

Small Fruit in the Home Garden

*Diane Relf and Jerry Williams**

The small fruits offer advantages over fruit trees for home culture. They require a minimum of space for the amount of fruit produced and bear one or two years after planting. Also, pest control typically is easier than with most tree fruits.

Success with a small fruit planting will depend on the attention given to all phases of production: variety selection, soil management, fertilization, pruning, and pest control. Plant only what you can care for properly. It is better to have a well-attended, small planting than a neglected, large one.

Planning the Small Fruit Garden

Locate your small fruit planting as close to your home as possible, in full sun. Space in or near the vegetable garden is usually preferred. Where space is a limiting factor, small fruits may be used in place of ornamental plants of comparable size. Strawberries may be used as a border for a flowerbed or as a ground cover. Grapes and raspberries may be planted parallel to the garden on a trellis or a fence along a property line. Blueberries may be planted to form a dense hedge or used in a foundation planting around the home. Select a site that is free from frost pockets, low/wet spots, and exposure to strong prevailing winds. Small fruits thrive best in a fertile, sandy

loam soil high in organic matter, but they will give good returns on the average garden soil under adequate fertilization and good cultural practices.

Overcrowding frequently results in weak plants and low yields. It also makes insect and disease control more difficult. For best results, small fruit plants should be set no closer than the minimums indicated in Table 1.

Special attention should be given to the selection of varieties. They must be adapted to your soil and climatic conditions. If possible, without sacrificing too much yield or quality, select varieties with the least insect and disease problems. Table 2 lists some varieties of small fruits suggested for planting in the home garden. They are listed in the order of ripening, and include only those adapted for growing under Virginia conditions.

Obtain the best nursery stock available. Buy only from reputable nurserymen who guarantee their plants to be true to name, of high quality, and packed and shipped correctly. Beware of bargains. High prices do not necessarily mean high quality, but well-grown plants are not cheap.

Place your order early, as soon as you decide what you want. Specify variety, size, grade of plants desired, and time of shipment preferred. It is best to have the plants arrive at the time you are ready to set them out. Unless you specify otherwise, some nurseries will only send plant material at the proper time to be planted in your area.

When your order arrives, unpack the bundles and inspect the plants. The roots should be moist and have a bright, fresh appearance. Shriveled roots indicate that the plants have been allowed to freeze or dry-out in storage or transit. Such plants seldom survive. Water root system lightly only if they are very dry.

If the plants cannot be set immediately, they should be kept either in cold storage or heeled-in. Wrap them in a garbage bag or other material that will prevent them from drying out, and store them at a temperature just above freezing. Strawberry plants, in small quantities, may be held in the refrigerator for a few days. Avoid storage chambers with apples and pears, which release damaging ethylene gas. If refrigerated storage is not

Table 1. Space Requirement, Yield, Bearing Age, and Life Expectancy of Small Fruits.

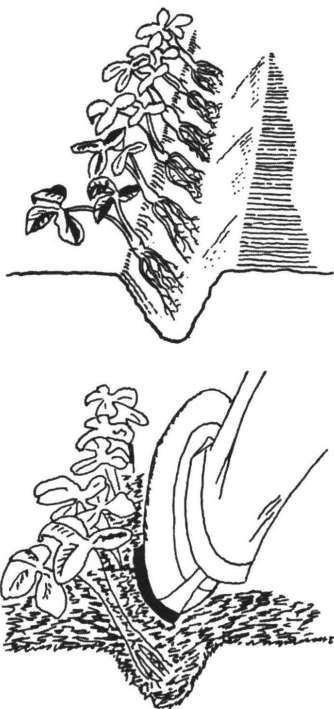
Fruit	Minimum Distance		Annual Yield per Plant	Average Bearing Age	Life Expectancy
	Between Rows	Between Plants			
	Feet	Feet	Quarts	Years	Years
Blueberry	6	4	4-6	3	20-30
Blackberry (erect)	8	3	1 1/2	1	5-12
Blackberry (trailing)	8	6	1 1/2	1	5-12
Raspberry (red)	8	3	1 1/2	1	5-12
Raspberry (black)	8	4	1 1/2	1	5-12
Raspberry (purple)	8	3	1 1/2	1	5-12
Grape (American)	10	8	15 lb	3	20-30
Grape (French American)	10	8	15 lb	3	20-30
Grape (muscadine)	10	10	15 lb	3	20-30
Strawberry (Juneberry and dayneutral)	3	2	1-2*	1	3
Strawberry (ever bearer)	3	1	1/2	1/3	2
Currant	8	4	4-6	3	10-20
Gooseberry	8	4	4-6	3	10-20

* per parent plant grown in the matted row system.

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available, remove the plants from the bundle and heel them in carefully in a trench of moist soil in a shaded location (Illus. 1). Pack the soil firmly around the roots to eliminate all air pockets and to prevent the roots from drying out.



Illus. 1

Establishing the Planting

There is probably nothing that causes more disappointment and failure in small fruit plantings than the lack of careful preparation and attention to detail at the time the plantings are established. Prepare the soil properly, set the plants carefully, and generally create conditions favorable for new growth. Detailed suggestions for the establishment of each of the small fruits follows. These suggestions should be followed closely for best results.

Maintaining the Planting

Once the planting has been established, future success will depend on the care it is given. If the planting is to be productive and long-lived, it must be properly fertilized. Competition from weeds or other plants must be avoided. Insects and diseases must be controlled, and the plants must be properly pruned. Study the maintenance suggestions for each of the small fruit crops, and plan to care for the planting properly. To do otherwise will probably result in disappointment and wasted effort.

Table 2. Some Suggested Varieties for the Home Small Fruit Planting (listed in order of ripening).

BLUEBERRIES (Highbush)	GOOSEBERRIES
¹ Earliblue	Pixwell
¹ Blueray	Red Jacket
Bluecrop	
Jersey	STRAWBERRIES (Regular)
² Berkeley	Earliglow
Coville	Sunrise
Elliott	Delmarvel
	Honeoye
BLUEBERRIES (Rabbiteye)	Surecrop
Climax	Redchief
Premier	Allstar
Powderblue	Delite
Tifblue	Lateglow
BLACKBERRIES (Erect)	STRAWBERRIES (Ever-bearing)
Darrow	Ozark Beauty
Cherokee	
Cheyenne	STRAWBERRIES (Day-neutral)
Comanche	Tribute
Shawnee	Tristar
Navaho	
	GRAPES (American bunch)
BLACKBERRIES (Semi-erect)	Seneca (white, seeded)
Black Satin (thornless)	Himrod (white, seedless)
Dirksen (thornless)	Mars (blue, seedless)
	Delaware (red, seeded)
BLACKBERRIES (Trailing)	² Concord (blue seeded)
(Dewberry and Boysenberry)	Steuban (blue, seeded)
Lucretia	Niagra (white, seeded)
Lavaca	
	GRAPES (hybrid, for wine)
RASPBERRIES (Red)	Vidal blanc (white)
Latham	Chardonel (white)
Heritage (everbearing)	Traminette (white)
	Chambourcin (black)
RASPBERRIES (Black)	
New Logan	GRAPES (Vinifera)
Bristol	Chardonnay (white)
Cumberland	Cabernet Franc (black)
Titan	
	GRAPES (Muscadine)
RASPBERRIES (Purple)	Scuppernong
Brandywine	³ Carlos
Royalty	³ Magnolia
CURRANTS	
Wilder	
Red Lake	

¹ Recommended for Eastern Virginia only.

² Not recommended for Eastern Virginia.

³ Perfect flowered. Scuppernong is female flowered and requires pollinizers.

Strawberries

Strawberries are the most widely cultivated small fruit in America. They are the favorite of many for pies, jams, jellies, preserves, and for eating fresh. Because strawberries are adaptable to a greater range of soil and climatic conditions than any other fruit, they are well suited to the home garden, (where supplemental watering is readily accessible).



Variety Selection

Strawberry varieties vary greatly in their adaptability to soil and climatic conditions. The varieties suggested for planting in Virginia have been selected on the basis of plant vigor, productivity, and quality of the fruit. Virus-free plants of the varieties are available and should be purchased. Varieties other than those listed may perform equally well.

Allstar bears late midseason. The berries are pinkish-red, very large and symmetrical with a sweet, mild flavor — great for table use. They are resistant to red stele and verticillium wilt and have some resistance to leaf scorch and powdery mildew.

Delite has berries that are large, long, and conic in shape. They are vigorous and produce runners freely. They are highly resistant to both red stele and verticillium wilt. Fruit flavor is mild, which makes it a good dessert berry; however, freezing ability is only fair.

Delmarvel is productive on a variety of different soil types. It is an attractive berry with good aroma and flavor. Plants have excellent disease resistance and good winter hardiness.

Earliglow is a variety noted for its superior dessert quality and disease resistance. The medium-large berries are very attractive with a glossy, deep-red color. It is one of the best for eating fresh, as a frozen product, and in jams and jellies. The plants are very vigorous and productive; however, they bloom early and are subject to frost injury.

Honeoye is one of the most highly regarded and popular varieties grown in the east. Fruit has excellent size, color, and freezing quality. Plants perform best on lighter soils and lack disease resistance.

Surecrop is mildly subacid and not of the highest quality for desserts. The deep-red berries are large and irregularly shaped. The plant is large, vigorous, and tolerant of drought and other environmental stresses.

Redchief is an extremely productive, high-quality dessert berry. It is medium to large in size; of uniform, deep red color; and has a firm, glossy surface. Redchief is very resistant to red stele.

Lateglow was developed for its production of fancy quality, late-season fruit and good disease resistance. Its berries are very large, symmetrical, and attractive. Its dessert quality is good for both fresh eating and freezing.

Sunrise produces extra-firm berries that run from medium to medium-large in size. They are relatively drought resistant and extremely vigorous. They have a tremendous aroma and a sub-acid flavor that makes them great for desserts and preserves.

Everbearing strawberries

These are less vigorous and generally less productive than the regular varieties. Because of consistently low yields, they are not recommended for planting in Eastern Virginia. **Ozark Beauty** is the most popular everbearing strawberry in Virginia, and the only one that can be recommended at this time. The plant is vigorous and produces good-quality fruit. The berries are red, wedge-shaped, firm, and only slightly acid. It is a good variety for eating fresh and for freezing.

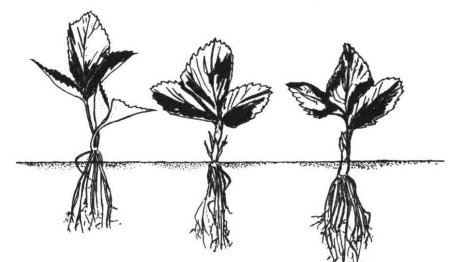
An interesting development of strawberry breeding in recent years is the production of varieties that are day-length neutral. This means that they do not respond to day length the way that conventional varieties do and can continue to produce over a longer period of time during the season. Although these varieties are sometimes listed with everbearers in catalogues, they are heavier producers and can be used satisfactorily in the home garden. **Tribute** is a vigorous variety with glossy, deep-green leaves; fruit is medium-sized in spring and summer, large in fall. Production and size drop in the heat of summer, but pick up in fall; this variety is best for fresh eating. **Tristar** also produces high-quality fruit, but is not as productive as Tribute.

Establishing the Planting

Site and Soil. Strawberries bloom very early in the spring, and the blossoms are easily killed by frost. In areas where late frosts are a hazard, try to select a site for your planting that is slightly higher than surrounding areas. Although strawberries grow best in a fertile, sandy loam soil with a pH of 5.7 to 6.5, they may be successfully grown in any good garden soil that is well drained and well supplied with organic matter. Soil for strawberries should be thoroughly prepared for planting. It should be loose and free of lumps. Avoid planting early varieties on south-facing slopes and be sure to select a site where tomatoes, potatoes, or eggplants have not been grown. These crops often carry verticillium wilt which lives in the soil for many years, and strawberries are very susceptible to this disease.

Do not set strawberries in soil that has recently been in sod. A clean-cultivated crop planted on the site for a year or two will leave the soil better prepared for strawberries and will assist in controlling weeds and white grubs which are troublesome in strawberry plantings. Where grubs and ants are a problem, chemical control may be necessary.

Planting. Virus-free, 1-year-old dormant plants should be set out early in the spring, about three or four weeks before the average date of the last frost. Spacing of the plants will depend on the training system used, but they should not be crowded. They should be placed no less than 12 inches apart in rows 3 to 3' feet apart. Set each plant so the base of the bud is at the soil level. Spread the roots out, and firm the soil carefully around them to prevent air pockets which allow them to dry out.



Too Shallow Correct Too Deep

Maintaining the Planting

Soil Management. Cultivation for weed control in strawberries should begin soon after planting and continue at approximately two-week intervals throughout the first growing season. Cultivation must be shallow to prevent root injury. Hoe as often as necessary to remove grass and weeds growing between the plants.

In colder areas, home garden strawberry plantings should be winter mulched. Any organic material free of weed seeds makes acceptable mulch. Hay, straw, and pine needles are most frequently used. Mulch should be applied 2 to 4 inches deep over and around the plants after the first freezing weather in the fall. This protects them from injury due to freezing and heaving of the soil during the winter. After the danger of frost is over in the spring, about half the mulch should be raked off the plants into the area between the rows. Mulch left around the plants will help keep the berries clean, conserve moisture, and check weed growth.

Fertilization. Where a soil analysis indicates the need, about 1 pound of a complete fertilizer, such as 10-10-10 or 10-6-4, per 100 feet of row should be cultivated into the soil before planting. The fertilizer used in the fall application should be the same analysis at the same rate and should be broadcast over the row in late August or early September.

The limited root systems will not benefit from fertilizer placed in the row middles. Brush the material off the plants to avoid foliage injury.

Do not apply spring fertilizer to strawberries growing in heavy soil because there is danger of excess vegetative growth resulting in reduced yield, increased rot, later ripening, and poor-quality fruit. In light, sandy soils where nitrogen leaches out rapidly, a spring application is usually beneficial. Apply a quickly soluble nitrogen fertilizer, such as nitrate of soda, at the rate of 1/2 to 3/4 pound per 100 feet of row before new growth begins.

Training. There are three popular training systems used in strawberry production. Many modifications of these systems are found. Under the **matted-row system**, used by most home gardeners, runner plants are allowed to set freely in all directions. The original plants should be set 18 to 24 inches apart in the row. Keeping the width of the plant bed narrow (16 to 18 inches) results in a good grade of fruit that is easy to pick.

Plants in the **spaced-row system** are set 18 to 24 inches apart in the row. The runner plants are set in place by hand until the desired stand is obtained. They are usually spaced 6 to 12 inches apart. All late-formed runners are removed as they appear.

In the **hill system**, plants are spaced 12 inches apart in the row. All runners are removed as soon as they appear, and the plants are encouraged to multiply in large crowns. This system is desired by many because the planting is easier to cultivate and harvest and produces larger, better berries than other systems. Many plants are required, however, and the initial cost of the planting is high. Black plastic mulch is particularly effective with this training system, but requires drip irrigation lines for

optimum performance. This "plasticulture" system is currently popular with commercial growers.

Blossom Removal. During the first season, all flower stems on the plants should be removed as soon as they appear. This strengthens the plants and allows early and vigorous runner production. The early-formed runner plants bear the best fruit the following year.

Renovation. If your strawberry planting is in a vigorous condition, it may be retained for fruiting the second year. However, allowing a planting to fruit more than two years often results in smaller berries and weak plants.

Soon after harvest, remove the mulch and clip the tops of the plants to within 1 inch of the crowns with a scythe or mower. If insects and foliage diseases are prevalent, move the leaves and mulch material out of the planting, and burn them. Apply a quickly soluble nitrogen fertilizer, such as ammonium nitrate (NH_4NO_3) at 1/4 to 1/2 pound or 1 to 2 pounds of 10-10-10 per 100 feet of row to encourage vigorous top growth. Any good garden fertilizer supplying an equivalent amount of nitrogen may be used if desired.

Some plant thinning may be needed, particularly in the matted-row system. Thin plants to 6 to 8 inches apart after new foliage appears. Keep the planting clean cultivated throughout the summer, irrigating when necessary during the dry season to keep the plants growing vigorously. Fertilize again in the fall as recommended for the first year, and renew the mulch after freezing weather begins.

Pest Control. Birds are one of the biggest pests in the strawberry planting. It may be necessary to cover the plants with plastic netting to keep the crop from being eaten before the berries are ripe enough to harvest. Aluminum pie tins, suspended by a string or wire above the plants in such manner that they twist and turn in the breeze, may be successful in keeping birds away.

Culture of Everbearing Varieties

Irrigation is particularly important for everbearing varieties because the late-summer/early fall crop ripens during a period when soil moisture is usually quite low. Soil preparation and fertilizer requirements before planting are the same as for regular varieties. Best yields are obtained from the everbearing varieties if they are set in early spring in the hill system about 1 foot apart, cultivated for the first ten days to two weeks, then mulched to a depth of 1 to 2 inches with sawdust. As the sawdust decays, the development of a nitrogen deficiency could occur. It can be quickly overcome with the application of 1 pound of 10-10-10 to each 100 square feet of mulched area.

Remove all runners as soon as they appear to encourage the plants to multiply in large crowns. Blossom clusters must be removed until the plants have become firmly established and are growing vigorously, usually about the first of July. Berries will begin to ripen about a month later, and plants will continue to bear fruit until frost if weed growth is kept down and adequate moisture is supplied. Allow the plants to bear fruit for the spring and fall crops the second year, then replant the following spring.

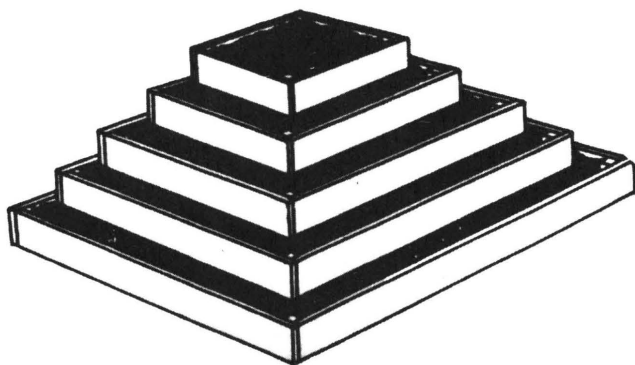
Harvesting the Planting

In the home garden, strawberries should be allowed to develop an overall red color and become fully ripe before harvesting. It is at this stage that the sugar content is highest and the flavor is best. It may be necessary to harvest every day during the peak of the season.

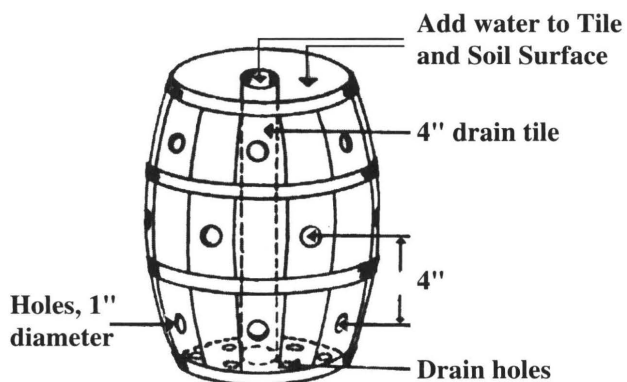
Harvest the berries carefully by the stems just above the caps to prevent bruising. Pick all that are ripe, since they will not keep until the next harvest. Ripe strawberries may be held for a day or two in a refrigerator.

Strawberry Growing in Pyramids and Barrels

In a garden where space is extremely limited or where the gardener wishes to use the strawberry planting as a novelty or decorative feature, the strawberry pyramid or the strawberry barrel can be useful and interesting. Pyramids may be square or round. Each step of the pyramid should have a flat surface not less than 6 to 8 inches in width. The frames for a square pyramid can be constructed out of landscaping wood. A suggested soil mixture for the pyramid is two parts good garden soil, one part peat, and one part sand.



In preparing a strawberry barrel, 1-inch diameter holes are made in the sides of the barrel at approximately 8-inch spacings. As the barrel is filled with successive layers of soil, strawberry plants are carefully inserted through the holes so that the roots are held firmly in contact with the soil. A porous tile inserted down the middle of the barrel will facilitate water reaching all of the plants (see diagram). Though the strawberry barrel may be a successful novelty, yields of fruit will be smaller than those in pyramid culture, and much more attention to planting, watering, and winter protection are required.



Damage to the strawberry plants growing under normal cultural conditions can be expected if they are not protected from extreme cold during the winter. Owing to the fact that plants growing in a pyramid or barrel are elevated above normal ground level and therefore are highly exposed, additional winter damage can be expected to roots, crowns, and fruit buds. Consequently, care must be taken to provide adequate winter protection. Pyramids can be mulched with 6 to 8 inches of straw after the soil is frozen. In the coldest part of the state, strawberries in barrels will survive better if protected with burlap covering. For especially cold winters, enclose straw in the burlap for added insulation. However, even with careful mulching, some plant injury can be expected during severe winters.

Grapes

Grapes of some type can be grown almost anywhere. Careful selection of cultivated varieties compatible with local soil and climatic conditions has led to successful production in home gardens and commercial vineyards.



American Bunch Grapes

Gardens may include a number of varieties of bunch grapes ripening in succession over a long season.

Seneca, an early yellow grape, is noted for its good flavor and tender pulp. It holds well on the vine and will keep in cold storage for about two months after harvest. Vine vigor and productivity are only moderate, and this variety is quite susceptible to black rot and mildew.

Himrod, a new golden-yellow grape, has good flavor and is almost seedless. Hardy, vigorous, and productive, it has been superior to its sister seedling, Interlaken, in areas where both have been grown.

Delaware is a high-quality, red grape ripening about one week before Concord. Quite susceptible to downy mildew, this variety produces clusters and berries that are rather small and vines that grow slowly. Delaware has an unusually good balance of sweetness and acidity. It yields fine-quality white wines and is often used in blends for American champagnes.

Concord is by far the most widely planted blue-black grape. The good-quality fruit ripens unevenly some seasons in warm climates. Concord is an excellent variety for the home gardener! The vines are vigorous and productive.

Steuben is a blue-black variety ripening about one week after Concord. The berries are medium in size with a sweet, spicy flavor. They keep well in storage. The vines are hardy, vigorous, and productive.

Niagara has green-white berries and is used in wine and as a table grape. It is the most widely planted white American grape in the United States and is being used more and more for white juice.

Mars Seedless has medium-sized berries of the slip-skin type and is sweet and enjoyable. It is a cold-hardy plant with high resistance to black rot, powdery mildew, and downy mildew.

Hybrids for wine

The following hybrids have been sufficiently tested and can be grown anywhere American bunch grapes can be grown.

Chambourcin is a black grape that produces a red wine often compared to Merlot.

Chardone is a late ripening white wine grape. It is very productive and more cold hardy than Chardonnay, which is one of its parents.

Traminette is a mid-season white wine grape with good productivity and partial resistance to several fungal diseases. It produces a wine with characteristics similar to one of its parents, Gewurztraminer.

Vidal Blanc is vigorous white wine grape, medium winter hardy, and ripens 5 to 10 days after Concord. It is slightly susceptible to downy mildew, moderately susceptible to powdery mildew.

Vinifera

Varieties of *Vitis vinifera* for table and wine use have increased in popularity in recent years. Although they lack winter hardiness, are susceptible to fungus diseases endemic to this area, and are totally lacking in resistance to the grape root louse, *Phylloxera*, it is possible to grow them with careful variety selection and cultural practices. Viniferaculture requires planting only vines grafted on resistant rootstocks, a rigorous spray program, and protection in areas subject to frequent, low and fluctuating winter temperatures.

Cabernet franc is a black grape that produces fine red wine. Vines are vigorous and more cold hardy than other black vinifera types.

Chardonnay, considered by many to be superior to all other varieties for dry white wine, is only moderate in hardiness, vigor, and productivity. It is a medium-sized, white grape in a compact cluster ripening three to five days ahead of Concord.

Muscadine Grapes

In areas where it is adapted, the muscadine grape is a favorite for home plantings. It is highly desirable for juice, jam, and jelly. Some varieties are cultivated for the exceptional quality of the wine. It cannot be successfully grown where temperatures fall below 10°F, however, which limits its production.

Many varieties have imperfect flowers and require pollination from either male or perfect-flowered varieties. Of those suggested for planting, Carlos, Magnolia, and Dearing are perfect-flowered and will supply adequate pollination for the other varieties.

Scuppernong, a name commonly applied to all bronze-skinned muscadine grapes, is the oldest and best-known variety. Berry clusters are usually small and shatter badly, but the grape quality is good, and it has a very distinctive flavor.

Carlos, a 1970 introduction from North Carolina, is a perfect-flowered bronze variety, ripening with Scuppernong and similar in size and flavor. It makes excellent white wine and is relatively cold hardy, disease resistant, and productive. It is recommended for both commercial and home garden plantings.

Magnolia is a self-fertile, white variety of large size and very high quality. The vine is vigorous and very productive.

Establishing the Planting

Site and Soil. Grapes should be planted where they have benefit of the sun for most of the day. They are deep-rooted plants, frequently penetrating to a depth of 6 to 8 feet under good soil conditions. They grow best on fertile, sandy loam soils high in organic matter. Deep sands or heavy clays may be used, however, if provisions are made for adequate fertilization, moisture, and soil drainage. Grapes are tolerant of a wide range of soil acidity, but prefer a 6.0 to 6.8 pH range.

Planting. Grape vines are usually set in early spring, about three or four weeks before the average date of the last frost. Vigorous, 1-year-old plants are preferred. Allow plenty of room between plants, at least 8 feet for the American bunch varieties and 10 feet or more for the vigorous-growing muscadine type. Trim the roots to about 6 inches in length to encourage formation of feeder roots near the trunk. Where the vines are to be set, dig the holes large enough so the roots can be spread without crowding and the plants can be set at about the same depth they grew in the nursery. Prune to a single cane, and head it back to two buds.

Maintaining the Planting

Soil Management. Mulching is the preferred soil management practice in home grape planting. Hardwood or softwood bark mulch to a depth of 4 to 6 inches is recommended.

Although grapes are deep-rooted plants, they do not thrive in competition with weeds and grass. If mulch material is unavailable, some cultivation should be done. It should be shallow and only as necessary to eliminate undesired vegetation.

Fertilization. Like all fruit plants, grapes usually require nitrogen fertilization. Except in sandy soils, this element may be the only one needed in the fertilization program. In the home garden, 1 ounce of ammonium nitrate per vine should be applied after growth begins in the spring. Spread the fertilizer in a circle around the plant and 10 to 12 inches from the trunk. Repeat the application about six weeks later. Just before growth begins in the spring of the second year, apply 4 ounces in a 4-foot circle around each vine and about 1 foot from the trunk. Apply the same amount (4 ounces) the third year. A mixed fertilizer, such as 10-10-10, applied at twice the rates may be substituted where phosphorus and potassium are needed.

Fertilizer applications to mature, bearing vines should be based on the growth and vigor of the plant. If the average cane growth is only 3 feet or less, additional nitrogen may be needed. Where proper pruning is practiced and competition from weeds and grass is kept to a minimum, however, it is doubtful that you will need to go beyond the amount recommended for a 3-year-old vine.

Training and Pruning. Much attention is given to the training and pruning of grapes. To be most productive, they must be trained to a definite system and pruned rather severely. There are several training systems used. Two that are commonly used are the vertical trellis and the overhead arbor. Both of these are satisfactory in the home planting if kept well pruned.

Of the many variations of the vertical trellis, the single trunk, four-arm Kniffin system is the most popular. Posts are set 15 to 20 feet apart and extend 5 feet above the ground. Two wires are stretched between the posts, the lower being about 2 1/2 feet above the ground and the upper at the top of the posts. Set between the posts, the vine is trained to a single trunk with four semipermanent arms, each cut back to 6 to 10 inches in length. One arm is trained in each direction on the lower wire.

During annual winter pruning, one cane is saved from those that grew from near the base of each arm the previous summer. This cane is cut back to about ten buds. The fruit in the coming season is borne on shoots developing from those buds. Select another cane from each arm, preferably one that grew near the trunk, and cut it back to a short stub having two buds. This is a renewal spur. It should grow vigorously in the spring and be the new fruiting cane selected the following winter. All other growth on the vine should be removed. This leaves four fruiting canes, one on each arm with eight to ten buds each, and four renewal spurs, one on each arm cut back to two buds each.

The same training and pruning techniques may be effectively used in training grapes to the arbor system. The only difference is that the wires supporting the arms are placed overhead and parallel with each other instead of in a horizontal position. Overhead wires are usually placed 6 to 7 feet above the ground.

If an arm dies or for any reason needs to be replaced, choose the largest cane that has grown from the trunk near the base of the dead arm and train it to the trellis wire. To renew the trunk, train a strong shoot from the base of the old trunk to the trellis as though it was the cane of a new vine. Establish the arms in the same manner as for a new vine, and cut off the old trunk.

Pruning may be done anytime after the vines become dormant. In areas where there is danger of winter injury, pruning may be delayed until early spring. Vines pruned very late may bleed excessively, but there is no evidence that this is permanently injurious.

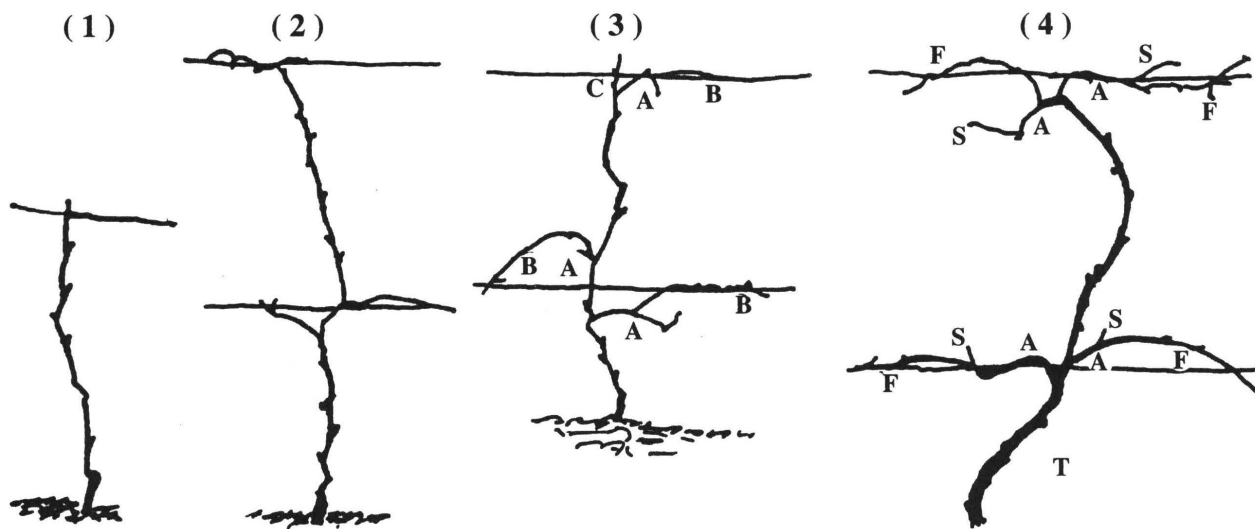
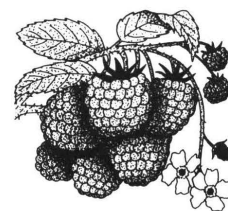
Harvesting the Planting

For best quality, bunch grapes should be fully ripe when harvested. They will not improve in sugar content or flavor after being removed from the vine. Most varieties should be used immediately because they do not keep well after ripening. Cut the clusters off with a knife or shears to avoid bruising the fruit and damaging the vine.

Muscadine grapes grow either singly or in small, loose clusters. Some varieties may be shaken off easily when ripe, others have to be handpicked. The grapes should be used soon after harvesting, since their storage life is relatively short.

Brambles

Bramble fruits, which include the red, black, and purple raspberries and the semi-erect blackberries, may be successfully grown in most gardens. Both raspberries and blackberries will usually yield a moderate crop of fruit the second year after planting and a full crop the third season. With good management, it is possible for gardeners to extend the productive life of well-located plantings beyond the six- to eight-year average.



Stages in training the young vine to the single trunk, four-arm Kniffin system.

(1) After pruning the first winter. The single cane is cut back and tied to the lower wire. If the cane has grown less than 3 feet during the first summer, it should again be cut back to two buds.

(2) After pruning the second winter. Two new canes of four or five buds each are tied on the bottom wire. A third new cane is tied up to the top wire and cut off.

(3) After pruning the third winter. Three of the arms (A) and the fruiting canes (B) have been formed. A cane (C) with four or five buds is left to establish the fourth arm.

(4) A fully formed vine after pruning the fourth winter. The arms (A) should be shorter than those shown. The vine consists of a single permanent trunk (T), four semipermanent fruiting arms (A), four annual fruiting canes (F), and four renewal spurs (S), with two buds on each.

Variety Selection

Of the many varieties of blackberries and raspberries available, few have proven totally satisfactory for growing under Virginia conditions. Only top-quality, 1-year-old plants of the best varieties should be planted. Obtain virus-free plants when possible.

Blackberries

Six erect and two semi-erect blackberries are suggested for planting. All are productive, vigorous, and winter hardy. Dewberries and boysenberries are also included under blackberries. Dewberry is a trailing form of blackberry, and boysenberry is a bramble hybrid of loganberry (*Rubus loganobaccus*) and various blackberries (*Rubus* spp.) and raspberries (*Rubus* spp.). The boysenberry is easily winter killed and should be planted only in areas of mild winters. Plants are extremely vigorous and productive and the berries are large and flavorful when fully ripe.

Most **erect blackberries** have thorns typical of many brambles. Recommended varieties include:

Darrow, more cold hardy and ripening about the first week of August in the Charlottesville area, is a large berry, almost an inch long and 3/4 inch wide. It is glossy black, mildly subacid, and of good quality.

Cherokee, Cheyenne, Comanche, and Shawnee are also good, with productive, erect-type vines.

Navaho is an erect, thornless, late-ripening blackberry that requires little or no trellising when properly pruned. The fruit shape is conic; the berry size is medium, but very firm; and the flavor is excellent.

The **semi-erect blackberries** recommended are thornless:

Black Satin is very productive and hardy. The fruit is large, firm, jet-black when fully ripe and has a delicious flavor. Peak quality is attained two to three days after the berry turns black.

Dirksen is also very productive and hardy. Slightly smaller than Black Satin, it is equally good when fully ripe.

Dewberries and **boysenberries** are vigorous plants with large, flavorful berries. Thornless boysenberries are also available. Recommended varieties of dewberry and boysenberry include:

Lucretia dewberry, best of the trailing blackberries, is relatively winter hardy, vigorous, and productive. The fruits are very large, often 1 1/2 inches long. It is a sweet berry with a good flavor.

Lavaca, a seedling of the boysenberry, is superior to its parent in production, size, and resistance to cold and disease. The fruit is also firmer, less acid, and of slightly better quality.

Raspberries

Raspberry types are based on color: red, black, and purple. Chances for success with raspberry plantings are better if the plantings are located in the cooler mountain sections of the state.

Red raspberries have generally been more successful in the warmer areas than have the other types.

Latham is the standard, spring-bearing, red raspberry grown in the eastern United States. Plants of this variety are vigorous, productive, and somewhat tolerant to viral diseases. The berries are above average in size, firm, and attractive. The flavor is somewhat tart, but the quality is good. This variety ripens evenly over a long season to mid-July in Zone 5.

Heritage is an everbearing red variety with crops in June and again in the fall. This variety may be annually pruned by simply mowing all tops in late winter. Use of this pruning technique will yield one crop in the fall of each year.

Black raspberries are very susceptible to viral diseases and are readily infected when grown near red varieties carrying a virus. Plants of red and black raspberries should be separated by at least 700 feet.

Titan is an early bearing, winter-hardy crop. This bright-red, firm berry is conic in shape and mild in flavor. It is the largest berry grown in the eastern United States. It is high yielding, and the canes are stout and nearly spineless which facilitates picking. It can be planted 2 feet apart as suckering is light to medium.

New Logan yields heavy crops of large, glossy-black fruit of good quality. The plants hold up well during drought and are relatively tolerant to mosaic and other raspberry diseases.

Bristol is a hardy, vigorous-growing, highly productive variety. The good quality, glossy-black berries are large, firm, and attractive. They may be difficult to pick unless fully ripe.

Cumberland, ripening about one week later than New Logan, has long been a favored variety because of its attractive, large, firm berries and fine flavor. The plants are vigorous and productive.

The **purple raspberry** is a hybrid of the red and black types. The fruits have a purple color and are usually larger than the parent varieties. They are more tart than either the reds or blacks and are best used in jams, jellies, and pies. They are excellent for quick freezing. The plants are hardy, vigorous, and very productive.

Brandywine is the best purple raspberry available. It ripens later than most red or black varieties. The fruit is large, firm, and quite tart, but of good quality.

Royalty, a new purple raspberry with delicious flavor, very large fruit, and high productivity, is excellent for fresh use and for jam and jelly. It is resistant to mosaic-transmitting aphids and raspberry fruit worm.

Establishing the Planting

Site and Soil. Brambles grow best on deep, sandy loam soils well supplied with organic matter. They may be grown in almost any good garden soil, provided it is well drained to a depth of at least 3 feet and has a high moisture-holding capacity. Although the pH of the soil is not critical, a range of 5.8 to 6.5 is considered optimum. Select a site where tomatoes, potatoes, or eggplants have not been grown. These crops often carry verticillium wilt, which lives in the soil for many years, and brambles, particularly black raspberries, are very susceptible to this disease.

Planting. Bramble fruits should be planted early in the spring, about four weeks before the average date of the last frost. Work the soil as for garden vegetables, particularly where the plants are to be set. When planting in rows, allow at least 8 feet between rows to facilitate cultivation. Erect-growing blackberries and red and purple raspberries may be set as close as 3 feet in the row; set semi-erect plants 5 feet apart. Black raspberries should be no less than 4 feet apart, and trailing blackberries no less than 6 feet apart.

Set the plants at about the same depth they grew in the nursery. The crown should be at least 2 inches below the soil line. Spread out the roots and firm the soil carefully around them. Do not allow the roots to dry out.

Most bramble fruits come with a portion of the old cane attached. This serves as a handle in setting the plants. Soon after new growth begins, the handle can be cut off at the surface of the ground and destroyed, as a safeguard against possible anthracnose infection.

Maintaining the Planting

Soil Management. Brambles grow best where there is a large amount of humus or organic matter in the soil. This is most easily maintained under permanent mulch. Mulch should be applied soon after setting the plants, and maintained throughout the life of the planting by replenishing annually or as needed.

It is suggested that hardwood or softwood bark at least 5 or 6 inches in depth should be applied. If materials low in nitrogen are used, it may be necessary to add sufficient nitrogenous fertilizer to prevent a temporary deficiency as the mulch begins to decay. Usually about 1/2 pound nitrate of soda or 1 pound of 10-10-10 for each 100 square feet of mulched area will be enough.

If mulch material is unavailable or if cultivation seems necessary, make the cultivation very shallow to avoid disturbing the roots and repeat as often as necessary to control weeds until the beginning of harvest.

Fertilization. On fertile soils, or where good mulch is maintained, it is usually unnecessary to make an application of fertilizer in the bramble planting. If growth is poor, the addition of 2 to 3 pounds of ammonium nitrate to each 100 feet of row when growth begins in the spring will be beneficial. On light, sandy soils, where phosphorus and potassium may be low, twice the amount of 10-10-10 or similar fertilizer should be used instead. Do not overfertilize, however, because it may result in too much vegetative growth with a loss of yield and quality of fruit or in injury to the roots of the plant and burning foliage.

Training and Pruning. Trailing blackberries need some form of support. They may be grown on a trellis, trained along a fence, or tied to stakes. Other brambles may either be trained to supports, or with more severe pruning, grown as upright, self-supporting plants. Red raspberries and erect-growing blackberries are frequently grown in hedgerows.

A simple trellis, used in many home gardens, consists of two wires stretched at 3 and 5 foot levels between posts set 15 to 20 feet apart. Fruiting canes are tied to these wires in the spring.

The erect varieties are tied where the canes cross the wires. Canes of trailing varieties are tied horizontally along the wires or fanned out from the ground and tied where they cross each wire.

Where stakes are used for support, they are driven into the ground about 1 foot from each plant and allowed to extend 4 or 5 feet above the ground. Canes are tied to the stake at a point about midway between the ground and the tips of the canes and again near the ends of the canes.

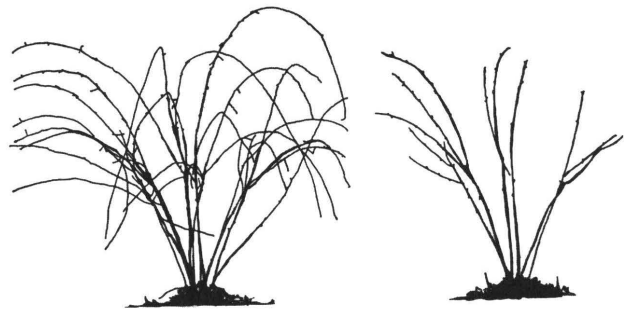
Canes of bramble fruits are biennial in nature; the crowns are perennial. New shoots grow from buds at the crown each year. Late in the summer, the new canes develop lateral branches with fruit buds on them. Early in the second season, fruit-bearing shoots grow from these buds. After fruiting, the old canes die, and new shoots spring up from the crowns.

These fruiting canes may be removed any time after harvest. They should be cut off close to the base of the plant, removed from the planting, and destroyed. Some growers, as a sanitation practice, do this immediately after harvest. Most, however, wait until the dormant pruning.

The dormant pruning is usually delayed until danger of severe cold is past and accomplished before the buds begin to swell. It consists of the removal of all dead, weak, and severely damaged canes and the selection and pruning of the fruiting canes for the coming season. Where possible, fruiting canes 1/2 inch or more in diameter are selected.

Black raspberries should be summer-topped when the young shoots are about 24 inches high; purple raspberries, when about 30 inches high. Summer topping consists of removing the top 3 to 4 inches of the new shoots by snapping them off with the fingers or cutting them with shears or a knife. Where trained to supports, let them grow 6 to 8 inches taller before topping.

At the dormant pruning, thin each plant until only four or five of the best canes remain. Cut the lateral branches of the black raspberry to 9 to 12 inches long; those of the purple raspberry to 12 to 15 inches long (See illustration below.).



(The following comments concerning red raspberries do not apply to the 'Heritage' variety.)

Red raspberries should not be summer-topped. Canes of everbearing varieties are handled in the same manner as those of ordinary varieties. At the dormant pruning, where the hill system of culture is used, thin until only seven or eight of the best canes remain per hill.

If the plants are grown in hedgerows, keep the width of the rows to 18 inches or less and remove all plants outside the row areas.

Thin the canes within the hedgerows to 6 to 8 inches apart, saving the best canes (See illustration below.).



Where the canes are supported either by a trellis or stakes, cut the canes back to a convenient height for berry picking, usually 4 or 5 feet. Grown as upright, self-supporting plants, whether in hills or in hedgerows, the canes should be cut back to about 3 feet in height. Any lateral branches should be cut to about 10 inches in length.

New shoots of erect blackberries should be summer-topped when they are 30 to 36 inches high. To prevent the planting from becoming too thick and reducing yields, it may be necessary to remove excess sucker plants as they appear. This can be done either with a hoe or by hand. In the hedgerow type of culture, leave only three or four shoots per running foot of row. Grown in hills, four to five new shoots may be allowed to develop in each hill.

At the dormant pruning, where supports are used, head the canes to 4 or 5 feet in height. Canes grown without support should be headed to 3 feet. Cut lateral branches back to 15 or 18 inches long.

Trailing blackberries require little pruning. All dead and weak canes should be removed after harvest or at the dormant pruning. They should be thinned to seven or eight of the best canes per hill, cut to about 5 feet in length, and tied to either a stake or trellis.

Blueberries

Many home gardeners in Virginia have been successful with Highbush blueberry plantings. Although they may be grown in any area where native blueberries, azaleas, mountain laurel, or rhododendrons do well, they have a better flavor when grown where nights are cool during the ripening season. They are very exacting in soil and moisture requirements, but require little protection from insect and disease pests.



Variety Selection

To provide adequate cross-pollination and to increase chances for a good crop of fruit, two or more varieties of blueberries should be planted. The following varieties suggested for planting ripen over a six- to eight-week period, beginning in early June and continuing through July. All are vigorous and

productive under good growing conditions and produce berries of large size and good quality.

Berkeley produces medium-large fruit but inconsistent yield. Bush is vigorous with spreading growth habit and attractive as an ornamental landscape plant.

Blueray, very hardy and productive, is recommended for planting. The fruit is large, medium- to light blue, flavorful, and resistant to cracking.

Bluecrop, although lacking in vigor, is very hardy and drought-resistant. The fruits are large, light blue, firm, and resistant to cracking. Their dessert quality is good.

Coville is of good dessert quality, but quite tart until fully ripe. It is a very large berry, deep blue, firm, and resistant to cracking. The fruit hangs well in clusters even after it is ripe.

Earliblue, though not a superior variety, is popular due to its early ripening. Fruit size is medium to large with average quality. Upright growing plants have good winter hardiness and ornamental appeal.

Elliott is light blue and has a good, mild flavor when fully ripe (if not fully ripe the flavor will be very tart). Its firm berry ranges in size from small to medium. Ornamental use of this crop is very good because of its upright growth habit, bluish-green leaf color, and late-blooming flowers (long-lasting, orange-red fall color).

Jersey, one of the leading commercial varieties, is also a favorite in the home garden. The plants are vigorous and hardy, producing heavy crops of large, light-blue berries of good quality.

Rabbiteye blueberries (*Vaccinium ashei*) have black, often dull fruit about 3/4 inch in diameter. These plants can grow in drier soils and are more productive than highbush blueberries; however, they cannot withstand low winter temperatures so production is limited to Zones 7b and 8 in Virginia. In warmer areas, Rabbiteye varieties **Climax**, **Premier**, **Powderblue**, and **Tifblue** do well.

Establishing the Planting

Site and Soil. Blueberries should be planted where they have full sunlight most of the day and are far enough from the roots of trees to avoid competition for moisture and nutrients. They are shallow-rooted plants and must either be irrigated, heavily mulched, or planted in a soil with a high water table. Adequate drainage must be provided, however, because they cannot tolerate saturated soils.

They grow best in porous, moist, sandy soils high in organic matter with a pH range of 4.2 to 5.5. Have the soil tested, and if it is not acid enough for blueberries, work such materials as peat moss, oak leaves, pine needles, or sulfur into the area where the plants are to be set. This should be done six months to a year before planting. To acidify sandy soils, sulfur is recommended at the rate of 3/4 pound per 100 square feet for each full point the soil tests above pH 4.5. On heavier soils use 1 1/2 to 2 pounds. Once proper acidity is established, it can be maintained through the annual use of an acid fertilizer, such as ammonium sulfate or cottonseed meal.

Planting. Vigorous, 2-year-old plants about 15 inches high are recommended for planting. Set in early spring about three or four weeks before the average date of the last frost. Blueberries are usually planted every 4 feet in rows 6 feet apart.

Give the roots plenty of room. Where the plants are to be set, dig the holes wider and as deep as necessary to accommodate the root systems. It is not necessary to incorporate organic matter or other soil amendments into the backfill soil. Trim off diseased and damaged portions of the top and roots, and set the plants at the same depth that they grew in the nursery. Spread the roots out, and carefully firm the soil over them. Water thoroughly after planting.

Maintaining the Planting

Soil Management. Mulching is the preferred soil management practice in the blueberry planting. The entire area around and between the plants should be mulched. Hardwood or softwood bark and sawdust applied to a depth of 5 or 6 inches is recommended. Many growers use a combination mulch - a layer of leaves on the bottom with 2 or 3 inches of sawdust on top. Renewed annually, this heavy mulch retains moisture, keeps the soil cool, and adds needed organic matter.

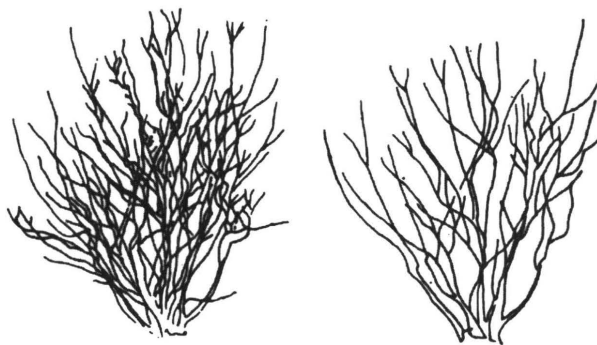
Fertilization. No fertilizer should be applied at planting time, and usually none is needed during the first growing season. On weak soils, however, the application of 2 ounces of ammonium sulfate around each plant about the first of June is beneficial.

Ammonium sulfate, at the rate of 2 ounces per plant, should be spread in a circle around each plant about 6 to 8 inches from its base just before the buds begin to swell the second spring. Increase the amount each succeeding spring by 1 ounce until each mature bush is receiving a total of 8 ounces annually. Cottonseed meal has proven to be an excellent fertilizer for blueberries and is used by many home gardeners. It supplies the needed nutrients and helps maintain an acid soil. Use it at the rate of 1/2 pound per plant. The rate should be doubled when the plants come into bearing. Where sawdust is used as a mulch, it will be necessary to apply additional nitrogen to prevent a deficiency as the sawdust decays. Usually about 3/4 pound of ammonium sulfate for each bushel of sawdust is sufficient.

Pruning. Until the end of the third growing season, pruning consists mainly of the removal of low spreading canes and dead and broken branches. As the bushes come into bearing, regular annual pruning will be necessary. This may be done any time from leaf fall until growth begins in the spring. Select six to eight of the most vigorous, upright-growing canes for fruiting wood and remove all others.

After about five or six years, the canes begin to lose vigor and fruit production is reduced. At the dormant pruning, remove the older canes of declining vigor and replace with strong, vigorous new shoots that grew from the base of the bush the previous season. Keep the number of fruiting canes to six or eight, and remove the rest. Head back excessive terminal growth to a convenient berry-picking height (See illustration at upper right.).

Pest Control. Birds are by far the greatest pests in the blueberry planting. Covering the bushes with wire cages, plastic netting,



or tobacco cloth is perhaps the best method of control. Aluminum pie tins have been used successfully. They are suspended by a string or wire above the bushes in such a manner that they twist and turn in the breeze and keep the birds away.

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Harvesting The Planting

Some varieties of blueberry will bear the second year after planting. Full production is reached in about six years with a yield of 4 to 6 quarts per plant, depending on vigor and the amount of pruning.

Blueberries hang on the bushes well and are not as perishable as blackberries or raspberries. Picking is usually necessary only once every five to seven days. Blueberries will keep for several weeks in cold storage.

Currants and Gooseberries

Currants and gooseberries are hardy and easy to grow in the home garden. Currant (*Ribes* spp.) bears flowers in racemes and fruits that are red, white, yellow, or black, often with bloom. Gooseberry (*Ribes grossularia* L.)



has only one or two flowers on each stem and globose to ovoid fruits that are red, yellow, or green. Their planting has been restricted in many areas in the past because they are alternate hosts to the white pine blister rust disease. However, the ban has been lifted completely for all gooseberries and currants.

Variety Selection

Currants and gooseberries are used mainly in making jellies, jams, preserves, and pies. Red varieties of currant are sweet when fully ripe and may be eaten fresh.

Wilder is one of the best currant varieties. It has large, dark-red, subacid berries that hang in large, compact clusters that are easy to pick. The bush is upright-growing, large, and vigorous.

Red Lake, ripening just after Wilder, has large, firm, light-red berries. The clusters are large and hang on long after the

berries are ripe. The bush is upright-growing, vigorous, productive, and very hardy.

Although European or English varieties of gooseberry are larger, the American varieties are more productive, hardier, considered to be of better quality, and are the two recommended for Virginia:

Pixwell is a nearly thornless variety of gooseberry that produces heavy crops of good quality fruit. The berries are pink when fully ripe and hang on slender stems almost an inch below the branches, where they may be easily picked. The bushes are very hardy and thrive in almost any soil type.

Red Jacket is a vigorous-growing bush; large, sturdy, and nearly thornless. It is very productive, with large berries that are dull red when ripe.

Establishing the Planting

Site and Soil. Currants and gooseberries need a cool, moist, semi-shady location. They are very resistant to low temperatures, but do not thrive where the summers are hot and dry. Gooseberries are somewhat more tolerant to heat than are currants. Where only a few plants are grown for home use, the north side of a building may be selected to protect them from summer heat.

Select a site with good air and soil moisture drainage. Currants and gooseberries bloom very early in the spring and need to be protected against frost. They are shallow-rooted plants that require a moist, but not saturated soil. They grow best in a deep, fertile loam with a pH range of 6 to 8. Although the heavier soils, such as silt or clay loams, are more suitable, the plants may be grown in lighter soils well supplied with organic matter if moisture is added during periods of drought.

Planting. Vigorous, 1-year-old plants are preferred. Planting in rows 8 feet apart with the plants spaced 4 feet within the row is the usual practice. Prepare the soil for planting as you would for a garden crop, and set the plants slightly deeper than they grew in the nursery. This causes new shoots to arise from below the soil level, forming bushes rather than single stems. Pack the soil firmly about the roots, and cut the tops back to a height of 8 to 10 inches.

Maintaining the Planting

Soil Management. Mulching is the preferred soil management practice for currants and gooseberries. Hardwood or softwood bark in a 3-foot circle around each bush is recommended. Pull it back each winter to eliminate a nesting place for mice that like to feed on the young shoots.

Fertilization. Currants and gooseberries usually respond to fertilization even when planted in fertile soils. An annual, fall or late-winter application of either barnyard or poultry manure is an effective way of supplying their nutritional needs. Spread it about 1 inch deep in a 3-foot circle around each plant. In the

absence of manure, 4 ounces of ammonium nitrate per plant should be applied just before the buds break in the spring. On sandy soil, a complete fertilizer, such as 10-10-10 or 10-6-4, at the rate of 12 to 16 ounces per plant may be needed.

Pruning. Currants and gooseberries typically form bushes with many branches arising near the ground level. Pruning may be done any time during the dormant period and consists primarily of thinning out excess stems. Except for the removal of weak, broken, or prostrate stems, very little pruning is done until the plants are 4 years old. The mature bush should have three or four stems each of 1-, 2-, and 3-year-old wood. The actual number should be determined by the vigor of the bush. Heading back is done only to reduce the height of extra-long, 1-year-old shoots (Fig. 4).



Fig. 4.

Remove all wood over 3 years old. Cut off the damaged and low prostrate stems, retaining only the most vigorous of the 2- and 3-year-old shoots, and remove the rest. Head back young shoots that are too long (Fig. 5).



Fig. 5.

Harvesting the Planting

Currants and gooseberries begin bearing when about 3 years old and have a productive life of 10 to 20 years. Under good cultural practices in the home garden, currants should yield 4 to 6 quarts per bush annually, and gooseberries even more. Unlike most fruits, currants and gooseberries may be left on the bush for several weeks after they are ready for use. Gooseberries may be left four to six weeks, and some varieties of currants even longer. They should be handled carefully to avoid bruising the fruit. Since gooseberries sunscald quickly, they should be placed in the shade soon after picking.