Highbush Blueberries - Planting, Early Care, and Nutrition

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Commercial blueberry plantings are most successfully established when careful attention is paid to site selection and preparation, planting, early care and nutrition.

Planting

Where - By way of review, highbush blueberry sites should be those that offer full sun, excellent air and soil drainage, proper soil pH (optimum 4.5 to 5.0, range 3.8 to 5.5), soil organic matter content of 3% or higher, and soil calcium content of less than 2,000 lb./A.
Selected sites should be well-prepared in terms of pre-plant weed management, pH modification and soil amendment prior to planting. Amendments should be incorporated to a soil depth of 8".

When - Planting may be done in early spring as soon as soil can be worked, and after danger of severe freeze/frost damage is past. Alternatively, plants may be established in fall on lighter soils with good drainage, provided plants are mulched after planting. Fall planting may be problematic however, on soils prone to frost heaving.

How – The blueberry root system is a shallow dense mat, thus planting holes should be wider than deep! Bare root plants should be set so the root/shoot juncture is at or slightly below (0.5") the soil surface. Make a slight mound of soil in the center of the planting hole. Set plant on top, spreading roots out in all directions. Soil should be firmed over the roots to prevent desiccation/exposure.
Containerized plants should be set with the root ball mass slightly below the soil surface level (0.5"). Loosen roots from root ball gently, spreading them in all directions. If plants are root bound, cut 4 upward slits in root ball base with sharp knife, then gently spread root ball out in 4 directions. Note: Failure to do this with pot bound plants may result in plant death in subsequent years when above ground foliage can no longer be sustained by a root mass that has not grown out beyond the original root mass. These plants may collapse and die under water stress conditions. Be sure the root ball surface is well-covered to prevent potting medium from being exposed/drying out.
Replace half the original soil excavated with supplemental organic matter when backfilling the planting hole. Alternatively, supplemental organic matter may be incorporated into the top 6 to 8 inches of soil prior to planting (i.e. a 2" layer of sawdust). Supplemental organic matter improves soil moisture, nutrient holding capacity and soil texture as well as facilitating root penetration. Organic material options include peat moss, composted sawdust, cranberry leaves, and wood chips. Mushroom compost should be avoided as it is not pH compatible with blueberries (very alkaline). Peat moss should be incorporated at the rate of 1 gallon *well-moistened* peat per plant. Peat bales are purchased dry to avoid excessive weight. They should be placed at regular intervals between planting rows in the field prior to planting. Slit the tops and saturate bales with water several days before planting.
Soil should be firmed around the plant to maximize root-soil contact. Plants should be irrigated immediately with 1" water to further settle soil around roots and prevent desiccation.

Early Care

Irrigation - Plants should leaf out and show a second flush of growth approx. 2 weeks after planting. At this point it is important to remember blueberries have the bulk of their root systems in top 18"of soil and are subject to drought stress. They require 1.0" to 1.5" water per week in form of precipitation or irrigation. The quality of irrigation water provided is also important. It should both low in total dissolved solids (<0.1%) and pH (<6.0).

Weed Management – Manage weeds to reduce competition for nutrients and water during the establishment period. In-row weed management is especially critical at this stage. Keep a 3 ft. area around young plants weed free through the summer. This may be accomplished using various methods: a mulched strip, hand weeding, herbicides. A mulched strip should be 4 feet in width. A layer of landscape fabric or water penetrable weed barrier may be applied under the mulch. Cover the 4 ft strip with 3 to 5" of mulch such as wood chips, bark, sawdust, straw, or chopped corn stalks. Between-row weed management techniques include frequent shallow mechanical cultivation, mulch, or row middle cover crops. Remember if cultivation is used to manage between row weeds that care must be taken to avoid any disruption of the root zone. Row middle cover crops are another option for between row weed management (Table1). Research at the Pennsylvania State University indicates hard fescues are an excellent choice for this purpose. They perform extremely well as permanent sod covers as they are slow growing (= less mowing), relatively non-competitive (non-spreading), and tough enough to withstand traffic. Hard fescues are best established in fall vs. spring.

Table 1: Characteristics of Row Middle Cover Crops

Cover Crop	Water Use	Establish-ment	Vigor	Dura-bility[a]	Seeding rate (lb/A)	Seeding time (month)	Requirements[d] N-P-K lbs/A & pH
Creeping red fescue	M[c]	VG[b]	L[c]	VG[b]	70	Apr-May or Aug-Sept	60-80-40 & 6-7
Chewing fescues	M	G	L	VG	75	Apr-May or Aug-Sept	60-80-40 & 6-7
Hard fescues*	M	F	L	E	80	Apr-May or Aug-Sept	60-80-40 & 6-7
White (ladino) clover	H	F	M	F	15	Apr-May	10-80-60 & 6-7
Tall fescue	MH	G	H	E	75	Apr-May or Aug-Sept	50-60-40 & 5-7
Sudangrass hybrids	H	VG	VH	P	80	June-Aug	80-40-40 & 5-7
Kentucky bluegrass	M	G	M	G	75	Apr-May or Aug-Sept	60-80-40 & 6-7
Perennial ryegrass	M	G	M	G	85	Apr-May or Aug-Sept	60-80-40 & 6-7
Annual ryegrass	M	G	M	P	60	Apr-May or Aug-Sept	60-80-40 & 6-7
Rye (*S. cereale*)	H	VG	H	P	110	May-Sept	30-60-30 & 5-7
Buckwheat	H	VG	H	P	75	May-Aug	30-40-30 & 5-7
Oats	H	VG	H	P	100	April or Aug	30-60-30 & 6-7

[a] tolerance to foot traffic or equipment operations [b] E = excellent; VG = very good; G = good; F = fair; P = poor. [c] VH = very high; H = high; MH = moderately high; M = moderate; L = low. [d] Nutrient requirements may be met by some soils without amendments. Consult soil test before applying fertilizers. Avoid balanced fertilizers high in chloride. *(Source: Mid-Atlantic Berry Guide for Commercial Growers 2010-2011)*

De-flowering - Gently rub off flower buds on newly set plants as they appear. This may be done by closing the palms of your hands over the flower clusters and gently rubbing them together. This practice will keep plants vegetative during the first season after planting to hasten establishment. This practice may be continued into year 2 if necessary for good establishment.

Nutrition

Pre-plant soil analysis and soil amendment based on test results is critical to successful blueberry planting establishment. Blueberry nutrition does not stop there however.

pH adjustment - If soil pH is under adjustment monitor pH semi-annually using a field pH test kit (DIY, $10). Collect 10 or more separate top soil samples (to 8" depth) at various locations across the planting for a better understanding of the soil acidification process underway: Apply 200 lb/A sulfur spring and fall until the desired pH is reached.

Soil analysis after planting- Periodic soil testing (every 2 to 3 years or as needed) is advisable for blueberry plantings. These tests estimate the available phosphorus, potassium, calcium and magnesium in soil. Soil test results and pH are used in conjunction with leaf analysis to check for possible deficiencies or excesses and develop the best fertilization strategy for the planting.

Leaf analysis – Annual leaf analysis is recommended for optimizing blueberry plant nutrition. It's a means of accurately identifying nutritional problems difficult to diagnose by soil testing or observation of bush appearance (plants can be deficient without showing visible symptoms in the field). Leaf analysis helps identify and correct potential nutrient deficiencies before growth and/or yield is impacted by providing estimates of nitrogen availability along with other macro and micro nutrient content in leaves.

The recommended procedure for leaf analysis is as follows: Collect 1 leaf sample per every 10 acres of planting. Each sample should be composed of 30 to 50 leaves collected from different bushes in sampling area. Collect middle leaves on current season shoots just before or during harvest. Leaves from different varieties or the same varieties on different soil types should not be combined; do not combine leaves from plants of different ages. Avoid including leaves from abnormal, weak or unhealthy plants; these should be sampled and analyzed separately.
Wash leaves by swirling in dilute detergent solution for several seconds then rinse with distilled water. Air dry leaves completely on a table top or counter. Pack dried leaves in brown paper bags for shipping to the lab for analysis.

Plantings with results below a deficiency level are likely to respond to nutrient applications. Those with results slightly below the sufficient range would not be expected to respond to nutrient applications but should continue to be monitored (Table 2). Results showing one or more of the deficiencies boron, copper, iron, manganese and/or zinc may indicate problems with soil pH. For information on fertilizer sources of major nutrients and suggested micronutrient

sources see Chapter 11 - Nutrient Management in: *NRAES-55 Highbush Blueberry Production Guide.*

Table 2: Deficient, sufficient, and excessive nutrient concentrations in blueberry leaves.

Nutrient		Deficient below	Sufficient	Excessive above
N	(%)*	1.70	1.7 – 2.1	2.3
P	(%)	0.08	0.1 – 0.4	0.6
K	(%)	0.35	0.4 – 0.65	0.9
Ca	(%)	0.13	0.3 – 0.8	1.0
Mg	(%)	0.10	0.15 – 0.3	0.4
S	(%)	--	0.12 – 0.2	--
B	(ppm)*	20	30 – 70	200
Cu	(ppm)	5	5 – 70	--
Fe	(ppm)	60	60 – 200	400
Mn	(ppm)	25	50 – 350	450
Zn	(ppm)	8	8 - 30	80

*(%) = percent dry weight of blueberry leaf; (ppm) = parts per million. (*Source: NRAES-55 Highbush Blueberry Production Guide*)

Blueberry plantings generally need nitrogen applications on an annual basis. Unlike other plants, blueberries are sensitive to applications of nitrate nitrogen forms (No 10-10-10!). The ammonium form of nitrogen such as ammonium sulfate, ammonium nitrate, urea or other organic sources are preferable. If soil pH is not under adjustment, urea is the recommended ammonium nitrogen form for blueberries. It is high in nitrogen (46%) and generally less expensive per unit N. It also provides some control of mummyberry disease when applied in spring. Urea should be applied during cool, wet weather or immediately be followed by irrigation to reduce loss due to volatilization. If pH is still under adjustment, ammonium sulfate is the best choice as it provides some added measure of soil acidification.

Table 3: Recommended annual rates of nitrogen (lb/A) in typical Northeastern or Midwestern blueberry plantings.

Planting Age (years)	Actual Nitrogen (lb/A)	Urea (lb/A)	Ammonium Sulfate (lb/A)
Planting year	--	--	--
2	15	35	75
3	20	45	95
4	27	60	130
5	35	80	170
6	45	100	215
7	55	120	260
8	65	145	310

(*Source: NRAES-55 Highbush Blueberry Production Guide*)