

For bearing thornless blackberry plants, broadcast 25 to 40 lbs/acre of actual nitrogen in late April. Use low rates on vigorous plants growing on silt loam soils with high organic matter. Split applications are suggested with 50% in late April and the remainder in mid-May to early June but before bloom.

New recommendations for raspberries, blueberries, and blackberries have suggested rates per 100 linear feet of row (Table 3-1). As the drive row distance decreases, the amount of linear feet per acre increases. Thus, higher amounts of nitrogen may be required for narrow rows. In most raspberry, blueberry, or blackberry plantings, distance between rows can be 14, 12, or 10 feet. If an acre is 215 ft (long) by 200 ft (width), then the broadcast rates per 100 ft of row apply as shown in Table 3-1. If you are banding fertilizer or using microirrigation (fertigation), use one-half of these rates.

There are 2,940, 3,360, and 4,200 linear feet of rows, respectively, if rows are spaced 14, 12, or 10 feet apart. There are 13% and 30% more linear feet in a 12-ft or 10-ft-row width, respectively, than a 14-ft width. You may wish to adjust the amount of actual nitrogen by these amounts. All brambles will require less fertilizer with high soil fertility, high organic matter, and microirrigation. Injected nutrients from May to mid-June can use one fourth or less actual N and K as KNO₃ (potassium nitrate) when a one-half rate granular fertilizer is applied in late March. Take leaf and soil samples during July and late August during the production years to monitor your fertilizer programs. When berries are soft or do not ship well

or have fungus problems, high nitrogen may be the cause. Review spray programs and fertilizer rates and adjust both to your conditions.

Proper pruning is a crucial part of pest management for raspberries. Remove old, second-year canes in the fall and also thin out weak, spindly, first-year canes. In the early spring, thin out the remaining canes, leaving only those with good height, large cane diameters, and no symptoms of winter injury, insect or disease damage. Everbearing cultivars (*e.g.*, Heritage) may be completely mowed down each year in March as a pruning practice.

Plant rows for red or yellow raspberries should be narrowed to a width of 2 feet or less. When finished, there should be no more than three or four canes per square foot of row remaining. Canes that have been cut should be removed from the planting and destroyed. Pruning in this manner will greatly reduce the incidence of most raspberry cane diseases by increasing air circulation and reducing disease inoculum. Check with your Extension office for local bramble cultivar and cultural recommendations.

Integrated Management of Bramble Diseases

An integrated disease-management program for controlling raspberry and blackberry diseases integrates the use of all available control methods into one program. The use of fungicides for control of several important diseases can be a major part of

Actual Nitrogen/Acre	Width Between Rows		
	14 ft	12 ft	10 ft
10	0.34	0.30	0.24
20	0.68	0.59	0.48
30	1.0	0.90	0.71
40	1.4	1.2	0.95
50	1.7	1.5	1.20
60	2.0	1.8	1.4
70	2.4	2.1	1.7
80	2.7	2.4	1.9

¹ When using 33% nitrogen, multiply amount by 3 to give total amount per year. When using 20% nitrogen, multiply amount by 5 to give total amount per year.



the overall disease management program, but the use of various cultural practices is perhaps even more important in obtaining effective disease control. Furthermore, many important bramble diseases cannot be controlled by fungicides. Thus, their control is almost completely dependent upon the use of cultural practices (see Table 3-2). An effective disease management program for brambles must emphasize the integrated use of specific cultural practices, knowledge of the pathogen and disease biology, disease resistant cultivars, and timely applications of fungicides or biological control agents when needed.

Fungicides can play an important role in the disease-management program; however, increasing emphasis is being placed on minimizing the overall use of fungicides while maximizing their benefits. Thus, the objective of the disease-management program is to provide a commercially acceptable level of disease control on a consistent (year-to-year) basis, with minimal fungicide use.

Identifying and Understanding the Major Bramble Diseases

It is important for growers to be able to recognize the major bramble diseases. Proper disease identification is critical to making the correct disease-management decisions. In addition, growers should develop a basic understanding of pathogen biology and disease cycles for the major bramble diseases. The more you know about the disease, the better equipped you will be to make sound and effective management decisions.

The literature listed here contains color photographs of disease symptoms on brambles as well as in-depth information on pathogen biology and disease development. These publications also contain excellent color photographs and information about insect pests as well.

Compendium of Raspberry and Blackberry Diseases and Insects — Published by the American Phytopathological Society, 3340 Pilot Knob Rd., St. Paul, MN 55121. Phone: 612-454-7250, 1-800-328-7560. This is the most comprehensive book on bramble diseases and insects available. All commercial growers should have a copy.

Bramble Production Guide — This is a comprehensive book covering most phases of bramble production. It can be purchased from the Northeast Regional Agricultural Engineering Service, 152 Riley-Robb Hall, Cooperative Extension, Ithaca, NY 14853. Phone: 607-255-7654.

Brambles: Production, Management, and Marketing — Bulletin 782, Ohio State University Extension. Can be obtained from Ohio State University Extension, Publications Distribution, 385 Kottman Hall, 2021 Coffey Road, Columbus, OH 43210-1044. Phone 614-292-1607.

The information presented on the following pages gives a description of symptoms and causal organisms for the most common raspberry and blackberry diseases in the Midwest.

Cane and Leaf Diseases

Anthracnose

Anthracnose is caused by the fungus *Elsinoe veneta*. One of the most common and widespread diseases of brambles in the United States, anthracnose can infect red, black, and purple raspberries, blackberries, dewberries, and loganberries. The disease is very destructive on black and purple raspberries. On red raspberries, it can be common but is usually not a serious problem. Disease losses can occur from defoliation, general stunting and a decrease in cane vigor, reduction in fruit yield and quality, and cane death. Resistance to anthracnose is not available in most cultivars. The use of fungicide (lime sulfur) and cultural practices such as sanitation (removal of old and infected canes) are key control methods.

Symptoms

Anthracnose can cause symptoms on canes, leaves, fruit, and stems of berry clusters. The most striking symptoms are on canes. A few days after the fungus invades the succulent tissue of young canes, minute purplish spots appear. These spots enlarge in diameter and become oval or lens-shaped. The centers become somewhat sunken and are pale-buff to an ash-gray color (Figure 58). Margins are somewhat raised and purple to purple-brown. If numerous, the lesions may merge and cover large portions of the cane. Diseased tissue extends down

