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Bramble Fruit Culture

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Bramble Fruit Culture



Bramble fruits, raspberries and blackberries, have long been considered among the choice fruit crops that can be grown successfully in Ohio. With proper care, plantings of these fruits may be expected to produce good crops of high quality berries for a number of years.

Bramble fruit plants are characterized by the biennial habit of their above-ground parts. Each spring the plants produce new shoots from below ground. These shoots overwinter, bear fruit the following season, and die. With everbearing types, the new shoots bear a crop during late summer and a second crop the next year during the regular season. Due to the variations in growth habit, however, each bramble crop requires special cultural practices.

A grower's success with brambles, as with any horticultural crop, depends on careful attention to cultural details. With these crops, special attention must be given to avoiding and controlling diseases which, more than any other factor, are apt to limit the profitable life of most plantings.

Raspberries and blackberries, which ripen shortly after the strawberry, in addition to being delightful and attractive dessert fruits are also highly nutritious. For example, an average serving of black raspberries will supply more than the average daily minimum requirements of vitamin C. These berries are prized for pies, jams, jellies, and also for freezing.

Selecting the Site

The bramble fruit grower can avoid many of the difficulties often associated with the production of these crops through careful site selection. It is generally recommended that new plantings be separated, if possible, by at least 300 feet from other bramble plants, either wild or cultivated. Unless this isolation can be afforded, virus diseases are likely to become serious problems. If only clean, "virus-free" planting stock is used, the different sorts may be planted close together. Such plantings should, however, be isolated from any bramble plants which may carry virus disease. For limited, family size plantings where isolation is not available, mixed plantings may be maintained.

Bramble fruits should not be planted on sites where tomatoes, potatoes, or egg plants have been grown previously. Such sites are frequently found to be heavily infected with verticillium wilt, a disease which may remain in the soil for many years. Brambles, particularly black raspberries, are very susceptible to this disease. At present there is no practical control for it. Hence, plantings on such sites are apt to be disappointing.

Brambles grow and produce satisfactorily on a wide range of soil types from sandy to heavy clay loams. They are not particularly sensitive to variation in soil acidity. The most suitable soil is a deep sandy loam with a good organic matter content, moisture holding capacity, and a pH of 5.8 to 6.5. In general, any good garden soil will be satisfactory.

The site must also afford good drainage—both soil and air. Plantings on poorly drained soils are generally short lived and unproductive. Where air drainage is limited, the crop may be lost due to late spring frosts which may kill the flowers. Choosing a suitable site is the first step toward success with bramble fruits.

Selection of Cultivars*

Many cultivars of each bramble fruit are available, but only a limited number have been proved satisfactory under Ohio growing conditions. All recommended cultivars are self-fruitful and will produce good crops without cross-pollination. Many growers plant several cultivars in order to extend the harvest season.

Raspberries

Black, red, and purple raspberries can be grown successfully both commercially and in home gardens in Ohio. The most popular raspberry in Ohio is the black. The

* CULTIVAR is the new term now being used in place of "variety" which has been common in horticultural literature for many years. Cultivar is being used to designate horticultural varieties throughout the world since its adoption in 1961 by the International Code of Nomenclature for Cultivated Plants.

red is the second most popular, while the purple is less widely grown. The latter, a hybrid between the red and black, is very productive, and its fruits are suitable for dessert and culinary purposes.

Usually the black cultivars ripen first, followed by the red and the purple types. There is considerable overlapping in ripening seasons. In general the purple is the largest fruited and the most productive of the group. The red is the least productive. There are also yellow-fruited kinds, but these are only grown as a novelty and are not of commercial importance.

Red Raspberries

Taylor matures in the same season or slightly before Latham. Berries are large, bright, attractive, firm, and of good quality. Plants are vigorous, hardy, and productive.

Latham is the most widely planted red raspberry in Ohio. The berries are an attractive light red which tends to darken as they become over-mature. They are roundish in shape, medium in size, and reasonably firm, but may crumble in some seasons. The fruit is of only fair quality. The plants are winter hardy. Although they are subject to mosaic, they produce well in spite of the disease. The fruit is easy to pick, and the season is fairly long.

Milton is recommended for extending the red raspberry season, ripening its fruit near the end of the Latham harvest. It produces good crops of attractive, large, long conic berries of good quality. Fruits are non-crumbling with a mild sub-acid flavor. The plants are vigorous, erect, productive, and reported to be more resistant to mosaic than Latham or Taylor.

The new cultivar, **Hilton**, has recently become available. This cultivar may have promise, but as yet not enough is known about its performance under Ohio conditions to warrant its planting except on a trial basis.

Black Raspberries

Logan (New Logan) is a popular black cultivar in Ohio. The berries are of good quality, medium to large, firm, and attractive. The plants are productive and vigorous.

Bristol, in recent years, has become the most popular and most widely planted black raspberry in Ohio. The berries are medium-large, glossy, attractive, and firm with good quality. They are sometimes difficult to pick unless fully mature. The plants are tall, vigorous, hardy, and productive.

Cumberland, an old, established late season cultivar, as well as to the different virus diseases; produce good, quality. The plants are very susceptible to anthracnose as well as to the different virus diseases; produce good, but not exceptional, yields.

Morrison may be planted for extending the picking season. The fruit is somewhat above average in size, firm-



Bristol—perhaps the most widely planted black raspberry in Ohio. These clusters of fruits are ready for harvest.

ness, and dessert quality. The plants are vigorous, but not as productive as Bristol and Logan.

Allen was named in 1963 by the New York Agricultural Experiment Station. It has performed well in tests at the Ohio Agricultural Research and Development Center. It is very productive. The berries, which ripen with or slightly before Bristol, are large, attractive, and of good quality. Plants are vigorous. Recommended for trial plantings.

Black Hawk is the latest desirable black raspberry available. Plants are vigorous. The berries are of good size and quality, but it is not as productive as the recommended main season cultivars. The new cultivar, **Huron**, has recently become available. As yet it has not been grown long enough to determine its value here in Ohio. Until the worth of a new cultivar is established it should be used only on a limited basis.

Purple Raspberries

Purple raspberry fruits resemble the red more closely than the black raspberry in physical characteristics. The berries are grayish-purple color and have a unique flavor. In some areas their fresh market value is limited because of the unusual color and distinctive flavor of the fruit. Where the berries are known, they are prized for fresh fruit, freezing, and culinary purposes.

Sodus produces very large, attractive purple berries that are firm and of good quality, but quite tart. The plants are very vigorous, upright, very productive, and hardy.

Marion produces berries that are somewhat larger and later ripening than those of Sodus. They ripen 7 to 10 days after Latham. The moderately firm, slight conic, tart fruit holds its size well throughout the picking season. The plants are vigorous, hardy, and productive.

Clyde is a more recently introduced purple cultivar which appears to offer promise, although as yet not enough is known of its performance to warrant its general recommendation. It is reported to be vigorous and productive. It ripens with Marion.

Everbearing Raspberries

Everbearing raspberries produce one crop during the normal season on one-year-old canes and a second, partial crop on the current season's growth during late summer or early fall. The fall crop is often terminated by frost.

This type of raspberry is quite popular with home gardeners who grow them for the novelty of the fall crop. Commercial production is strictly limited to a few growers who supply special markets with fall berries. Their cultural requirements are basically the same as those of ordinary types.

Everbearing types of black raspberries have been introduced from time to time, and there is some interest in everbearing purple raspberries. As yet, however, the only reliable everbearing kinds are red raspberries. A brief description of the most desirable cultivars follows:

Durham ripens its fall crop earlier than any other everbearing raspberry. The fruit is large and attractive, but of only fair quality. The plants are vigorous and erect.

September matures its fall crop shortly after Durham and about four weeks earlier than Indian Summer. The berries are large, attractive, well colored, and of good quality.

Indian Summer is one of the older, better-known everbearing cultivars. The berries are large, attractive, and

of good quality, but have a tendency to crumble. It is one of the last of the everbearing sorts to mature its fall crop, and production is often limited by early killing frost. Because of this, September or Durham is preferred.

Blackberries

The trailing types of blackberries, such as the Boysenberry, Loganberry, Youngberry, and dewberry, are not adapted to Ohio conditions. The canes, unless given special winter protection, are not hardy enough to withstand severe winter temperatures, and hence are not reliably productive. In addition, the plants, because of their habit of growth, require trellising which is difficult as well as laborious because of their thorny nature. Therefore, trailing blackberries should not be considered even by the home gardener, unless he is willing to give particular care to their culture.

The erect types of blackberry are more winter hardy and can be grown successfully in Ohio in both commercial and home plantings. The plants are vigorous and productive. In recent years, the standard cultivars have been troubled with a disorder commonly referred to as "sterility." This difficulty has been associated with a number of factors, but no real solution to the problem has yet been found. Plants so affected generally make good growth. They bloom profusely but produce few berries, and these are usually malformed.

The sterility problem has limited the number of commercial plantings in the state. Growers can best avoid the problem by setting only plants obtained from known healthy fruiting stock. Plants troubled by sterility should be destroyed.

Hedrick is one of the newer erect type cultivars. The plants are hardy, vigorous, and productive. The berries, which ripen in early July, are large, firm, and of good quality.



Sterility has limited blackberry production in Ohio. Fruiting shoot at right is normal, while the one at left shows typical symptoms. Avoid it by the use of good planting stock and destruction of diseased plants.

Bailey, another new erect type which shows promise, produces large, firm, and mild berries which ripen shortly after **Hedrick**. The plants are hardy and vigorous, but not as productive as **Hedrick**.

Darrow, also a new erect cultivar, is similar to **Bailey**, but is reported to be hardier. Plants are very vigorous and uniformly productive. Berries are of good quality. It has produced very well under Ohio conditions.



Darrow is a hardy, vigorous, and uniformly productive blackberry cultivar under Ohio conditions.

Thornfree is a recently introduced thornless erect cultivar. Plants are vigorous, apparently hardy, and very productive. Fruits mature somewhat later in season than do ordinary sorts. Berries are medium to large, but lack firmness and are somewhat acid.

Smoothstem is another new thornless erect cultivar. Plants are vigorous, very productive, and reported to be hardy. Berries mature over an extended season, beginning about a week after **Thornfree**. Berries are medium to large and of good quality, but lack firmness. **Smoothstem** is very productive.

Selection and Care of Plants

The selection of planting stock is of major importance. Good quality planting stock is the key to success in the bramble fruit enterprise. The disadvantages of poor stock can never be overcome. Many serious production problems are often directly associated with the plants used in establishing the planting.

It is necessary to secure stock from a reputable source to be sure of getting disease-free plants, true-to-name. To secure plants of the desired cultivar, place orders as early as possible. When placing the order, indicate the desired delivery date. One-year-old plants are best.

The state certificate of nursery inspection is the grower's assurance that the plants are as free of disease and insect pests as possible. It is unwise to use plants that do not carry this certificate. Generally, the better the planting stock, the longer lived and more profitable the planting. Virus-free raspberry plants are now becoming available and, in the future, nurseries will offer a wider selection of cultivars that are virus-free.

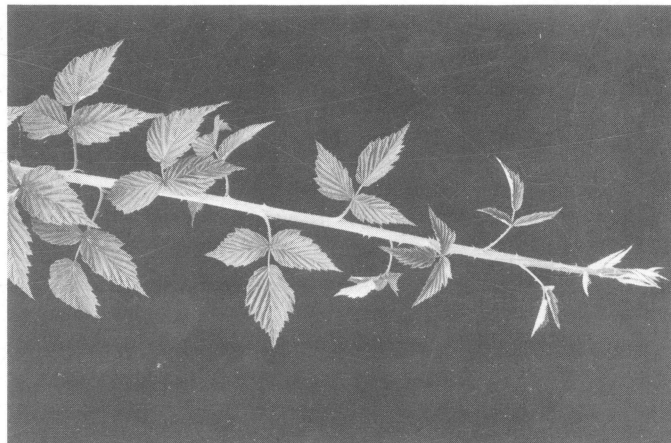
Dormant plants are best for planting. Plants dug and held dormant in storage, if properly handled, are as good as freshly dug ones. In some cases, they may be superior to freshly dug ones. It is important to keep plants from drying out.

As soon as the plants arrive, open the packages and, if necessary, moisten the roots. Unless planting can be done within a few days, place the plants in storage at about 35° F., or heel them in until they can be planted. To do this, dig a shallow trench, deep enough to accommodate the root systems, in a sheltered area where the soil is well drained. Open the bundles and place a single layer of plants against one side of the trench so that the root systems are completely below the soil surface. Cover the roots with soil, and firm carefully. Plants so treated can be held safely for a reasonable length of time, if they are not allowed to dry out. Do not delay setting plants any longer than absolutely necessary.

Although bramble fruits can be propagated rather easily, most growers find it wiser, unless they are keen observers of disease problems, to purchase nursery stock rather than use their own or their neighbor's plants.

Propagation

Growers are not encouraged to produce their own planting stock. Some growers, however, find the production of plants an interesting sideline, and, occasionally, plant production can be profitably combined with fruit production. The production of plants of the different bramble fruits is not complicated. Plants, however, cannot be sold unless the grower secures the proper certifi-



The black raspberry is ready for tip layering when new shoots elongate as shown here.

cate from the State Department of Agriculture, Division of Plant Industry at Reynoldsburg, Ohio.

Sucker plants or shoots which arise naturally within the planting from underground stems are used for the propagation of red raspberries. In late winter or early spring, before growth starts, these plants may be dug. After digging, the canes are shortened to 12 to 18 inches. Only large, strong plants should be saved. Limited numbers of some purple raspberry and blackberry cultivars which produce suckers can be obtained in the same way.

Black raspberries, most purple raspberries, and the new thornless blackberry cultivars are propagated by tip-layering. When the tip portions of the new shoots are elongated and light in color, with small curled leaves—normally in August—they are ready for layering. These tips are inserted vertically into the soil to a depth of 3 to 4 inches. The simplest way to layer is to force a small pointed shovel into the soil, move it back and forth to make a V-shaped opening, insert the tip, and press the opening closed with the foot.

The new plant will be ready for transplanting in late fall or the next spring. When the plants are dug, the cane from the parent plant is cut so that 6 to 8 inches of the old cane remains with the new plant. This portion of the old cane is referred to as “the handle.”

Frequently, with black raspberries and other brambles having a similar growth habit, the tips that contact the soil will root naturally. These plants are not considered to be desirable for establishing new plantings. Such plants should be destroyed during the pruning operation.

Root cuttings are normally used when large numbers of blackberry plants are to be propagated. This method is more complicated than those previously described. In the fall, plants are dug and the roots about one-fourth inch in diameter are saved. These roots are cut into pieces 3 to 4 inches long. The cuttings are then buried outside for the winter, below the frost line, in moist sand in a well-drained location. In spring, the cuttings are planted 3 to 6 inches apart in furrows 2 or 3 inches deep. They are laid horizontally at the bottom of the furrow. The plants will be large enough to transplant at the end of the first growing season. This method is not recommended for thornless cultivars. This type of plant can be propagated either by tip-layering or by stem cuttings.

Site Preparation

The proposed site should, ideally, be used to grow a fertilized cultivated crop the season prior to planting, or be maintained under a cover crop of soybeans. Chemical means of controlling chronic weed problems, such as thistle, quackgrass, and dock, may be done safely the season prior to planting (see pp. 8 and 9). Avoid sites infested with such troublesome weeds until the weeds have been eradicated. If a sodded area must be used, it is best to plow it in the fall before spring planting.

To help hold the soil, the area should be planted to ordinary rye the September prior to planting. Usually 2 or 3 pounds of seed per 1000 square feet or 2 or 3 bushels per acre will give the desired results. If animal manures are available, apply them in the fall. A suitable application is 50 to 75 pounds of horse or cow manure per 100 square feet or 10 to 12 tons per acre.

Prepare the site for planting as early as possible, usually during late March or early April. As the soil is prepared, a complete fertilizer may be disked-in. On most sites, 8 to 10 pounds per 1000 square feet or 350 pounds per acre of 8-16-16 or similar analysis fertilizer will be beneficial. Work the soil to near “seed bed” condition.

If the soil reaction is known to be below pH 5.5 incorporate limestone or hydrated lime at the time the site is prepared. Use lime only when the need is indicated. If the soil reaction is unknown, local county Extension agents can assist in determining it and will recommend the quantity of lime, if any is needed.

Even though early spring preparation is encouraged, it should not be done until the soil is dry enough to work. The advantages of early preparation will be lost if “wet soil” is worked. It may become “puddled.” The effect of puddled soil may be noticeable for the life of the planting, particularly on heavy soils.

Establishing the Planting

Early spring planting is best. Normally, plants can be set in late March or early April. It is better to delay planting than to attempt to work wet soil.

Fall planting may be done if the expected press of spring work will make spring planting difficult. Planting can be done in late October or early November after the plants have become dormant but before the soil freezes. A light mulch applied within the row area will reduce the loss of such plants from heaving caused by freezing and thawing of the soil.

The distance between bramble plants in the row and between rows depends on the training system followed and the vigor of the particular type of bramble. Brambles are generally grown either in “hedge rows” or in the “hill system.” Hedge rows are solid rows of plants which limit movement in the planting to one direction. The hill system is established on the basis of individual plants set 6 to 8 feet apart in both directions. It allows movement through the planting in all directions. Most growers, however, prefer the hedge row because it simplifies cultural practices and generally produces higher yields of fruit than does the hill system.

Where the hedge row is followed, red raspberries should be set 2 feet apart in rows 6 to 8 feet apart. Black and purple raspberries, which are more spreading, should be set 2½ feet apart in rows 8 to 10 feet apart, while the erect blackberry should be spaced at least 3½ feet apart in rows 10 to 12 feet apart. Adjust the actual distance be-

tween rows to the type of implements to be used in the maintenance of the planting. Most growers prefer the convenience afforded by the wider spacing between rows.

Set the plants at about the same depth as they grew previously. The crown of the plant (the point where the roots and stem join) should be no more than 1 to 2 inches below the soil surface. Plants may be set by hand in a furrow or in individual holes. In planting, spread out the roots and firm the soil carefully about them. To prevent drying of roots, carry the plants wrapped in wet burlap or in a bucket of muddy water during the planting operation. Ordinary mechanical transplanters can be adapted for use in setting bramble plants and may be used to advantage when large plantings are established.

The "handles" (the above ground portion) of black raspberries should be cut away and destroyed at planting time as a safeguard against early infections of anthracnose, a fungus disease.

Soil Management

It is important to keep bramble crops weed free by cultivation and hand hoeing during the first growing season. It is best to plant a cover crop of rye between the rows in mid-September. Usually, 2 to 3 pounds of seed per 1000 square feet or 2 to 3 bushels per acre will be needed. Some growers prefer ryegrass. In growing these cover crops, it is wise to keep the seed out of the row area. The cover, when disked down in early spring, will help maintain the soil organic matter content.

Once the planting has become established, there are several soil management practices that can be followed. Brambles are commonly cultivated between the rows during the growing season, followed with a cover of rye seeded in the fall. In such plantings, weed control in the row area is essential for good production. This may be accomplished by either physical means, hand hoeing, or through the use of herbicides.

Benefits in both growth and yield may be expected where a mulch system of soil management is adapted. Highest yields of the largest berries can be obtained when mulch is used. Although straw is the most commonly used mulch material, other organic materials such as sawdust can be used. Where ample mulch is available, it can be applied to the entire area of the planting row and aisle areas alike. It is best applied initially during the fall of the second season. Sufficient material must be used to suppress weed growth. Normally, 6 to 8 inches of loose straw is needed. Additional material will be required each succeeding fall to maintain sufficient mulch.

Mulch should be considered as a soil management practice in any planting. Because of the difficulty of obtaining mulch materials, however, it is more applicable to plantings of limited size.

If mulching material is limited, some benefits can be obtained by mulching the row area only. Where this is

done, it is better to keep the area between the rows under cultivation with a winter cover of rye. Some growers allow sod to develop between the rows of mulched plants. Where this is done, mow the grass several times during the growing season and allow clippings to remain where they fall.

Where plantings are used to produce plants as well as fruit, cultivation is generally followed, and no winter cover is seeded. Winter weed growth is depended on to hold the soil. In such plantings the incorporation of animal manures or other organic matter is most desirable.

Chemical Weed Control

Annual weed growth within bramble fruit plantings can be safely and effectively controlled through the use of recommended herbicides. Such techniques, in addition to solving the weed problem, remove the hazard of physical injury to the plants and their roots inherent with mechanical control methods. The use of such techniques should be considered for any large scale planting; however, use of such techniques in small family plantings is questionable.

Established perennial weeds such as quackgrass and thistle dock cannot be effectively controlled in bramble fruit plantings with the herbicides presently cleared for use in these crops. The only procedure recommended for control of these weeds in such plantings, therefore, is manual or mechanical.

Many of these difficult weed problems can and should be avoided by selecting planting sites free of perennial weeds or by using herbicides to destroy or kill them prior to establishment of the planting. Quackgrass, perhaps the most difficult problem, can be controlled on the proposed planting site before any crop is established by treating it with dalapon (2,2-dichloropropionic acid) at 10 to 20 pounds per acre, amitrole (3-amino-1, 2, 3-triazole) at 5 to 7½ pounds per acre, or amitrole T at 2 pounds per acre. (All rates refer to acres of sprayed area.)

All of these herbicides should be applied in 100 gallons of water per acre when the quackgrass is vigorously growing in early spring or early fall. Amitrole and amitrole T treatments are also effective in control of dock and thistles. About 10 days or 2 weeks after treatment, the weeds should be spaded or plowed under. Such treatment should be accomplished the season prior to the planting.

Chemical weed control in established plantings is of primary value in reducing the weed problem in the row area itself, and is primarily recommended for this purpose. Since weed growth between the rows can be handled most easily with power equipment, and since total elimination of weed growth in this area may create other cultural problems, such use does not appear warranted.

Before any herbicide is applied within a bramble fruit planting, the grower must be sure that such use is rec-



Black raspberry planting on July 12 where no chemical weed control has been followed. Heavy weed growth in the row competes with berry plants for soil moisture and plant nutrients. It is also costly to hoe out such an established weed growth.



Black raspberry planting that was sprayed on May 11 with diuron at the rate of 3 pounds commercial material per acre in 50 gallons of water. The photo was taken two months later. Note complete prevention of weed growth in the berry row. Diuron and simazine will give season-long control of annual weeds and grasses.

ommended on the label and is in current Extension Service recommendations. Further, the herbicide should be used only within the limitations stated on the label. Use of other than such recommended or approved herbicides may result in injury to the plants and undesirable residues in the fruit.

Successful chemical weed control depends on the application of the correct herbicide in the correct amount and at the proper stage of growth of both the weed and bramble. Improper use of even recommended herbicides can result in damage to the crop or lack of weed control. Since many variables can effect the results obtained,

growers are advised to learn to use chemical weed control measures in a portion of their plantings before making extensive applications.

The herbicides recommended for use in bramble plantings are best applied at low pressures, 40 to 50 pounds per square inch in 50 to 100 gallons of water per acre of sprayed area. A special herbicide sprayer which provides agitation within the tank and is equipped so as to allow directed spray within the row area is preferred. In making applications, be careful to avoid contact with crop plants.

The following herbicides were approved for use in bramble fruit plantings at the time of printing this bulletin. Since label approval on a given herbicide may change from time to time, the grower must check current recommendations before applying.

DIURON-(3-(3,4-dichlorophenyl)-1, 1-dimethylurea) may be applied at 3 pounds of the commercial product (80% WP) per acre of sprayed area. Apply as a directed spray in very early spring, after pruning, but before the plants begin to leaf out and before weed growth begins. Do not apply to newly set plantings, those with exposed roots, or those on very light or gravelly soils. Do not disturb soil surface following application.

SIMAZINE-(2-chloro-4,6-bis(ethylamine)-s-triazine) may be applied at 5 pounds of the commercial product (80% WP) per acre of sprayed area. Apply as a directed spray after pruning but before weeds emerge and fruit sets. For new plantings, use half the dosage. Do not apply to foilage, to exposed roots, or to plantings on very light or gravelly soils. Do not disturb soil surface following application.

CHLORO IPC-(esopeopyle N(3-chlorophenyl) carbamate) will effectively control small weed seedlings when applied at the rate of 5 pounds of the active herbicide per acre. Apply in late fall or very early spring when the plants are fully dormant. Apply after pruning in the case of the black raspberry and other brambles with a similar growth habit.

Fertilization

Brambles, like other plants, require ample quantities of all the essential plant nutrient elements if they are to grow and yield well. Under Ohio growing conditions, the soil generally supplies enough of all the nutrients except nitrogen. Hence, in general, the fertilizer recommendations for these fruits call for annual applications of nitrogen-carrying fertilizers.

The first fertilizer application is normally made when the site is prepared for planting, as described on page 7. Usually, this is enough fertilizer for the first year of planting. If the plants fail to "grow-off" well, it is advisable, however, to apply additional nitrogen in late May or early

June. For this purpose, apply 1 or 2 ounces of a 33 per cent nitrogen carrier (ammonium nitrate) or the equivalent per plant. Later applications should be avoided because plants so treated are more likely to suffer winter injury.

The general recommendation for the second and each succeeding season is to apply 50 to 150 pounds of actual nitrogen per acre. This would equal 150 to 450 pounds of ammonium nitrate per acre. This material should be broadcast into the row area in early spring before growth starts. In smaller plantings this would mean about 3½ to 10 pounds ammonium nitrate per 100 feet of row, or the equivalent of another carrier.

The appearance of the plants during the growing season provides a suitable guide to the amount of nitrogen to apply the following spring. Small, yellowish-green leaves usually indicate a lack of sufficient nitrogen. Plants showing such leaves will benefit from the higher rate of application. Plants with very dark green leaves and making excessive shoot growth may be over fertilized. The rate of fertilization to such plants should be reduced.

A more exact guide to the nutritional status of the various bramble fruits can be determined by means of foliar analysis. A foliar analysis service is available to Ohio growers through each county Cooperative Extension Service office on a nominal fee basis. The service supplies the grower with precise analytical results and specific fertilizer recommendations based on those results.

Mulched plantings will require more than the normal amount of nitrogen fertilizer until the mulch is well established, perhaps 2 or 3 years. Generally, twice the normal amount of nitrogen during these years will be needed. After that period, the mulched plants will require only about half as much nitrogen as those grown without mulch. As the mulch decays, it releases nitrogen and other nutrients.

If animal manures are available they may be used to fertilize bramble plantings. A general recommendation for most soils is 6 to 8 tons of cow or horse manure (275 to 365 pounds per 1000 square feet) or 2 to 3 tons (90 to 135 pounds per 1000 square feet) of poultry manure per acre.

Manures are best applied in late fall or winter months while plants are dormant.

Irrigation

Lack of water can seriously reduce crops of bramble fruits, particularly when it occurs just prior to or during the harvest season. Under such conditions brambles will respond favorably to irrigation. Lack of available water at this time can not only affect the current season's crop, but also limits the production of desirable fruiting canes and so affects the following year's crop.

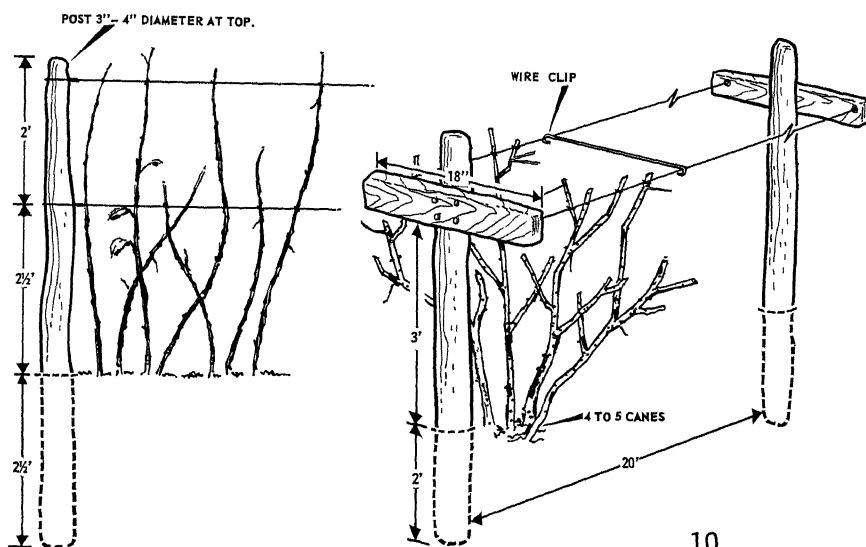
During the growing season, brambles require about one inch of water per week. When rainfall does not supply this amount, supplemental irrigation may be used to advantage. Portable sprinkler type irrigation is most popular.

Supporting the Canes

Supports for bramble fruit canes are not essential, except in the case of trailing type blackberries. They can be used to advantage, however, particularly with red raspberries, to minimize loss of crop due to wind damage, and to facilitate harvest and other cultural practices. Where supports are not used, more severe pruning is required. Because of the costs involved, supports are more widely used in home garden plantings than large commercial plantings in Ohio.

Where the hill system of culture is followed, support can be given by a single stake driven in the center of the hill. The stake should extend above the soil 4 to 5 feet and be stout enough to last a number of seasons. The fruiting canes are tied securely to the stake each spring following dormant pruning.

A wire trellising system is most practical where the hedge row type of culture is used. The two-wire system is common. Posts are set about every 20 feet with 3½ to 5 feet remaining above the ground. Near the top of each post is nailed a cross-piece about 18 inches long. A wire is attached to the ends of the cross-piece and run along



Typical single- and double-wire trellises used with bramble fruits. The single-wire type is most useful with red raspberries and trailing blackberries, while the two-wire system can be used with any of the brambles. The height of the trellis should be adjusted to the vigor of the plants.

each side of the row. The canes are trained between the wires or tied to them. Wire clips, used between the posts, will keep the wires from spreading.

A single-wire trellis may also be used. It is most useful with red raspberries and trailing blackberries. Posts are set in the same manner as for the two-wire trellis, but no cross-pieces are used. One, two, or three single wires are strung between the posts. The individual canes are tied to these wires following dormant pruning.

Pruning

Pruning Black and Purple Raspberries

Summer Topping: An essential step in the production of these brambles is summer topping. Topping consists of removing, by snapping off with the fingers or cutting with a pair of shears, the top 3 to 4 inches of the new shoots as they develop.

Topping should be done with black raspberries when the shoots are about 24 inches high and with purple ones when they reach 30 inches, if they are grown without supports. When plants are grown with supports, the shoots may be allowed to grow 6 to 8 inches more. Plantings need to be topped a number of times as new canes arise over a period of several weeks. In most seasons this operation will, in part, coincide with harvest.

Summer topping encourages the development of strong fruitful laterals. It also produces stronger, stockier plants better able to support their crops and to resist wind damage. Simply pinching out the tips or removing large segments of shoots has not proved to be as beneficial.

Removal of Fruited Canes: Characteristically, the canes of bramble fruits die shortly after they have produced a crop. These canes can be removed, therefore, anytime after the harvest season. They should be cut off close to the soil surface, removed, and destroyed. Many growers remove these canes immediately after harvest; others wait to remove them until the following season and cut them out as part of the spring pruning. Either practice is satisfactory.

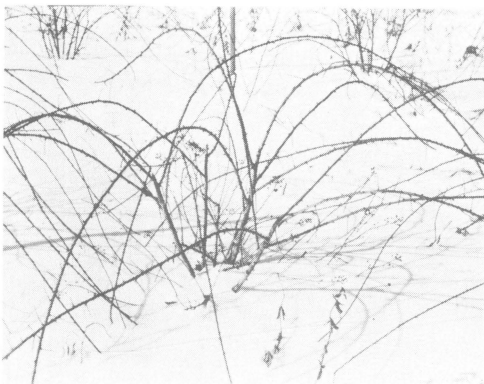


Summer topping is an important step in the culture of black and purple raspberries as well as erect-growing blackberries. When the new shoots reach the desired height, cut or snap off 3 or 4 inches of the shoot.

Spring Pruning: Spring pruning is best done after the danger of severe freezes is past and before the buds begin to swell. In Ohio, March is the most suitable month.

This pruning consists of removing all dead, severely damaged, or weak canes, and the shortening of laterals. With the black raspberry, best yields can be expected when 8 to 12 buds per lateral or 6 to 10 inches of growth are left. Experimental results show that shortening the laterals as indicated will not affect the total yield and will assure production of larger berries. If laterals are left too long, berries will be smaller. The stronger laterals may be allowed to carry more buds than those of small diameter. Very small spindly laterals, as well as any laterals close to the soil surface, should be removed entirely. Usually there is no need to thin out or reduce the number of canes per plant. Each plant needs at least 4 or 5 large canes for good yields.

Purple cultivars are handled similarly to the blacks. Because of their superior vigor, they may be allowed to carry 3 or 4 more buds per lateral.



Early spring pruning of the black raspberry consists of removing dead, injured, and very weak wood and shortening the laterals. Best results may be expected where only 8 to 10 buds per lateral are left.

Pruning Red Raspberries

No Summer Topping: New shoots of the red raspberry should **not** be summer pruned or topped. Such pruning usually reduces yields.

Removal of Fruited Canes: The canes of red raspberries are biennial in nature like other brambles. Therefore, they may be removed anytime after harvest. They should be cut off close to the soil surface. Removal may take place immediately after harvest or may be delayed until the time of spring pruning. Either practice is satisfactory. The canes of everbearing cultivars are handled the same way as ordinary cultivars, following the summer harvest. The shoots that bear the fall crop should not be removed after harvest as they will bear again the following summer.

Spring Pruning: Spring pruning is best done in very early spring after the danger of severe cold is past and before the buds begin to swell, usually in March. It consists of removing all dead, weak, or severely damaged canes, adjusting cane stand and reducing cane height.

Where the red raspberry is grown in hedgerow, best yields will be obtained when the rows are not allowed to exceed 18 inches in width. Thus, in the spring, all canes growing outside this row should be removed. Further, the number of canes within the hedgerow should be thinned so those remaining are 6 to 10 inches apart. In thinning these canes, save only the largest canes as indicated by diameter and length as they are the most fruitful. Where the hill system of culture is followed, only the best 7 to 8 canes should be saved per hill. The size of cane should be the guide in selecting the canes to be saved.

Most canes should be shortened or headed back. The height at which they should be headed depends on the vigor of the planting and whether or not supplemental supports are to be used. Light-to-moderate heading will not reduce yields. Plants so headed produce somewhat larger berries and are more resistant to wind damage than where no heading is done. Severe heading back will result in yield reduction. Normally, the canes should be reduced by a third or quarter of their total length. Where no support is offered, more severe heading is usually required. In most cases, regardless of original cane height, such unsupported canes should be cut to about 3 feet.

If lateral branches are present, they should be pruned to about 10 inches in length. Fruit normally ripens several days later on the laterals than on the main canes.

Pruning Blackberries

Summer Pruning: Summer topping of the new shoots of erect-growing types serve the same purpose as the topping of black and purple raspberries. The same method is used. Since these plants are more vigorous, top so as to leave the new shoots 30 to 36 inches above the ground. Do not top trailing types.

For best yields and to prevent the planting from becoming a thicket, remove excess sucker plants in the summer. This can be done by pulling or cutting them away soon after they appear. Where the plants are maintained as individuals within the row area or in hills, allow not more than 4 or 5 new shoots to develop within the plant area. Where a hedgerow type of culture is followed, it is best to leave only 3 or 4 shoots per running foot of row. All other shoots should be pulled or cut off as they develop. With trailing types, as many as 12 to 16 new shoots may be allowed to develop per plant.

Removal of Fruited Canes: Canes that have fruited may be removed anytime before the harvest season. They should be cut near the ground surface and removed from the planting. This can be done in the summer or as part of the spring operation.

Spring Pruning: Spring pruning of erect blackberries is much the same as that of black raspberries. Because of the greater vigor of this type of bramble, the laterals may be left 12 to 18 inches long.

Thin trailing-type blackberries to the best 7 or 8 canes per plant. Cut these canes to about five feet in length and tie them to either a stake or trellis. As with other brambles, remove all dead or weak canes before growth starts.

Winter Protection

The canes of recommended cultivars of red, black, and purple raspberries as well as blackberries, when well grown, are hardy in Ohio and require no special winter protection. Occasional winter injury to red raspberry canes occurs because of severe cold conditions in late winter after the rest period is broken. Attempting to protect canes from such injury is impractical.

Trailing-type blackberries, during most winters, demand special protection if the fruiting wood is to escape injury. They can be protected if, in the fall after the new growth becomes dormant, the new canes are placed on the ground and covered lightly with soil or straw. In the spring when danger of severe cold has passed, the canes are uncovered and placed on the trellis or tied to a stake.

Disease and Insect Problems

Brambles are particularly troubled by disease problems. The grower's failure to avoid or control disease is more apt to limit the productive life of a planting than any other factor. For these reasons, special attention should be given to the selection of site and planting stock.

The most serious problems are created by a group of systemic virus diseases. These diseases, which spread rapidly, seriously reduce the quantity and quality of berries produced. There is no program that can be followed to prevent entirely these problems. They can best be



Virus diseases can create serious problems in black raspberry plantings. Compare shoot affected with leaf curl on left to healthy one on right. Grower's solution is to avoid planting diseased stock and to destroy infected plants.

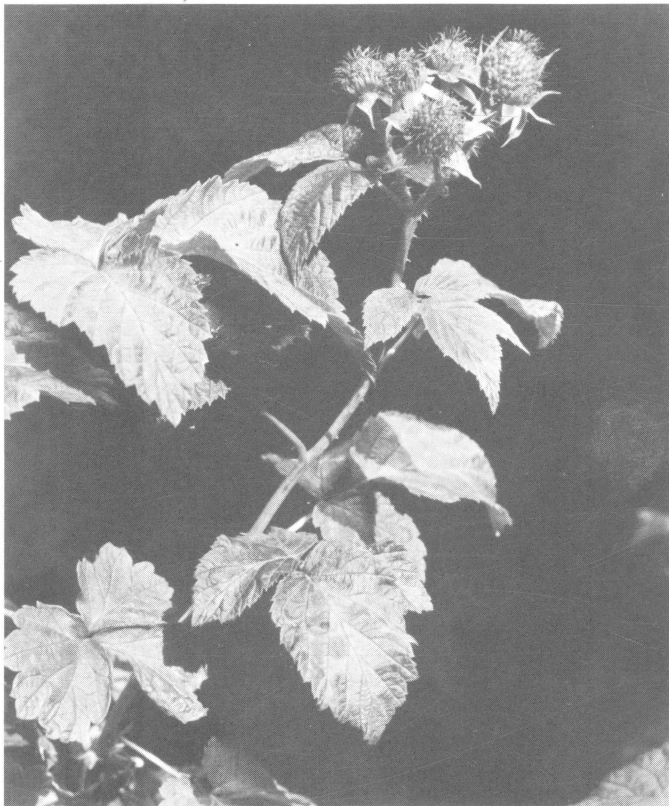
avoided by use of certified planting stock, isolated planting sites, and close observation of the planting. Infected plants must be destroyed as soon as observed to prevent spread of disease. Plants suspected of being diseased should be burned in place to destroy insect vectors and then removed from the field. Frequent inspection for the presence of these diseases is recommended.

The virus diseases are more severe on black and purple raspberries than on red. Their presence is generally indicated by foliage abnormalities, stunted growth, and poor quality berries. There are three common ones—**Mosaic**, **Leaf Curl**, and **Mild Streak**. **Mosaic** causes a reduction of leaf size and a green or yellow mottling of the

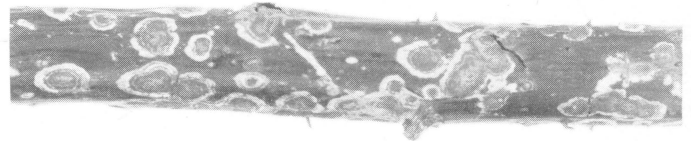
foliage. **Leaf Curl** severely stunts the plants. Infected plants have small, closely spaced leaves which curl downward and inward. **Mild Streak** infected plants are also dwarfed. Light purplish streaks may be visible near the base of new shoots. Berries that mature on infected plants are small, dry, and seedy.

Another troublesome disease of black raspberries and blackberries which cannot be controlled by spraying is **Orange Rust**. Plants infected with it are of little value. In late spring, such plants exhibit small distorted leaves with orange-colored spore bodies on the under side. The new shoots of such plants are willowy and free of thorns. Infected plants must be destroyed when the first symptoms appear to prevent spread of the disorder.

Anthracnose, or **Cane Spot**, is most often associated with black raspberries but also attacks the red and purple types as well as blackberries. The characteristic symptoms are oval grayish spots on the canes with reddish or purple borders. Spots may also occur on leaves and fruit stems. In severe cases, wilting may result. It can be controlled by a regular spray program which begins with a delayed dormant application of liquid lime sulfur, 10 gallons per 100 gallons of water, and follow-up sprays of Captan (50% WP), at the rate of 2 pounds per 100 gallons of water as the first blossoms open and two weeks later. It requires from 200 to 300 gallons of spray per acre to adequately cover a mature planting.



Black raspberry plant showing symptoms of mosaic, another virus disease.



Anthracnose is a common disease affecting the canes of brambles, especially black raspberries. It can cause marked yield reduction. Growers are advised to follow a regular spray program for its control.

Crown, or Cane Gall, is often found in bramble plantings. It causes cauliflower-like growths on the affected part. Spraying will not control it. Such plants should be destroyed. Infected planting stock and infected sites should be avoided.

Verticillium Wilt, sometimes called **Blue-Stem** or just **Wilt**, occasionally causes heavy losses in raspberry plantings. No cultivar or species of raspberry has shown resistance to wilt, although black raspberries seem to show severe effects more frequently. Symptoms first appear in midsummer. Affected plants cease growth, the leaves droop, turn yellow, and those at the base of new shoots drop. In severe cases, a broad blue stripe extends from the base upward on each shoot. Plants mildly affected may partially recover in the fall, but the canes usually do not survive the winter. As mentioned under the section, "Selecting the Site," there is no known control of this disease. Do not make plantings on land where tomatoes, peppers, eggplants, or potatoes have been grown recently.

Although bramble fruits and plants may be attacked by a number of insects, none are so consistently destructive as to warrant a regular annual control program.

One of the most common insects attacking brambles is the **raspberry cane borer**.* The adult insect is a dark,



Raspberry cane borer damage to raspberry. Note the two rows of punctures in the lower center of the photo.

slender beetle which appears in early July. At this time of the year the female makes two rows of punctures which encircle the cane approximately six inches below the tip. The tip above the puncture wilts and droops. This damage, together with the distinctive manner of stem girdling, makes the identification of this pest very easy. This insect is controlled by cutting off the wilted tips a few inches below the girdle during pruning operations.

* *Oberta bimaculata* Oliver.

There are practically no insect pests which are so persistently damaging to brambles as to warrant regular spraying programs. The only exception to this is in the case of the raspberry fruit-worm. Red raspberries, particularly in small plantings, should be treated on a preventive basis with insecticides. Chemical controls may not be needed in commercial plantings of black raspberries.

Current recommendations for the control of insects as well as diseases attacking brambles are available from local county Cooperative Extension Service offices.

Harvesting

A partial crop may be expected the second summer after a bramble planting is established. Full production should be reached by the third harvest season. Plantings may be expected to be profitably productive for 8 to 10 years. Carefully cared for plantings on good sites may produce longer, while those on marginal sites and those that receive poor care may become worthless in a few years.

Bramble fruits must be harvested and handled properly if the best yields of the highest quality berries are to reach the table. The best gauges of maturity are those of fruit color and ease of separation. Full color often develops before the berries separate easily. If the berries are picked too soon, berry size and flavor will be sacrificed.

When possible, avoid picking the berries when they are wet. Harvest as often as necessary, normally every second or third day. Pick berries by gently lifting the berries with the thumb and fingers. Raspberries separate, leaving the receptacle, the center part of the fruit, on the bush. Blackberries, when harvested, separate so that the receptacle remains with the fruit. Care should be taken to prevent crushing of the harvested berries. As soon as the berries are harvested, they should be protected from the sun, and, if possible, cooled so as to extend their shelf life.

Brambles are normally harvested directly into the container in which they are to be sold. The quart cup is the most widely used container. Some growers, particularly of red raspberries, prefer the pint container in order to minimize crushing. Harvesting can be facilitated by the use of either waist carriers or picking stands which leave both hands free. Waist carriers are the more popular.

"Public picking" or "pick-your-own" harvesting methods can be used effectively by blackberry or raspberry growers located near centers of population. The consumer picks his own fruit, usually into his own container. The fruit is then paid for on the basis of volume or weight. Once this system is developed much of the cost of securing and transporting pickers, marketing, and containers is avoided. Careful supervision of the picking operation must still, however, be maintained.

Grower Services

The Ohio Cooperative Extension Service maintains three special service laboratories to assist Ohio growers and to supplement its special publications and planned educational programs.

Complete details of these services, which are available on a nominal fee basis, may be obtained from each local County Extension Service office. It is important that samples supplied to the laboratories be collected, prepared and mailed with the required information in order that these services will be of greatest value to growers.

The services available are briefly described below:

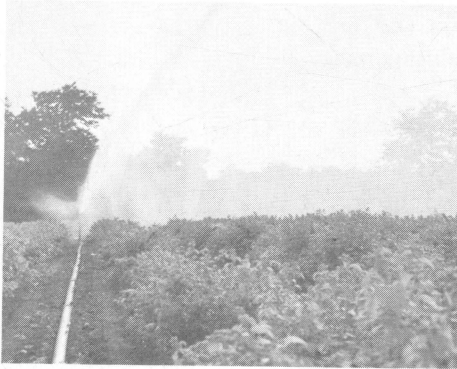
The Plant Analysis Laboratory is located at The Ohio Agricultural Research and Development Center, Wooster. Specified plant parts can be analyzed for content of thirteen nutrient elements: nitrogen, phosphorus, potassium, sodium, calcium, magnesium, manganese, iron, boron, copper, molybdenum, zinc, and aluminum. Leaf or petiole samples from fruit crops should be collected and mailed to the laboratory between July 20 and August 10.

The results of the analysis are returned to the grower along with recommendations as to specific alterations in the fertilizer program that may be needed, according to the analysis results.

The Soil Testing Laboratory, located on The Ohio State University campus, makes chemical analyses of soil samples. The laboratory is equipped to analyze samples for organic matter, pH, phosphorus, potassium, magnesium, manganese and boron. A competent authority in each specialty field prescribes individual fertilizer and cultural programs based on the soil test results. Samples may be taken and mailed to the laboratory any time of year.

The Plant Disease Clinic, 1735 Neil Avenue, Columbus, Ohio 43210 is also on The Ohio State University campus. The clinic was established to assist growers in diagnosing plant disease problems.

In the laboratory, special diagnostic techniques are used to determine the cause of an apparent disorder. The grower submitting the sample is thereupon supplied with the diagnosis together with recommendations for control of the disorder.



BRAMBLE FRUITS are among the choice fruit crops that can be successfully grown throughout Ohio. Modern practices applied to the culture of these fruits can make them profitable to the commercial grower and rewarding to the home gardener. The nutritious berries make delightful deserts, are prized for use in pies, jellies, jams, and for freezing.