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Growing Raspberries in Michigan
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Growing Raspberries in Michigan

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Many parts of Michigan are well suited for raspberry production. Most raspberry types can be grown successfully throughout southern Michigan, and several varieties grow well in northern Michigan and the Upper Peninsula.

Michigan producers currently grow only about 700 acres of raspberries, and most berries are marketed through "pick-your-own" operations. Before planting raspberries, investigate costs of production, anticipated yields and potential markets. Raspberries are extremely perishable, so berries that are to be sold fresh must be handled carefully. Also, consider labor availability—pruning and harvesting can be labor-intensive.

Yields in Michigan are usually lower than those in South or the Pacific Northwest. Raspberries are a perennial crop and normally require three years to reach maximum productivity. Few fruits are produced the year of planting. Red and black raspberries may yield 500 to 1,500 pounds per acre the second year and 2,000 to 5,000 pounds the third year and after. Purple raspberries are usually slightly more productive than reds or blacks. Well-managed plantings remain productive for eight to 15 years.

Site Selection

Geographic distribution. Raspberries can be grown in all areas of Michigan, though some types are more adapted to certain regions than others (see "Types of Raspberries and Variety Selection" elsewhere in this bulletin). Like most fruit crops, raspberries perform well along the Lake Michigan shore, where the climate is moderated by the lake. They

grow well throughout southern Michigan, and some varieties are hardy in the Upper Peninsula.

Avoid "frost pockets." Cold air tends to drain off slopes and hills and collect in low areas. Because these "frost pockets" are generally colder than elevated areas, they are poor sites for growing raspberries. An ideal site is higher than the immediate area, with a gentle slope.

Soil requirements. Raspberries prefer well-drained, sandy loam or loam soils. Soil pH should be 6.0 to 6.8, and high soil organic content is preferred. Soils must be well-drained, because raspberry roots are very sensitive to excessive soil water, which limits the oxygen supply to roots. Poor drainage causes root dieback and increases the plants' susceptibility to Phytophthora root rot. Do not plant in poorly drained soils unless you can improve the drainage by installing drainage tile or by some other means.

Other considerations. Avoid areas previously used to grow crops susceptible to Verticillium wilt (other brambles, eggplant, pepper, strawberry, tomato) or crown gall (brambles, grapes, tree fruits). The pathogens that cause these diseases can remain in soil for many years. Wild brambles within 400 yards of the planting are potential sources of viruses and other disease organisms, and if possible, should be removed.

North- or east-facing slopes may be preferable for summer-fruiting raspberries, because soils warm and plants develop more slowly in the spring, and late spring frosts are less likely to damage plants. Primocane- or fall-fruiting raspberries, which are pruned to the ground each year, may begin fruiting earlier in the fall if planted on south-facing slopes.

Types of Raspberries and Variety Selection

Raspberries can be classified by fruit color (black, purple, red, yellow) or fruiting habit (summer-fruiting, primocane-fruiting). All raspberries are members of the *Rubus* genus, but they include several species: *R. idaeus* (red raspberries); *R. occidentalis* (black raspberries); and *R. idaeus* x *R. occidentalis* (purple raspberries).

Though raspberry plants are perennial, individual canes live for only two years. Summer-fruiting raspberries, which include most varieties, produce fruit only on second-year canes in midsummer. These canes die soon after fruiting. Primocane-fruiting varieties produce fruit on 1-year-old canes (primocanes) in late summer to early fall. The same canes will produce additional fruit the following summer. These raspber-

ries are sometimes called everbearers, because they can produce two crops per year. Several red and yellow primocane-fruiting raspberry varieties are currently available, and primocane-fruiting black raspberries are being developed.

Black Raspberries

Black raspberries are generally less hardy than red raspberries. Canes of most blacks are damaged by temperatures below -20 degrees F, and many are injured when temperatures lower than 0 degrees F are accompanied by high winds. The general characteristics of various black raspberry varieties currently available (Table I) were compiled from various sources, because detailed variety testing has been limited in Michigan. The following varieties have performed well in Michigan and can be recommended:

Table I. Relative characteristics of black raspberry varieties.

Variety	Harvest season	Yield potential	Hardiness	Fruit		
				Size	Flavor	Firmness
Allen	mid	high	hardy	large	fair	good
Black Hawk	late	medium	hardy	medium to large	good	good
Bristol	mid	medium to high	medium hardy	large	very good	good
Cumberland	mid	medium to high	hardy	medium	good	good
Dundee	late	medium to low	medium hardy	large	good	good
Haut*	early	high				
Huron	mid	medium	medium hardy	medium to small	very good	good
Jewel	mid	medium	hardy	medium to small	very good	good
Lowdon*	late	medium	very hardy	medium	good	good
Munger	early	medium	medium hardy	medium	good	
New Logan	early	medium to high	hardy	large	good	good

Information compiled from trials and observations in the Great Lakes region.

(*) denotes varieties not tested in Michigan

Logan (New Logan)—an early season, productive variety well-suited for processing. Berries are firm and large, and plants are vigorous but very susceptible to virus diseases. The harvest season is short, usually requiring only three to four pickings.

Cumberland—a mid-season variety, previously the most popular in Michigan. Canes are hardy and productive. Fruits are medium to large, attractive and firm.

Allen—a hardy, mid-season variety that appears to have high yield potential, though observations in Michigan are limited. Fruits are large and firm with fair flavor.

Others—varieties suggested for growing on a trial basis include Bristol, Black Hawk, Huron and Jewel.

Red Raspberries

General characteristics of various red raspberry varieties are summarized in Table 2. Red raspberries are generally more hardy than black raspberries—the hardiest varieties withstand temperatures of -30 degrees F. The following varieties perform well in Michigan and are recommended:

Latham—an extremely hardy, reliable producer, particularly in northern areas. Latham provides a long harvest season, but berry size and quality are only fair.

Canby—a popular mid-season, relatively hardy, variety. Its productivity is usually higher than that of Latham, with larger fruits of good quality. Canby is nearly thornless, and has some resistance to virus diseases.

Taylor—a mid- to late-season variety noted for large, high-quality fruits. Taylor is not as hardy as Latham, and yields are typically lower.

Titan—a very large-fruited, high-yielding, mid-season variety that is adequately hardy for southern Michigan, but questionable in northern areas. Fruit flavor is fair. Plants are very susceptible to crown gall and *Phytophthora* root rot.

Others—Chilcotin, Haida, Nootka and Skeena are newer varieties developed in British Columbia that are resistant to aphids, which spread some virus dis-

eases. Limited observations in Michigan indicate that yields and berry quality can be high. They are marginally hardy (hardiest is Haida), and appear to be susceptible to crown gall. Other varieties with potential for colder areas of Michigan include Boyne, Killarney and Nordic.

Purple Raspberries

Brandywine—a very high-yielding, late-season variety. Fruits are very large, light purple, and relatively firm and round. Fruits are tart and make an excellent jam. Plants are very vigorous and hardy, but susceptible to crown gall.

Royalty—a high-yielding late-season variety. Its fruits are sweeter and often larger than those of Brandywine, and are well-suited for fresh consumption or jam. Plants are slightly less vigorous than those of Brandywine, relatively hardy, and resistant to some insects.

Sodus and Clyde—older, late-ripening purple varieties that have been generally replaced by Brandywine and Royalty.

Primocane-Fruiting Raspberries

General characteristics summarized in Table 3 pertain to the fall crop. Most of these types are grown in Michigan for only the fall crop. All varieties are listed as hardy because canes are usually removed to ground level each year.

Heritage—the most popular variety in Michigan. Yields are very high, and fruit size, flavor and firmness are exceptional. The fall crop is relatively late (begins in early to mid-August in southern Michigan, and early to mid-September in northern Michigan). Early fall freezes may severely reduce yields, particularly in northern Michigan.

Redwing—a newer variety developed in Minnesota. Yield potential is similar to that of Heritage, but fruits are somewhat smaller and less firm. The harvest season is earlier than that of Heritage, so Redwing may perform better in northern areas with a shorter growing season.

Fallgold—a yellow-fruited variety that is slightly earlier than Heritage. Yields and fruit size are average.

Table 2. Relative characteristics of selected red raspberry cultivars.

Variety	Harvest season	Yield potential	Hardiness	Fruit		
				Size	Flavor	Firmness
Boyne	early	high	very hardy	small	fair	poor
Canby	mid	medium to high	hardy	large	very good	very good
Chilcotin	mid	medium	less hardy	medium to large	good	good
Carnival*	mid	medium	hardy	medium	good	good
Comet	early to mid	low to medium	hardy	medium	good	poor
Festival*	mid	high	hardy	medium	good	good
Haida	mid to late	high	hardy	medium	good	good
Hilton*	mid	low to medium	hardy	medium to large	good	good
Killarney*	early	high	very hardy	medium	fair	fair
Latham	mid to late	medium	very hardy	small to medium	fair	fair
Liberty*	early to mid	medium	hardy	medium	good	poor
Newburgh	mid	medium	hardy	medium to large	very good	fair
Nootka	mid	medium	less hardy	large	good	good
Nordic*	early	medium to high	very hardy	medium	good	good
Reveille*	early	medium to high	very hardy	medium to large	good	poor
Sentry	mid	medium	less hardy	medium	good	good
Skeena	mid	medium to high	hardy	medium to large	good	good
Southland	early to mid	low	less hardy	medium	good	good
Taylor	mid to late	low to medium	hardy	large	very good	very good
Titan	mid	high	hardy	very large	fair	fair

Information compiled from trials and observations in the Great Lakes region.

(*) denotes varieties not tested in Michigan.

Table 3. Relative characteristics of primocane-fruited raspberry varieties.

Variety	Harvest season	Yield potential	Hardiness	Fruit		
				Size	Flavor	Firmness
Amity	mid	medium	hardy	large	good	good
Augustred*	early	medium to low	hardy	small	fair	poor
Durham	late	medium to low	hardy	medium	fair	fair
Fallgold	mid	medium	hardy	medium	good	fair
Fallred	early	medium to low	hardy	small	good	poor
Heritage	late	very high	hardy	very large	very good	very good
Redwing	mid	very high	hardy	medium	good	good
Ruby (NY114)*	mid to late	high	hardy	very large		
Scepter	very late	low	hardy	small	fair	good
September	very late	low	hardy			

Information compiled from trials and observations in the Great Lakes region.

(*) denotes varieties not tested in Michigan.

Fruits become smaller and crumbly in older plantings. Fallgold has limited use as a commercial variety.

Others—Amity and Fallred have some potential. Fallred is one to two weeks earlier than Heritage, but yields and fruit quality are inferior. Amity fruits are larger and firmer than those of Fallred, but Amity begins maturing relatively late—one to two days before Heritage. The new variety Ruby reportedly has high yields of large fruits, but it has not been tested in Michigan.

Obtaining Plants

Buy plants only from state-certified nurseries. Certified nurseries are inspected regularly by state officials for visual evidence of destructive insects and diseases.

Some nurseries offer virus-tested plants, which are propagated from virus-tested parent material and grown according to strict regulations to prevent exposure to viruses. Virus-free plants are highly recommended because they are more vigorous and live longer.

Red raspberries are usually sold as 1-year-old rooted suckers dug from the field. Black and purple raspberries are usually propagated by tip-layering. Tips of canes are buried in 2 to 4 inches of soil in late summer or early fall so that roots develop by the following year. Tips are then cut from the mother plant, dug and sold bare-root.

Several nurseries now offer tissue-cultured (TC) red, black and purple raspberries. Plants may be sold directly from the greenhouse as small green plantlets in trays, or grown out in the nursery for one year and sold as nursery-matured plants. Tissue-cultured plants may be more vigorous and become established more quickly than conventionally propagated plants. Because TC plants are small and succulent, proper irrigation and weed control are critical during the first year.

Raspberries can be easily propagated from established beds by transplanting suckers (reds) or tip-layering (blacks, purples). Purchase of new plants is advised, however, because plants propagated from older beds are often diseased.

Storing Plants. Bare-root plants received too early to plant can be stored in a cool (32 to 45 degrees F), moist place for one to two weeks. Plants can also be stored by opening the bundles and placing plants in a shallow trench and covering the roots with soil.

Planting

Site Preparation

Site preparation should begin at least one year before planting. Raspberries benefit from additions of organic matter. Plant the site with green manure crops such as sorghum or Sudan grass for one to two years and plow the residues in. This will add organic matter and control many problem weeds. Animal manure or bedding can also be incorporated. Test the soil the year before planting for nutrients and nematodes. Consider fumigating the site in the fall before planting if other fruits or solanaceous vegetables had been grown there within the past three years; if high pathogenic nematode populations are present; or if perennial problem weeds persist (consult MSU Extension bulletin E-154, "1989 Fruit Spraying Calendar for Commercial Growers," for current fumigant recommendations). In the spring before planting, cultivate the site to produce a fine, uniform planting bed.

Planting and Planting Systems

Planting. Spring planting (April) is preferred, though raspberries can be set in the fall. Plant as soon in the spring as the soil can be worked. Make holes or furrows large enough to hold the plant roots. Set bare-root plants 1 inch deeper than they grew in the nursery. Exposed roots dry quickly, so protect plants from the sun and wind during planting. Cover roots with 2 inches of soil, and pack this firmly around roots. More soil may keep new sprouts from emerging and kill the plants. Immediately after setting bare-root plants, cut red raspberries off 6 inches above the ground, and black and purple varieties at ground level. This is a precaution against disease organisms that might be on old cane wood. Set tissue-cultured plants at the level of the soil in the plug, and firm the soil around the plants.

Planting Systems. Most raspberries in Michigan are grown in the hedgerow system. Plants are set 1.5 to 4 feet apart in rows 6 to 12 feet apart. Plants fill in to form a hedge, which is maintained at a width of 1.5 feet by regular cultivation. Spacing within the row is determined by the suckering ability of the variety. Most red raspberries sucker profusely and can be planted at wider spacings (3 to 4 feet apart). Black raspberries should be planted 1.5 to 2 feet apart, because they sucker very little. Purple raspberries produce fewer suckers than reds but more than blacks, so they should be planted at intermediate spacings. Distance between rows is determined by the width of cultivation and spray equipment, and by the vigor of the variety.

Some growers prefer the hill system, but it is usually less productive than hedgerow plantings. Plants are usually set 5 to 6 feet apart, and the planting is cultivated in both directions to maintain distinct hills. This system is best suited for varieties that do not sucker profusely. Hills are thinned each year to six to 10 strong canes per hill. Canes in each hill are supported with a 5-foot stake.

Fertilization

Submit a soil sample before planting, and adjust the soil pH to 6.5 to 6.8 if necessary. Also, if the soil test indicates a need, incorporate phosphorus (P), potassium (K) and magnesium (Mg) at rates indicated in Table 4. These rates will maintain most plantings for several years.

Most plantings need nitrogen (N) applications annually. Urea (46 percent N), ammonium nitrate (32 percent N), and calcium nitrate (21 percent N) are suitable nitrogen sources. Nitrogen can also be supplied as a complete fertilizer containing phosphorus and potassium, such as (12-12-12), or manure, though these sources are often more expensive than those supplying only nitrogen. Use complete fertilizers with a 1:1:1 or similar ration if the soil has not been sampled to determine fertility levels.

Fertilize newly set plants two to three weeks after planting by sprinkling the equivalent of 15 to 20

pounds of nitrogen per acre (0.5 lb N/100 feet of row) around individual plants, keeping the fertilizer 3 to 4 inches away from the bases of the plants. This may be repeated in the summer if growth is poor and leaves are pale green. Apply 25 to 30 lb N/acre (.75 lb N/100 feet of row) in April or May of the second year in a 4-foot-wide band over the row. Plantings three years old and older require 50 to 60 lb N/acre (1.5 lb N/100 feet of row) each year banded over the row.

The variety and soil type determine the exact amount of nitrogen required. Vigorous varieties (Brandywine, Royalty) and promocane-fruited types usually require 50 to 100 percent more nitrogen. Plantings on light, sandy soils require higher rates than those on heavier soils. Generally, red raspberries should be fertilized to produce canes 5 feet tall, and canes of purple raspberries should be taller than 5 feet. New black raspberry canes should reach a height of 2.5 to 3 feet by harvest time.

Table 4. Soil phosphorus (P), potassium (K) and magnesium (Mg) requirements for raspberries.

Soil test P, K or Mg (lb/acre)*	Recommendation (lb/acre)		
	P ₂ O ₅	K ₂ O	Mg
25	75	225	100
50	50	200	75
75	25	175	50
100	0	150	25
125	0	125	0
150	0	100	0
175	0	75	0
200	0	50	0
225	0	25	0
250	0	0	0

*Based on MSU soil test results. Consult your county Cooperative Extension Service office to convert results from another laboratory to MSU basis.

Monitoring Fertility. Test the soil before planting and every three to four years in established plantings to monitor soil phosphorus, potassium, calcium and magnesium levels, and soil pH. Leaf samples can also be useful in monitoring nutrient levels in plants. Collect leaves from the middle of primocanes in mid-summer. Select a total of 40 to 50 leaves from various canes throughout the planting.

Additional information on leaf analysis is available in MSU Extension bulletin E-449, "Plant Tissue Analysis to Determine Fertilizer Needs of Michigan Fruit Crops," which is available through your county Cooperative Extension Service office. Sampling leaves every three to four years is usually adequate unless nutritional problems occur that must be diagnosed.

Weed Control

All weeds must be eliminated before planting. Combinations of cultivation, cover crops and postemergent herbicide applications the year before planting are effective. Control weeds during the planting year by cultivation, hand weeding and the use of pre-emergent herbicides. (Consult MSU Extension bulletin E-154, "1989 Fruit Spraying Calendar for Commercial Growers," for current herbicide recommendations.) Tissue-cultured plantlets appear to be more sensitive to herbicides than bare-root plants. Control weeds by cultivating and hand weeding during the first year if you use tissue-cultured plants.

Weeds emerging within the row of 2-year-old and older plantings are best controlled by pre-emergent herbicides. Quackgrass has been a serious weed species in raspberries; some new postemergent grass herbicides can now be used for control. Aisles are often maintained weed-free by repeated cultivation or an established sod or annual cover crop. Kentucky bluegrass and creeping red fescue are useful sod species. Species such as oats or Sudan grass seeded in late summer provide a cover crop that dies during the winter.

Irrigation

Irrigation is advantageous for raspberries in Michigan and is highly recommended for plantings on light-textured, sandy soils, which have low water-holding capacity. Compared with most other fruit crops, raspberries use large amounts of water. Because nearly all roots are located in the top 20 inches of soil, plants readily deplete the available water in the root zone, particularly during hot, windy weather. Water stress reduces cane height, berry size and yields.

Irrigation Systems. Overhead sprinklers and trickle irrigation systems are used successfully on raspberries in Michigan. Overhead sprinkler systems can also be used for frost protection, but costs are generally higher than for trickle systems. Rotating sprinkler heads on 4- to 6-foot risers and portable aluminum pipe are most commonly used. Trickle systems may deliver water with emitters or perforated bi-wall tubing.

Water Sources and Quantities. Surface water from ponds, lakes and streams may be best suited for sprinkler systems, because sediment and algae often plug trickle systems. Well water is suited for sprinkler and trickle systems.

The water source must provide an adequate volume to meet maximum daily use rates and seasonal water demands. Daily use rates can approach 0.3 inches a day during hot, dry, windy weather. Roughly 8,000 gallons/acre are required over a 24-hour period to replace this water (6 gallons/minute). Total seasonal (June, July, August) irrigation requirements for raspberries vary from 5 to 12 inches. Between 140,000 and 330,000 gallons of water per acre would be required to replace this loss.

Pruning

Black Raspberries. Pruning requirements are illustrated in Fig 1. Pinch off the top 2 inches of primocanes as they reach a height of 2 to 2.5 feet. This may need to be done on several dates, because canes grow at different rates. Pinching encourages lateral branches to

grow lower on the cane. These laterals will bear most of the fruit the following year.

After harvest, old fruiting canes must be removed at ground level. Before growth resumes the following spring, lateral branches that grew last year must be shortened to 8 to 10 inches. Most buds on lateral branches will produce fruit. Branches left longer will produce more but smaller berries than shorter branches.

Red Raspberries. Summer-fruiting red raspberries are pruned as illustrated in Fig. 2. Begin in early spring by thinning the canes. Remove short, spindly canes at ground level. If necessary, remove some large canes so that only six to eight canes remain per linear foot of row. Some growers shorten tall canes to 4 to 5.5 feet in the spring so that canes remain erect when the fruit matures later in the summer. Buds removed by topping could have produced fruit, so shorten canes only enough to keep them upright. Remove all old fruiting canes immediately after harvest.

Purple Raspberries. Purple raspberries can be managed like blacks or reds, depending on grower preference. Purple raspberry canes are vigorous and require a trellis for support if they are not tipped. Thin canes to four to six canes per linear foot of row in the spring, and remove old fruiting canes soon after harvest. Or, manage them like blacks: tip primocanes when they are 3 feet tall, and shorten lateral branches in the spring to 8 to 10 inches. Plants managed in this manner may not require trellis support.

Primocane-Fruiting Raspberries. Most primocane fruiters are pruned to produce a fall crop only by removing all canes at ground level in winter or early spring. A second option is to manage primocane-fruiting raspberries like summer-fruiting reds. This gives a summer and a fall crop of berries, but increases pruning costs. Total yields seldom justify the added cost.

Figure 1. Pruning Black Raspberries

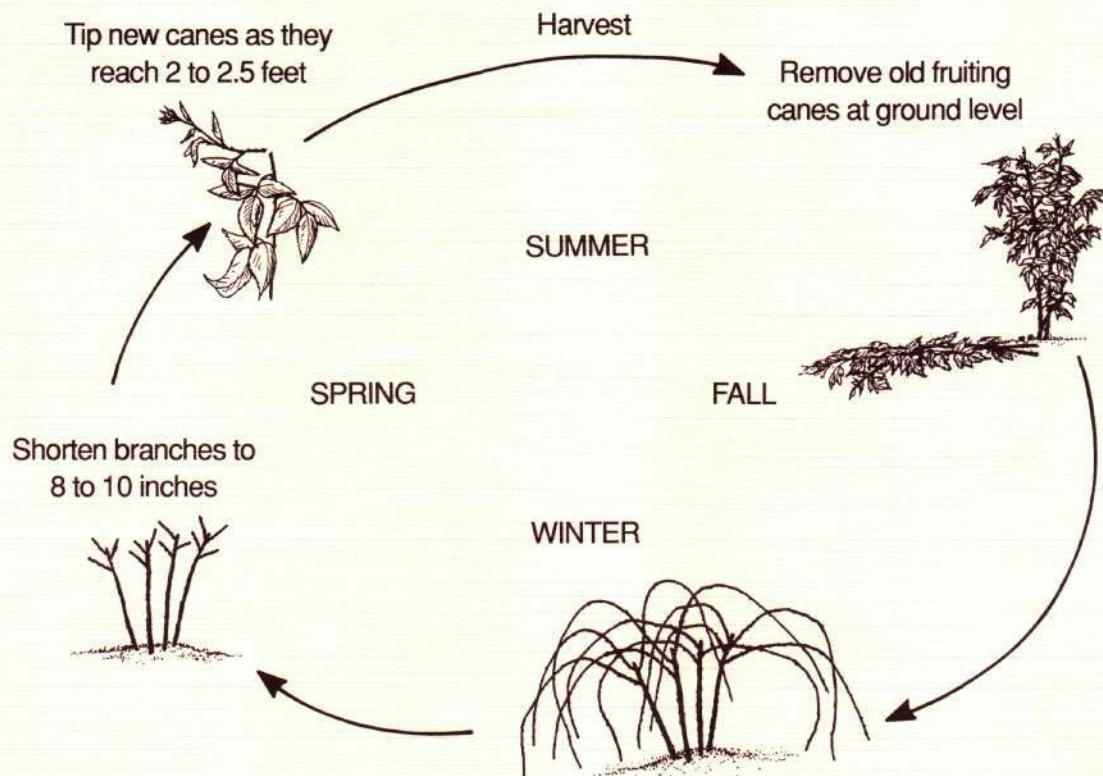


Figure 2. Pruning Summer-fruiting Reds

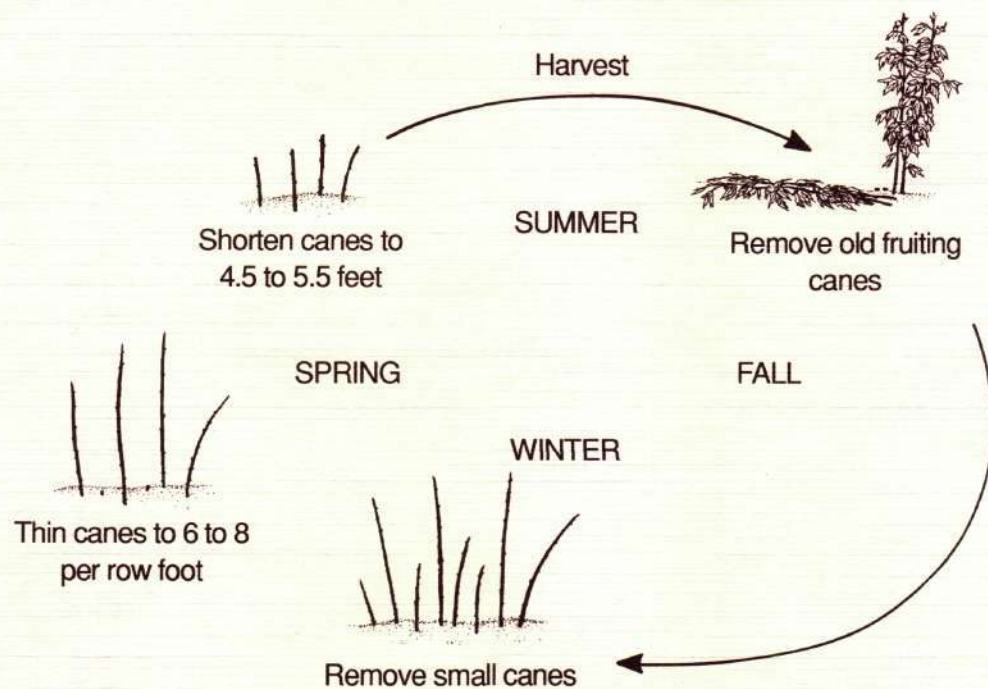
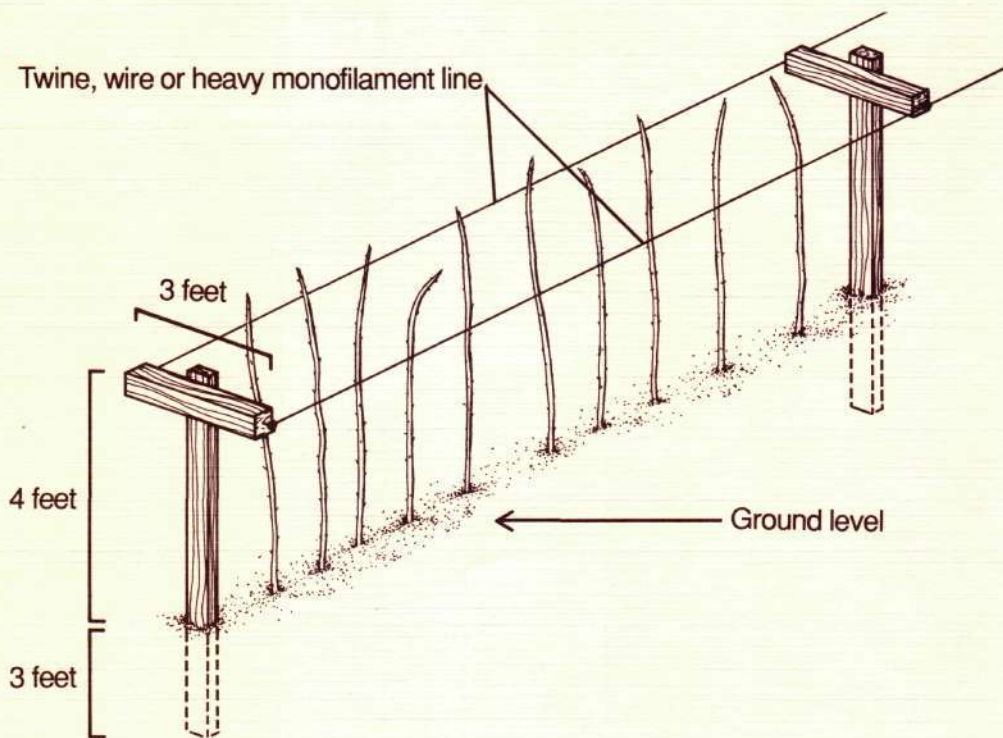


Figure 3. T-Trellis Design



Trellises

Some raspberries require trellising to keep canes upright. Black raspberry canes pinched at the proper height are self-supporting. Most summer-fruiting red raspberries are self-supporting if plants are not over-fertilized and canes are maintained at heights less than 5.5 feet by topping in the spring. Trellises are necessary for purple raspberries and can be useful in vigorous plantings of primocane-fruiting raspberries. The T-trellis is the most common design (Fig. 3), though several other systems are used.

Permanent trellises are needed for purple raspberries. Monofilament plastic wire is preferred because it is easily handled, strong and lightweight. Trellises in primocane-fruiting plantings must be removed each year so that canes can be mowed. Consider placing trellis posts in 2- to 3-foot lengths of PVC pipe buried upright in the soil. Posts can then be lifted from the pipes before pruning. Baling wire may be preferred for

support because it is inexpensive and can be discarded each year.

Fruit Harvest and Handling

Summer-fruiting raspberries (reds, blacks and purples) require three to six pickings to harvest; primocane-fruiting types require six to 10 pickings. Berries must be harvested more frequently during hot weather (at 2- to 3-day intervals) than during cool weather (3- to 5-day intervals). Five to six pickers may be needed to properly harvest 1 acre of berries.

Berries for the fresh market need to be picked by hand. Pick berries when they first color fully. Discard overripe berries—they deteriorate and mold quickly. Early morning harvesting is preferred because berries are coolest at this time. Cool berries to 32 to 34 degrees F as soon as possible and store them at this temperature. Delaying cooling even an hour significantly reduces the shelf life of raspberries.

Berries for processing can be harvested by hand or mechanically. Several types of mechanical harvesters are available. Fruits harvested mechanically are not suited for fresh market because they include mature, overripe and bruised fruits.

Diseases

Raspberries are subject to various diseases caused by fungi, bacteria and viruses. Common diseases and suggested controls are discussed in MSU Extension bulletin E-1730, "Raspberry Diseases in Michigan," and spray programs are outlined in E-154, "1989 Fruit Spraying Calendar for Commercial Growers."

Insect Pests

Various insects are periodic pests on raspberries. The most serious pests are aphids, raspberry cane and crown borers, rednecked cane borers, leafrollers, sawflies, raspberry fruitworm, and picnic or sap beetles. Insecticide applications are most commonly

made to control aphids, leafrollers, crown borers, raspberry sawflies and fruit worms. Consult E-154, "1989 Fruit Spraying Calendar for Commercial Growers," for current recommendations.

For more information on planting and growing raspberries in Michigan, see the following MSU publications, available from your county Cooperative Extension Service office:

- E-154, "1989 Fruit Spraying Calendar for Commercial Growers," \$3.00, for sale only.

(Single copies of the following are available at no cost to Michigan residents:)

- E-449, "Plant Tissue Analysis for Determining Fertilizer Needs of Michigan Fruit Crops"
- E-1730, "Raspberry Diseases in Michigan"
- E-1864, "Small Fruit Insect Pests and Their Control: A Homeowner's Perspective"

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