions, results in larger plants and 2-4x yields over time as compared to non-mulched plants. The primary benefit of mulching is moderation of soil moisture loss and more uniformly moist soils, but also soil temperatures are kept cooler during summer and warmer during the winter, and can keep soils from freezing.

Mulching does result in delayed spring growth and a later crop as compared to no mulching because of delayed spring warm-up. Mulching is not a replacement for irrigation, which will be needed under drought conditions. Mulching should be used with discretion in poorly drained or heavy soils, and in consistently wet sites, characteristic to some mountain regions.

Almost any organic material will function as a suitable mulch. Sawdust has been shown to be a material of choice and is sometimes mixed with hardwood chips to decrease crusting. Pine bark has the advantage of a lower pH than hardwood chips (3.5-4.5 vs. >5.0). A heavy layer of rotted leaves will also work, and is preferable to wheat straw. Fabric mats have the advantage of better weed control, but they increase soil temperatures and do not supply needed organic matter over time as would an organic mulch.

Mulch should be applied every 2-3 years, at a depth of 6 inches. A "once mulched always mulched" policy should be used for the life of the planting. Older plantings losing mulch cover will experience root damage more readily than non-mulched plantings due to a more shallow root system and exposure.

Mulching adds to the expense of growing blueberries for materials and time to spread, and also by increased fertilizer costs. Mulches decay at the point of soil contact through microbe activity, which utilize nitrogen for the process of carbon breakdown. To get enough nitrogen fertilizer through this soil / mulch interface, rates are adjusted to compensate, often by 2-3x, depending on the state of decay of the mulch.

IRRIGATION

Supplemental irrigation for blueberries is considered essential for most areas. Crop water use is significant: 4-6 gal/day/plant or 1 acre inch/week for mature planting, 2 inches with a full crop load. Blueberries thrive under constant, yet moderate soil moisture. Blueberry rootlets though fine in diameter, are less efficient as compared to other plants because of a lack of root hairs to absorb water and nutrients. While avoidance of droughty conditions and fluctuations is important, it is equally a concern to avoid excess irrigation to reduce root-rot. Soil moisture monitoring is essential to determine true moisture status. A tensiometer or other moisture evaluation tool is a minimal investment to ensure an adequate balance is maintained.

Drip irrigation is a preferable method to overhead irrigation due to increased efficiency and delivery where needed; it also allows concurrent field work activity, and reduces foliar disease incidence. However if the site is frost prone, then overhead should be installed to provide frost protection and supplement moisture. Micro-emitter systems are better than point-source drip systems because they wet a larger surface area, though over-wetting of the crown area should be avoided with this system.

FERTILIZATION

Considerations for blueberry fertilization integrate several factors: age of plants, soil pH / N source, use of and age of mulch and water applied.

Age of plants: Nitrogen (N) application levels are gradually increased each year from planting until a maximum is reached. A general rule of thumb is to apply 20lbs N/acre in the first year, and increase 20 lbs/year until 80-120lbs/acre is applied annually (4-6th years). The final amount is site and growth dependent, however 80lbs is considered a minimum rate on most soils. In the year of planting, wait at least one month before making the first application of 10lbs/N/acre. Then apply 2 more increments of 5lbs each at 6 week intervals. For older plantings the total should be split between an early spring application before bud break, and again 6-8 weeks later. If growth is slow, an additional split may be helpful, but fertilizer should never be applied after July 1. Materials can be applied on a per-plant basis, or banded or broadcast over the row.

Soil pH / N source. Nitrogen fertilizer is available in several forms. Blueberries have been shown to primarily utilize the ammonium (NH₄⁺) versus nitrate (NO₃⁻) form. The latter is absorbed, but not to the extent of ammonium. One fertilizer that is recommended for blueberries is ammonium sulfate (21%N), which serves two purposes. It is in a form most utilized by the plant, and the sulfate component helps to maintain a low (acidifying) pH. When pH is 5.0 or below, other types of nitrogen can be used such as urea (46%N, also released as ammonium), or a complete fertilizer such as 10-10-10. Soil pH should be regularly monitored at least every two years.

Elemental sulfur can be surfaced applied post-planting if significant pH change is needed. Plants exhibiting high pH sensitivity will have chlorotic leaves which are greenish yellow with dark green veins. This is a sign of poor iron uptake, and it can be corrected by an iron foliar spray and taking long-term steps to lower soil pH.

Use of mulch: The above rates are determined by site conditions and plant growth response under specific conditions. For mature bushes, 6-12" of new growth is adequate, while general leaf yellowing and poor shoot growth is a sign of N deficiency. New applications of fresh mulch, or materials worked into the soil may lead to N deficiency, and supplemental N should be added. Older and thinner mulches do not tie-up as much N, and the total annual rates may be decreased by 1/3 to 1/2 of the above rates (40-60lbs), provided growth is maintained.

Water applied: Soil moisture levels influence N release to plants; too little or too much water can reduce growth. Wet springs and over-irrigating can lead to leaching of fertilizers, but also to increased nitrogen in soil solution and for plant uptake when application rates are high or not split over time. Thus water helps to make nitrogen available, but it also can be a factor for its loss below the root zone. Drought conditions restrict soil release of nitrogen, and excess nitrogen application may cause damage to roots if not dissolved and leached by rainfall or irrigation.

PRUNING

Unlike many fruit crops such as grapes or peaches, failure to annually prune blueberries does not lead to immediate crop failure. However mature bushes will respond to proper pruning with much higher yields and larger fruit sizes. Pruning should be done during the dormant season, with late winter preferable.

After planting, pruning for the next year should consist of removal of weak, damaged or diseased wood and flower buds. The third year, flower buds may be left on the most vigorous shoots. By the fourth season a light crop may be harvested, but flower buds should be thinned to prevent over-fruiting and bending of the shoots. By the 5th to 6th year and later, annual pruning will involve:

1. Pruning small, twiggy growth at the base of the plant and removing dead wood.
2. Removal of older canes at ground level: one cane should be taken out for every 6 present. This is the most important step in mature blueberry planting. It will help to stimulate new shoots and keep the bush productive.
3. Tall new shoots should be headed back to encourage branch development at a lower level and this helps to control bush height
4. Thin the dense growth in the upper part of the canopy by removing crossing and twiggy branches by as much as 50%. This is time consuming, but such "detail" pruning can increase fruit size significantly.

Failure to prune will result in a gradual decline in plant vigor and small fruit size. In the above pruning regime, the canes will be renewed every six years, an age in which individual shoot productivity declines.

HARVEST

Well managed, mature highbush plants can yield up to 10 lbs/plant. Depending on cultivar, weather, and to some extent the level of detailed pruning done, harvest spread can be over a number of weeks. Fruit will hold well on the plant through varying degrees of maturity. Best quality is reached if picking is conducted every 5-7 days, after the first ripe fruit develop. Southern highbush, like their rabbiteye parents may maximize flavor with 7-8 days allowed between pickings.

Berries should be picked into small buckets or shallow trays, and should not be placed more than 4-5 inches deep in a container. Though considerably firmer than other small fruit, over-ripe and soft berries can detract from the pack when they are crushed.

Blueberries keep well, and pre-picked fruit can store 7-10 days or more under cold storage conditions, and several days in a cool, open market setting.

MARKETING

The primary market for small scale blueberry producers is consumers from surrounding communities. Fruit is direct marketed, and usually sold as pre-picked product, on the farm, or to restaurants and local stores. Most commonly blueberries are sold as a Pick-Your-Own (PYO) commodity. In comparison to strawberries, PYO blueberry markets are less saturated and tend to attract older clientele who do not have to stoop to pick fruit. Usually PYO fruit is sold at 15-25% less than pre-picked fruit. Fruit sold by weight (usually pounds/ounces) must be weighed with state inspected scales (Virginia Dept. of Agriculture and Consumer Services). Sales by volume (i.e. pints, quarts) do not need this oversight.

The successful PYO marketer must be a savvy entrepreneur who must plan ahead, order supplies, train workers, handle harvest logistics such as customer parking and flow, be people oriented and develop a successful advertising program. One must have a feel for the potential PYO trade area, who are the competitors, and what is the best advertising media/approach. In general it requires about 450 customers to harvest one acre (~6,000 pounds) of blueberries.

Adequate insurance coverage is also necessary. Often normal farm insurance plans may not be sufficient for PYO, and the policy should provide for both customer and product liability.

PREDATION CONTROL

Bird predation is the biggest problem faced by blueberry growers. Without protection, losses can exceed 75% of the crop in smaller plantings. Scare devices and exclusion by netting are the most common means to reduce these losses. Netting (1 inch mesh) is usually draped over the rows or supported on a framework. This will eliminate most of the damage, though birds such as ground traversing robins often come through the open bottom. Newer scare devices which emit bird distress calls have provided some degree of protection. Loud propane canons and stationary scare balloons lose their effectiveness over time.

Deer may be a problem on some isolated plantings, though this damage is usually confined to winter twig browsing and not fruit feeding. Fencing and/or trained dogs are effective deterrents.

WEED, INSECT AND DISEASE CONTROL

Weeds compete for water, nutrients and in new plantings for space and light with young plants. In well-mulched plantings, weed problems will be minimal, but can increase over time as the mulch degrades and weed seeds migrate in. Hand pulling or spot spraying with a contact herbicide is generally sufficient. Row middles should be kept mowed to reduce grass invasion and seed drop into the mulched strip. A number of pre-emergent herbicides are available for use in blueberries, which can be applied to the mulch surface to prevent weed seed germination. Label directions should be followed carefully to avoid damage to plants. Cultivation for weed removal should always be shallow to avoid damaging roots.

Insect and disease problems in blueberries are limited but present in Virginia. Maintenance of adequate cultural conditions and healthy plants helps to prevent problems from arising. Growers should be aware of the potential pest problems, and gain an understanding of their biology and life cycles to better target control measures. A number of excellent insecticides and fungicides are available for use on blueberries. Each material has specific one-time and seasonal application rates, re-entry and pre-harvest intervals to consider.

Blueberries have potential as an organically grown fruit, and can often be grown with limited insecticide and fungicide inputs. A number of organically approved spray materials are available, and manure and other organic fertilizers can be substituted for chemical fertilizers.

For a summary of available pesticide materials for blueberries, consult the "Forestry and Horticultural Crops Pest Management Guide" (VCE Pub #456-0147).