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# AGRICULTURAL ALTERNATIVES

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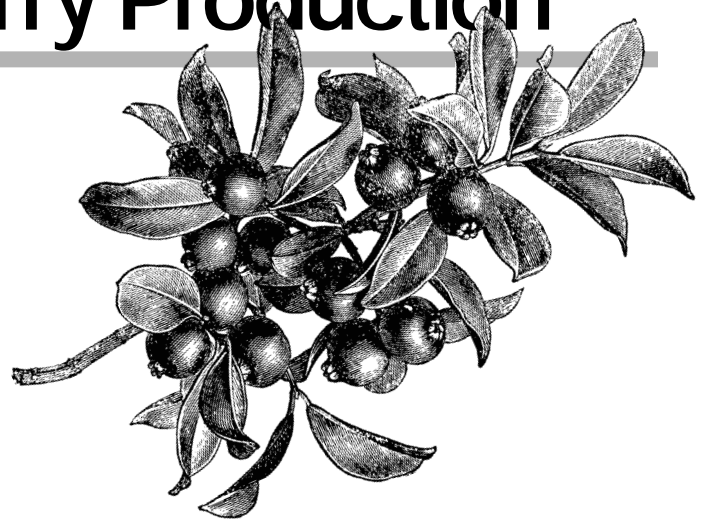
## Highbush Blueberry Production

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Blueberries are well suited for small-scale and part-time farm operations. The initial investment is large, primarily because of the cost of preparing the land, establishing plants, and installing an irrigation system. However, little equipment is needed for small plantings, and healthy, well-tended plants can be expected to bear fruit for 50 years or more. Demand for blueberries has increased in recent years, and fresh-market prices have been relatively stable. However, blueberry production is not for everyone due to the specialized cultivation requirements of the plants and the relatively short shelf life of the fruit.

Three species of blueberries are native to North America: highbush (used in commercial plantings in cooler climates), lowbush (wild fruit harvested commercially in New England), and rabbiteye (used in commercial plantings in the southern United States). To meet growing consumer demand, commercial blueberry acreage increased more than 60 percent in the past 15 years. Production has more than doubled since the late 1970s. Major increases have occurred in Michigan (where more than 40 percent of the commercial acreage is located) and in the southeastern United States. Although about 90 percent of the commercial acreage is located in the United States, sizable plantings are also located in Australia, New Zealand, Germany, Romania, Holland, and Poland.

The United States produces 150 to 200 million pounds of blueberries annually, with most of this production coming from highbush or rabbiteye plantings. Nearly one-half of the total blueberry crop is consumed fresh, but most lowbush blueberries are processed due to their small



size. Maine is the leader in lowbush production and Georgia is the leader in rabbiteye production. The top three highbush blueberry states are Michigan, New Jersey, and North Carolina. This publication focuses on highbush blueberry production.

### Marketing

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Fresh-market blueberries usually are sold in plastic half-pint and pint containers covered with lids. Six basic marketing options are available to the blueberry grower: wholesale markets, marketing cooperatives, local retail markets (grocery stores), roadside stands, pick-your-own operations, and processors.

With the wholesale option, either you or a shipper takes your crop to the market. Shippers generally sell and transport the blueberries for a predetermined price. This marketing alternative has the greatest price fluctuations. Marketing cooperatives generally use a daily pooled cost and price, which spreads price fluctuations over all participating producers. To sell directly to local retailers, you need to contact produce managers and provide consistent quality

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when the stores demand the berries. Roadside stands (either your own or another grower's) and pick-your-own operations provide an opportunity for you to receive higher-than-wholesale prices for your fruit. However, you may have significant expenses for advertising, building and maintaining a facility, and employing someone to serve your customers. In a pick-your-own operation, you save harvest costs, but you must be willing to accept some waste.

Depending on your location, you may be able to sell your crop to a processor who is willing to contract with a small grower, but processing prices are much more volatile than fresh-market prices. For more information on marketing, consult *Agricultural Alternatives: Fruit and Vegetable Marketing for Small-scale and Part-time Growers*.

Because of increasing demand, wholesale prices for fresh-market blueberries have been relatively stable, ranging from \$0.80 to \$1.20 per pound, generally about half of the retail price. Demand for processing blueberries also has been strong, but prices in this market fluctuate more than fresh-market prices. This is because the price of processing blueberries depends on the size of the wild lowbush blueberry crop, almost all of which is processed. Depending on the grower's location, processing prices have varied in recent years from less than \$0.25 per pound to as much as \$0.85 per pound.

At the present time, U.S. No. 1 (fruit of good average quality) is the only federally recognized blueberry grade. Federal inspectors check the berries primarily to determine the amount of diseased, soft, or leaky fruit. Fruit marketing cooperatives often have additional criteria to judge berry quality, including flavor, ripeness, odor, and the presence of insects, foreign material, and stems.

## Production Considerations

It is often assumed that blueberries are easy to cultivate because they grow wild in poor soil or in swampy areas. Given the right soil conditions, this is true. However, most of Pennsylvania's soils are not naturally suitable for blueberry production. Highbush blueberries evolved in low pH soils that were poor in nutrients and rich in organic matter. The plants adapted specifically to these soil conditions. While natural populations are often seen in swampy areas, blueberry plants are always found on a small, dry mound in the swamp with the root system above water. As with other small fruits, blueberries require well-drained soils in full sun.

The blueberry plant is a woody shrub with canes originating from the crown. The root system is shallow compared to the size of the plant. Highbush blueberries are usually 4 to 8 feet tall at maturity, but their root system rarely extends deeper than 24 inches. Irrigation is desirable to water the plants and provide frost protection, particularly in low areas. Trickle irrigation is most commonly used because it adds water to the root zone with little loss to the atmosphere and without wetting the fruit. However, plants requiring frost protection need overhead irrigation.

Blueberries require a soil pH of 4.5 to 5.0. If the native pH of your soil is above 6.2, do not consider blueberries for commercial production. If the pH is 6.2 or below, the soil pH can be lowered by adding sulfur. In mineral (clay) soils, adding organic matter in the planting hole as well as using organic mulch is necessary. Growers most often use rotted sawdust, although peat moss or other forms of composted organic matter are suitable. Mushroom compost or other high pH mulches and soil amendments should not be used.

To help control weeds, grow cover crops, such as rye or sudangrass, for at least one year before planting blueberries. Adding organic matter by plowing under cover crops is particularly beneficial to blueberries, which produce best in soils with high organic matter.

Growers usually plant blueberries 5 feet apart in rows spaced 8 to 12 feet apart. Use either potted or dormant plants purchased from a reputable nursery. Dormant shrubs should be planted in early spring, around April, but foliated, potted shrubs should not be planted until after the danger of frost has passed.

Apply a mulch of rotted sawdust or another nonalkaline organic mulch to a depth of 4 inches or more at planting, and maintain the mulch throughout the life of the planting. Remove flower blossoms for the first two years after planting, and remove about half of the buds in the third year. This practice allows the shrub to put its nutrients into plant establishment. Stunted plants may never recover. Since an established blueberry planting can produce fruit for 50 years or more, sacrificing a few pounds of fruit initially is well worth the cost.

Highbush blueberry plants require annual dormant pruning. Pruning controls crop load, which increases fruit quality. It also invigorates the plant by stimulating new growth from the plant's base. Pruning is usually done towards the end of the dormant season (usually March) when fruit buds are easily recognizable. Pruning involves the removal of small, spindly branches and canes lying on the ground and thinning of the centermost canes to increase light conditions inside the plant.

Highbush blueberries will produce a small crop, approximately 2,000 pounds per acre, in the third year and increase fruit production until they are about 5 years old and yield an average of 8,000 pounds per acre. Mechanical harvesters are available, but you need a large planting to justify the expense.

A list of recommended highbush blueberry cultivars can be found in the *Commercial Berry Production and Pest Management Guide*. By selecting a mix of cultivars, growers could harvest blueberries from July through mid-September in Pennsylvania.

# Pest Management

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Several insect pests and diseases can injure or destroy a blueberry crop, so you need to carefully monitor and treat pests. Some pests affect the fruit, while others attack the plant. Pesticide application is just one management option. You should use a combination of practices to reduce the potential for disease and insect damage, such as selecting a proper site and cultivar, planting disease-free shrubs, cultivating, and using soil amendments.

Birds are a serious problem on many blueberry farms, sometimes consuming over half of the berries. In such cases, you may need to protect the crop with nets, chemical repellents, scare tactics, and noise devices. Deer also can cause extensive damage by browsing and trampling the shrubs and eating the ripening berries. Hunting, fencing, and repellents are options for reducing deer damage.

Weeds are another pest that must be controlled in blueberry plantings. Because the shrubs have shallow root systems without root hairs, they are at a disadvantage when competing with weeds for water and nutrients. By avoiding sites with persistent weeds and eliminating weeds before planting, you can greatly reduce many weed problems. Shallow cultivation, herbicide application, and sod maintenance between rows will help control weeds in established plantings.

## Postharvest Handling

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Proper postharvest handling of blueberries is critical to marketing success. You should cool the picked berries immediately after harvest to remove field heat and improve shelf life. You also may want to consider chemical treatment to reduce fruit rot. Removing debris and under-ripe and overripe berries helps to maintain quality and improve the appearance of the packaged fruit.

## Sample Budgets

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The sample budgets included in this publication summarize costs and returns for three phases of highbush blueberry production: land preparation, plant establishment, and fruit production from a mature (5 years and older) blueberry planting. Land preparation costs assume that tillage and fertilizer application would be done either by a custom operator or with rented equipment. Budgets for intermediate production years (1-to-4-year-old plantings) are not included. They would have lower receipts and harvest costs than for the mature planting. The sample budgets should help ensure that you include all costs and receipts in your calculations. Costs and returns are often difficult to estimate in budget preparation because they are numerous and variable. Therefore, you should think of these budgets as an approximation and make appropriate adjustments in the "Your estimate" column to reflect your specific production and resource situation. Additional highbush blueberry budgets can be found in the *Commercial Berry Production*

and *Pest Management Guide*. More information on the use of crop budgeting in farm management decision making can be found in *Agricultural Alternatives: Enterprise Budget Analysis*.

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## For More Information

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*Blueberry Culture*. Edited by P. Eck and N. Childers, New Brunswick, NJ: Rutgers University Press, 1966.

*Commercial Berry Production and Pest Management Guide*. AGRS-53. University Park, PA: Penn State College of Agricultural Sciences, 2000.

Dunn, J., J. Harper, and G. Greaser. *Agricultural Alternatives: Fruit and Vegetable Marketing for Small-scale and Part-time Growers*. University Park, PA: Penn State Cooperative Extension, 2000.

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Kindhart, J. and G. Holcomb. *Blueberries: A Small-scale Agricultural Alternative*. Washington, DC: USDA Office for Small-scale Agriculture, 1994.

Pritts, M. and J. Hancock, eds. *Highbush Blueberry Production Guide*. NRAES-55. Ithaca, NY: Northeast Regional Agricultural Engineering Service, 1992.

*Small-scale Fruit Production*. AGRS-60. University Park, PA: Penn State College of Agricultural Sciences, 1997.

## Associations

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North American Blueberry Council  
4995 Golden Foothill Parkway, Suite 2  
El Dorado Hills, CA 95762  
<http://www.blueberry.org>

North American Fruit Explorers, Inc.  
1716 Apples Road  
Chapin, IL 62628  
<http://www.nafex.org>

Pennsylvania Vegetable Growers Association  
RR 1, Box 947  
Richfield, PA 17086  
e-mail: [wt.pvga@tricity.net](mailto:wt.pvga@tricity.net)

# Fresh-Market Highbush Blueberry Production Budget

Per acre costs for land preparation, establishment, and mature production.

	Land preparation (year -1)	Your estimate	Planting establishment (year 0)	Your estimate	Mature planting (year 4+)	Your estimate
<b>Variable costs</b>						
Custom operations	\$74.60	_____	\$34.80	_____	\$6.00	_____
Fertilizer	\$311.00	_____	\$16.00	_____	\$32.00	_____
Herbicides	\$0.00	_____	\$129.64	_____	\$212.10	_____
Insecticides	\$0.00	_____	\$10.88	_____	\$74.85	_____
Fungicides	\$0.00	_____	\$0.00	_____	\$103.24	_____
Seed	\$48.00	_____	\$60.00	_____	\$0.00	_____
Plants	\$0.00	_____	\$2,001.00	_____	\$0.00	_____
Irrigation	\$0.00	_____	\$620.00	_____	\$120.00	_____
Mulch	\$0.00	_____	\$250.00	_____	\$0.00	_____
Bee rental	\$0.00	_____	\$0.00	_____	\$25.00	_____
Labor	\$8.00	_____	\$400.05	_____	\$5,526.19	_____
Fuel	\$0.00	_____	\$4.23	_____	\$7.32	_____
Repairs & maintenance	\$0.00	_____	\$3.12	_____	\$8.07	_____
Interest	\$22.62	_____	\$188.13	_____	\$16.87	_____
<i>Total variable costs</i>	\$464.23	_____	\$3,717.84	_____	\$6,131.63	_____
<b>Fixed costs</b>						
Equipment	\$0.00	_____	\$6.22	_____	\$14.71	_____
Land	\$100.00	_____	\$100.00	_____	\$100.00	_____
<i>Total fixed costs</i>	\$100.00	_____	\$106.22	_____	\$114.71	_____
<b>Total costs</b>	<b>\$564.23</b>	_____	<b>\$3,824.06</b>	_____	<b>\$6,246.35</b>	_____

## Returns above total costs for various price and yield combinations:

Price received (\$/lb)	Yield (lb/A)			
	4,000	6,000	8,000	10,000
\$0.75	-\$646	-\$446	-\$246	-\$46
\$1.00	\$354	\$1,054	\$1,754	\$2,454
\$1.25	\$1,354	\$2,554	\$3,754	\$4,954
\$1.50	\$2,354	\$4,054	\$5,754	\$7,454
\$1.75	\$3,354	\$5,554	\$7,754	\$9,954
\$2.00	\$4,354	\$7,054	\$9,754	\$12,454
\$2.25	\$5,354	\$8,554	\$11,754	\$14,954

## Minimum price needed to cover total costs at various yields:

\$/lb	\$0.91	\$0.82	\$0.78	\$0.75

## Initial resource requirements

- Land: 1 acre
- Labor
  - Land preparation: 4 hours
  - Establishment: 54 hours
  - Production for years 1-4: 16-32 hours
  - Production for mature planting: 40 hours
  - Custom harvest labor: \$5,200
- Capital
  - Land preparation: \$564
  - Blueberry plants: \$2,001
  - Irrigation system: \$550
  - Mulches and soil amendments: \$561

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