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Red Raspberry Production

Raspberry production is well suited to small farms, as a small area of raspberries can provide significant income and equipment needs for an acre or so of raspberries are not great. Raspberry plantings should fruit for at least 6 years and occasionally produce for more than 20 years. However, raspberries should be considered a "high stakes" crop. Initial investment in a planting is relatively high, good management skills are needed to produce a quality product, and substantial labor is required. Costs involved in establishment are primarily those related to land preparation, planting, and installation of a trellis and irrigation system. Raspberries also have a short shelf life and a short marketing season, but demand for raspberries is usually excellent and high prices can be obtained.

Raspberries come in two basic types: red and black. Yellow raspberries are a mutation of red or black raspberries, and purple raspberries are a cross between red and black raspberries. Red raspberries have chilling requirements that limit their production to cooler regions of the United States. An estimated 75 percent of all domestically grown raspberries are of the red variety, and most of these are processed.

The leading raspberry producing states are Washington, Oregon, and California, with a combined acreage of more than 15,000 acres. Michigan, Pennsylvania, New York, and Ohio are similar to each other in area and in production (500 acres in each state, plus or minus 100 acres) while Minnesota, Wisconsin, Massachusetts, New Jersey, and Connecticut have smaller amounts. Canada is a major producer of red raspberries, with most of the production located in British Columbia and Ontario. Red raspberries also are produced in Europe and the Southern Hemisphere.

Marketing

Fresh-market raspberries usually are sold in half-pint clamshells (hinged plastic containers). Six basic marketing alternatives are available to the raspberry grower: wholesale markets, cooperatives, local retailers, roadside stands, pick-your-own operations, and processing firms. Because they are so perishable, red raspberries are well suited to roadside stands and pick-your-own operations, where the postharvest time spent in the "pipeline" from the producer to the consumer is short.

With the wholesale option, either the grower or a shipper can take the crop to the market. Shippers generally sell and transport the raspberries for a predetermined price. This

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marketing alternative is subject to the greatest price fluctuations. Marketing cooperatives generally use a daily pooled cost and price, which spreads price fluctuations over all participating producers. Local retailers are another possible market, but you must take the time to contact produce managers and provide high-quality raspberries when stores require them. Roadside stands (either your own or another grower's) and pick-your-own operations provide opportunities to receive higher than wholesale prices for your fruit, but you may have some additional expenses for advertising, building and maintaining a facility, and providing service to your customers. With pick-your-own operations, you save on harvest costs, but you must be willing to accept that some of the crop will not be harvested.

Depending on your location, processors may or may not be a marketing option. Traditional processors are less likely to contract with small-acreage growers, and, historically, processing prices have been more volatile then fresh-market prices. Recently, however, there has been an increased interest in locally produced raspberries for their use in fruit wines, which can be an outlet for excess fruit. Fruit can also be frozen for later use in locally produced value-added processed products. For more information on marketing, consult *Agricultural Alternatives: Fruit and Vegetable Marketing for Small-scale and Part-time Growers.*

Prices growers have reported obtaining for fresh-market red raspberries vary tremendously depending on location, from as little as $0.80 per pound pick-your-own in rural locations, to as high as $4.25 per ready-picked half-pint clamshell in locations near population centers. Processed raspberry prices in traditional outlets have typically been only one-third to one-half that obtained for fresh-market berries. Potential growers may wish to conduct a quick survey of prices obtained for red raspberries in their area before establishing their plantings.

Production Considerations

While high prices can be obtained for red raspberries, these delicate fruits are susceptible to numerous diseases, require a great deal of labor for hand harvesting fresh-market fruit (machine harvest is an option only for berries that will be processed), and have a very short shelf life. Therefore, the production of a good crop from year to year requires careful management.

Site Selection

Red raspberries grow best on sunny sites with well-drained soil. Poorly drained soils usually have high clay content and low (less than 2 percent) organic matter content. The slope of the site should be no greater than 12 percent. Water may run off of a sloping site, but this does not necessarily mean that the soil is well drained. The soil pH should be between 5.5 and 6.5. Soil tests should be conducted in the fall before spring planting. Soil test kits can be obtained from your local extension office. Depending or the previous use of the land, a nematode survey may be recommended. Do not use a site that was previously in sod because it can harbor root-feeding grubs and wireworms that can damage the raspberry roots. Also, red raspberry plantings should not follow *Verticillium*-susceptible crops, such as peppers, eggplant, tomatoes, potatoes, or strawberries. Soil that has been used to grow these crops should be either cropped for 5 to 8 years with a non-*Verticillium* susceptible crop or fumigated before planting. Depending on the results of a nematode survey, a cover crop of rapeseed plowed under and used as a green manure may be an option for fumigation. Cover cropping for at least a year with rye or sudangrass is a highly recommended practice that will help control weeds prior to planting the raspberry crop. Also, cover crops can be plowed under to add organic matter to the heavy soils that are prevalent in much of Pennsylvania.

Growth Habit

The red raspberry plant has one of two growth habits: summer bearing or primocane.

• **Summer bearing.** This is the most common type of raspberry in the bramble family. The individual canes of brambles are biennial, while the root systems are perennial. In the first year of planting, vegetative canes are produced. The following year, these same canes flower and produce fruit. While they are flowering and fruiting, new vegetative canes ("suckers") are produced from buds on the roots and grow throughout the summer. These canes then bear the next year's crop. Fruiting canes die shortly after producing that year's crop. Therefore, a mature raspberry planting has two types of canes: vegetative canes that originated during the current year (primocanes) and fruiting canes that originated during the previous year (floricanes). Fruit usually is harvested in July in Pennsylvania. Summer-bearing plants must be pruned by hand during the dormant season.

• **Primocane bearing or everbearing.** This type of red raspberry produces primocanes that are capable of flowering and fruiting in the same year that they are produced. Once the cane reaches its mature length, it begins fruiting at the tip, with progressively lower flower buds breaking on the cane as the season proceeds. Because the canes don't reach their mature length until mid-summer, fruiting is later than for summer-bearing raspberries. Fruiting usually begins in late August and continues until a hard frost or freeze. The canes of primocane-bearing raspberry plants are usually mowed to the ground every winter because the next year's crop does not require the previous season's canes. However, if the canes are not removed, they will produce a small summer crop from previously unbroken fruit buds low on the cane and, hence, are sometimes referred to as "everbearers."

Some commonly grown cultivars of summer-bearing red raspberries are Boyne (early season), Nova and K81-6 (mid-season), and Taylor (late season). Commonly grown primocane-bearing cultivars are Caroline, which begins producing in mid- to late August; and Heritage, which beings producing in early September.

Planting

Both summer-bearing and primocane-bearing cultivars readily produce new shoots from the roots (called "suckering"). New plantings are established by taking advantage of the plants' ability to produce suckers. Red raspberries usually are planted 24 inches apart in rows that are 8 to 12 feet apart. Spacing decisions depend on the size of your equipment. Tissue-cultured plantlets or nursery-matured stock of cultivars appropriate to the site should be purchased from a reputable nursery. Plant in May after the danger of hard frost has passed. Four inches of clean straw mulch (about 2 tons of straw per acre) should be applied immediately after planting. This practice has been shown to greatly increase plant vigor and survival rates. However, straw mulch should be used only during the establishment period because excessive moisture under the mulch of established plantings can increase disease problems. Plants will produce many suckers in the first year. Rows should be mowed to keep the row width to about 12 inches at the base of the planting.

Irrigation

Irrigation is highly recommended and will help ensure a more consistent crop from year to year. Trickle irrigation is greatly preferred over overhead irrigation because it adds water directly to the root zone and does not wet the fruit. Also, very little water is lost from evaporation. More information on irrigation can be found in *Agricultural Alternatives: Irrigation for Fruit and Vegetable Production* and *Agricultural Alternatives: Drip Irrigation for Vegetable Production.*

Pest Control

Several insects and diseases can injure or destroy raspberries. Therefore, monitoring and controlling pests is important. Some pests affect the fruit while others attack the plant. Pest management involves many aspects of production, with pesticide application being only one. Try to use all available practices to reduce the potential for disease and insect damage. Many pest problems can be avoided through proper site selection, crop rotation, variety selection, soil treatment, and by planting disease-free plants.

Weeds must be controlled in a raspberry planting. Raspberries have shallow root systems, which puts them at a disadvantage when competing for water and nutrients. Some weeds also harbor insects and disease. The first steps in weed management are to avoid sites with persistent weed problems and eliminate weeds before planting. Mulch and herbicides can be used to control weeds after establishment. A permanent slow-growing sod such as hard fescue is recommended to suppress weeds between the rows.

Harvest and Storage

With summer-bearing red raspberries, the first significant crop is usually obtained during the third year after planting. Primocane-bearing plants usually yield a significant crop in the second year. At maturity (about 4 years old), plants will produce about 5,000 pounds of fruit per acre. Because of the extremely short shelf life of red raspberries, good postharvest practices are essential.

Red raspberries must be picked and handled very carefully. The fruit must be firm, well colored, and rot free. If harvested at the proper time and handled carefully, raspberries will remain in good condition for several days. Because the fruit is fragile, it should be picked and packed directly into containers without further sorting. Pickers must be closely supervised and instructed to harvest only high-quality fruit. The fruit should be harvested at least once every 3 days, with adjustments made to the picking schedule based on weather conditions.

Proper postharvest handling of raspberries is essential if you are to be a successful marketer. Cooling the berries to remove field heat and improve shelf life is especially important. Harvesting early in the day while temperatures are cool and then precooling the fruit before shipment significantly extends shelf life.

Sample Budgets

Included in this publication are three annual budgets for red raspberry production. The first two summarize the costs of land preparation and establishment of the red raspberry planting. The third summarizes the costs and returns for a mature (4-year-old) red raspberry planting. Intermediate production years (years two and three) are not included. These years would have less receipts and lower harvest costs than a mature planting. These sample budgets should help ensure that all costs and receipts are included in your calculations. While the budgets are calculated for one acre of production, a beginning grower should start much smaller. 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 then make appropriate adjustments in the "Your Estimate" column to reflect your specific production and resource situation. More information on the use of crop budgets can be found in *Agricultural Alternatives: Enterprise Budget Analysis.*

Fresh-Market Red Raspberry Production Budget

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

	Planting Establishment (year 0)	Your Estimate	Year after Establishment (year 1)	Your Estimate	Mature Planting (year 4+)	Your Estimate
Variable Costs						
Custom operations	$379.80	_____	$182.00	_____	$561.80	_____
Fertilizer and lime	9.30	_____	9.30	_____	9.30	_____
Herbicides	0.00	_____	154.00	_____	161.11	_____
Insecticides	24.75	_____	24.75	_____	42.99	_____
Fungicides	0.00	_____	93.00	_____	220.80	_____
Seed	45.00	_____	0.00	_____	0.00	_____
Plants	1,210.00	_____	0.00	_____	0.00	_____
Irrigation	530.00	_____	120.00	_____	120.00	_____
Mulch	100.00	_____	0.00	_____	0.00	_____
Trellis	975.00	_____	0.00	_____	0.00	_____
Leaf test kit	0.00	_____	24.00	_____	24.00	_____
Labor	249.00	_____	29.55	_____	39.99	_____
Fuel	3.00	_____	9.18	_____	12.26	_____
Repairs and maintenance	1.50	_____	6.37	_____	8.70	_____
Interest	110.30	_____	4.27	_____	14.98	_____
Harvest Expense						
Labor		_____	500.00	_____	5,000.00	_____
Flats		_____	147.40	_____	1,467.40	_____
Packaging		_____	176.00	_____	1,760.00	_____
Total Variable Costs	$3,637.65	_____	$1,479.82	_____	$9,443.33	_____
Fixed Costs						
Equipment	$2.22	_____	$3.99	_____	$8.93	_____
Land	$150.00	_____	$150.00	_____	$150.00	_____
Total Fixed Costs	$152.22	_____	$153.99	_____	$158.93	_____
Total Costs	**$3,789.87**	_____	**$1,633.81**	_____	**$9,602.26**	_____

Initial Resource Requirements

- Land: 1 acre
- Labor
  - Land preparation: 3 hours
  - Establishment: 49 hours
  - Production (year 1): 22 hours
  - Production (year 2): 54 hours
  - Production (mature): 59 hours
  - Custom harvest labor (mature): $5,000
- Capital
  - Land preparation: $300
  - Red raspberry plants: $1.210
  - Trellis: $1,075
  - Trickle irrigation: $500

Annual returns above total costs for various price and yield combinations:

Price* received ($/lb)	Yield (lb/A)			
	2,000	3,500	5,000	6,500
$0.60	$1,200	$2,100	$3,000	$3,900
$1.00	$2,000	$3,500	$5,000	$6,500
$1.40	$2,800	$4,900	$7,000	$9,100
$1.80	$3,600	$6,300	$9,000	$11,700
$2.20	$4,400	$7,700	$11,000	$14,300

*Prices are for pick-your-own operations with harvest labor excluded.

Annual returns above total costs for various price and yield combinations:

Price* received ($/½ pt)	Yield (1/2 pt./A)			
	6,400	11,200	16,000	20,800
$0.60	$549	$961	$1,373	$1,784
$1.00	$3,109	$5,441	$7,773	$10,104
$1.40	$5,669	$9,921	$14,173	$18,424
$1.80	$8,229	$14,401	$20,573	$26,744
$2.20	$10,789	$18,881	$26,973	$35,064

*Prices are for hand harvesting in ½-pint containers and flats. Berries in ½-pint clamshell weighing 5 ounces.

For More Information

Penn State Commercial Berry Production and Pest Management Guide (2002). University Park, Pa.: The Pennsylvania State University. A replacement for this guide—a regional *Mid-Atlantic Berry Guide*—is currently in production and should be available in fall 2005.

Dunn, J., J. Harper, and G. Greaser (2000). *Agricultural Alternatives: Fruit and Vegetable Marketing for Small-scale and Part-time Growers.* University Park, Pa.: The Pennsylvania State University.

Greaser, G., and J. Harper (1994). *Agricultural Alternatives: Enterprise Budget Analysis.* University Park, Pa.: The Pennsylvania State University.

Identifying Bramble Problems (1985). University Park, Pa.: The Pennsylvania State University.

Lamont, W. J., J. K. Harper, A. R. Jarrett, M. D. Orzolek, R. M. Crassweller, K. Demchak, and G. L. Greaser (2001). *Agricultural Alternatives: Irrigation for Fruit and Vegetable Production.* University Park, Pa.: The Pennsylvania State University.

Lamont, W. J., M. D. Orzolek, J. K. Harper, A. R. Jarrett, and G. L. Greaser (2002). *Agricultural Alternatives: Drip Irrigation for Vegetable Production.* University Park, Pa.: The Pennsylvania State University.

Pritts, M., and D. Handley, eds. (1989). *Bramble Production Guide.* Ithaca, N.Y.: Northeast Regional Agricultural Engineering Service.

Small-Scale Fruit Production (1997). University Park, Pa.: The Pennsylvania State University.

Associations

American Pomological Society
102 Tyson Building
University Park, PA 16802
http://americanpomological.org/

North American Bramble Growers Association
1138 Rock Rest Road
Pittsboro, NC 27312
e-mail: nabga@mindspring.com
http://nabga.com/

Pennsylvania Vegetable Growers Association
815 Middle Road
Richfield, PA 17086-9205
e-mail: wt.pvga@tricountyi.net
http://www.pvga.org/

Prepared by Kathleen Demchak, senior extension associate in horticulture, Jayson K. Harper, professor of agricultural economics, and Lynn F. Kime, extension associate in agricultural economics.

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