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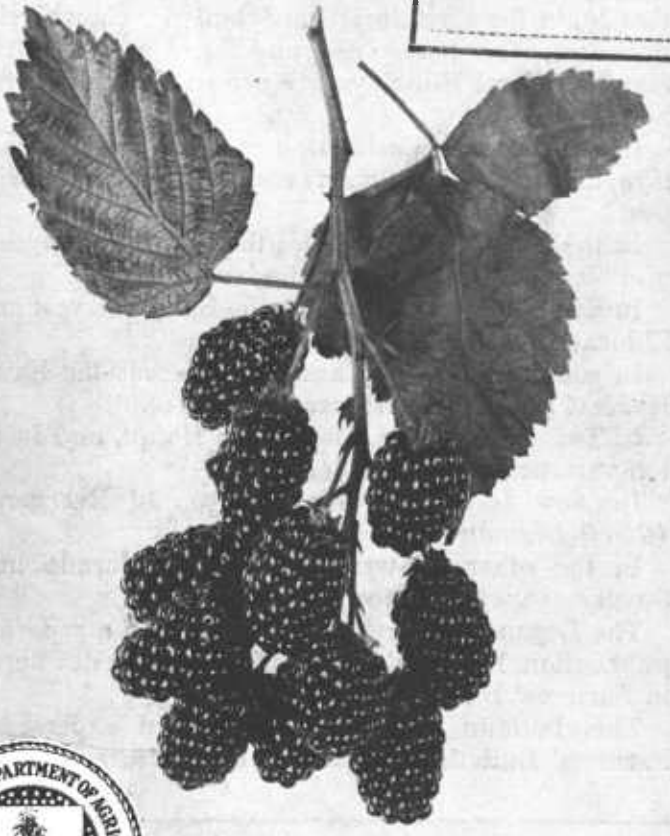
BLACKBERRY GROWING



THE GROWING POPULARITY of the blackberry for canning and jam making is increasing the demand for this fruit. It is now being grown profitably in many States, and in some sections is one of the important crops.

In this bulletin directions are given for propagating, planting, cultivating, pruning, and training blackberries. The leading characteristics of the principal varieties are described.

Much depends upon selecting the varieties best suited to different sections of the country.

In southern California the Crandall is the leading variety, while in the central and northern parts of that State the Lawton is important for commercial purposes; for home use and local markets the Mammoth and Himalaya are grown throughout the State.

In Oregon and Washington the Evergreen, Himalaya, and Eldorado (*Stuart*) are the important varieties.

In the North Central States the Eldorado, Snyder, and Mersereau are among the best sorts.

In Kentucky and Tennessee the Early Harvest and Eldorado do best.

In southern Missouri and in Arkansas the Early Harvest and McDonald are productive.

In Texas the Dallas, McDonald, Haupt, and Lawton varieties are desirable.

In New Jersey the Ward, Joy, and Evergreen (*Black Diamond*) are recommended.

In the other Eastern States the Eldorado and Snyder are widely grown.

The Logan blackberry is considered in a separate publication, Farmers' Bulletin 998, and the dewberry in Farmers' Bulletin 1403.

This bulletin is a revision of and supersedes Farmers' Bulletin 643, Blackberry Culture.

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BLACKBERRY GROWING[1]

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ACCORDING to the Fifteenth Census (1930) about 44,000 acres in the United States were devoted to the cultivation of blackberries and dewberries in 1929.

The outline map in Figure 1 shows the areas where these berries were grown. They are cultivated generally over a wide area extending westward and southwestward from Virginia and North Carolina to Kansas, Oklahoma, and Texas. Outside this area they are grown

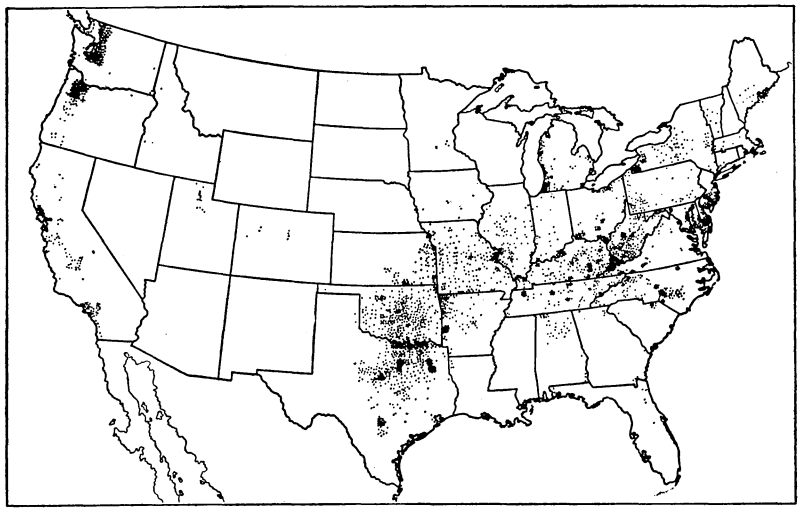

FIGURE 1.—Outline map of the United States, showing areas in which blackberries and dewberries were grown in 1929, as reported in the Fifteenth Census. Each dot represents 10 acres. The dewberry is important in southwestern Michigan, southern New Jersey, and central North Carolina

[1] The loganberry, or Logan blackberry, grown extensively in the Pacific Coast States, is not discussed in this bulletin. For information on it the reader is referred to Farmers' Bulletin 998, Culture of the Logan Blackberry and Related Varieties. Out of print, but may be consulted in libraries.

generally to some extent in New York and California and in concentrated areas in southern New Jersey, on the Eastern Shore of Maryland and in southern Delaware, southwestern Michigan, the Willamette Valley in Oregon, and the Puget Sound region of Washington. It is difficult to estimate the acreage devoted exclusively to blackberries, since dewberries are grown with blackberries, to some extent, in nearly all sections except in Oregon and Washington. It is known that a considerable portion of the acreage in southwestern Michigan and southern New Jersey and all of the acreage in central North Carolina is devoted to dewberries. Texas has the largest acreage in these fruits, with over 7,500 acres in blackberries and dewberries; Oklahoma is second, with over 3,000 acres; other important States are Kentucky, Missouri, Washington, West Virginia, Michigan, New Jersey, and Arkansas.

A comparison of the census figures for 1919 and those of 1929 shows a small decrease in total acreage, from more than 46,000 acres in 1919 to less than 44,000 acres in 1929. The Northern States generally showed decreases. These were greatest in New York, Pennsylvania, Indiana, Illinois, Iowa, and Missouri. The Southern States generally increased their acreage, the largest increases being in Virginia, West Virginia, Alabama, Arkansas, Oklahoma, and Texas. On the Pacific coast, Washington showed a considerable increase and California showed some decrease.

The cultivation of the blackberry has extended much less rapidly than would have been the case had not the wild forms of this fruit been found in such abundance in nearly every section of the country. With the gradual introduction of new and better varieties especially adapted to different regions, the superior size and quality of the cultivated berries are beginning to be recognized. Commercial varieties produce firmer fruit, which can be kept in good condition longer after picking. Moreover, through proper selection of varieties, fresh cultivated blackberries can be obtained before the first wild ones ripen, and long after the last wild ones are gone. When these points of superiority become more widely known, the use of the cultivated varieties will become more general.

LOCATION OF THE PLANTATION

The principal factors to be considered in selecting a location for a commercial blackberry plantation are the facilities for marketing the fruit and the moisture conditions of the soil. The fruit of most varieties is tender, and the keeping qualities are seriously affected by being jarred on rough roads. The berries should therefore be grown near good roads, and placed on the market as quickly as possible after they are picked.

Important shipping centers for the blackberry crop are in southern New Jersey, northern Ohio, southwestern Michigan, southern Illinois, the Ozark region of Missouri and Arkansas, northeastern Kansas, the Tyler section of Texas, the Sebastopol section of California, the Willamette Valley of Oregon, and the Puyallup section of Washington.

The moisture supply in the soil at the ripening season and during the winter or dormant months is the most important factor to be considered in selecting a site.

The blackberry suffers more than almost any other crop if its water supply is insufficient while the berries are growing and ripening. The blackberry, with its shallow root system, ripens in midsummer, later than the strawberry and raspberry and when evaporation of soil moisture is the most rapid. Droughts are, therefore, a serious menace. On the other hand, the plants are often killed if water stands on the plantation during the winter or dormant period.

In sections where there are frequent drying winds during the ripening period or during the winter it is important to choose a sheltered location. Low places, where there is danger from late frosts which may kill the new growth and destroy all prospects of a crop, should be avoided. High land with good air drainage should be selected.

Though wild blackberries are abundant in the northernmost part of the eastern United States and even in Canada, they are found chiefly in woods and thickets where there is protection from cold drying winds in winter. Furthermore, cultivated varieties are selections from wild species of blackberries which are found mostly in the more temperate parts of the country, rather than from the species native to the colder and more exposed locations in the North. For these reasons cultivated varieties are chiefly adapted to the more temperate sections of the country.

SOILS

The blackberry will flourish on nearly any type of soil, if it has suitable moisture conditions. The finest wild berries are found in localities where the humus and soil conditions are such that the plants can get a proper supply of water. The best blackberry land is a deep, fine, sandy loam with a large supply of humus. Such a soil is to be preferred to a coarse, sandy, or a clay soil, since it can be controlled to a greater extent. The largest yields are produced on soils having a mellow subsoil which allows the roots of the plants to go deep for plant food and moisture.

PREPARATION OF THE SOIL

The land on which blackberries are to be grown should be planted with a cultivated crop the season before the berry plants are set. This will insure the thorough rotting of the sod and will help to destroy cutworms and other insects often injurious to the young plants. The soil should be plowed about 9 inches deep in the spring, and the whole field should be thoroughly harrowed before the plants are set. In order to provide a suitable subsoil, it frequently pays to loosen it with a subsoil plow during the previous fall.

PROPAGATION

The roots of blackberries live for many years, but the canes of most varieties last only two years. These canes grow from the crown in the spring and live until after the fruiting season of the following year. When they die, other canes are ready to take their places, the new ones having grown from the crown during the spring. The new canes die at the end of the fruiting season of the next year. Berries are borne only on canes which are in their second season's growth. This is not true of the Evergreen and Himalaya varieties, the canes

of which are perennial in some sections of the extreme South and on the Pacific coast.

It is the habit of the plant to throw up suckers from the roots at various distances from the parent plant, especially where the roots are cut, in addition to the canes which grow from the crown. New plants are usually obtained by digging up these suckers, and when the suckers are vigorous and well rooted this method of starting new fields is very satisfactory. Another method is to dig roots one-fourth inch or more in diameter in the fall or early spring. These are cut into pieces about 3 inches long and planted horizontally, in trenches, about 3 inches deep. By the following fall they should have become strong plants, generally with a better root system than that of "sucker" plants, which depend upon the single large root from the parent plant for most of their food and water.

Certain varieties are blackberry-dewberry hybrids and have canes which root at the tips, like the dewberry. The Evergreen and Himalaya varieties, although not dewberry hybrids, also have tips that root. New plants of these varieties are obtained either by covering the tips with soil in late summer or by making root cuttings, as in the case of other blackberries.

POLLINATION

Practically all the blackberry varieties which have no strain of dewberry parentage are entirely self-fertile and may be planted by themselves without provision for cross-pollination. The Rathbun, Mammoth, McDonald, Wilson, and other varieties not so well known are imperfect pollinizers under certain conditions and should not be planted in large blocks alone. The Cazadero is an imperfect-flowered sort grown to a small extent in Oregon. The Ideal Wild (Santiam), the Logan, or the Young is suggested as a pollinizer for the Cazadero.

PLANTING

Blackberry plants usually are set as early in the spring as the land can be properly prepared, since the soil generally contains more moisture at that time and the young plants can make a vigorous start. The earlier they are set, the larger the proportion that live and the better their growth. When early spring setting is impossible, the plants may be set in the late fall if there is no danger from drying winds during the following winter. The roots of newly set plants can not supply as much moisture as those of plants which have grown in the soil for a season. They should be set as deep as they formerly stood in the nursery, or slightly deeper, for the canes break easily if the crowns project above the surface of the ground. The tops should be cut back to 6 inches or less in length. Figure 2 shows blackberry plants as received from the nursery heeled in, pending permanent planting. The heeling in prevents the roots from drying out.

In the Eastern States blackberries are usually planted 2½ to 3 feet apart in the row, in rows 8 feet apart. In localities where the canes grow very large, as they frequently do on the Pacific coast, the plants may be set 2 to 3 feet apart in rows 8 feet apart. Planting distances for the Evergreen, Himalaya, and Mammoth varieties are given with

their descriptions on pages 14 and 15. These distances allow cultivation in but one direction. For cultivation in both directions, the plants of erect-growing sorts are usually set 5 by 5 feet. This distance should be increased to 7 or 8 feet apart both ways if the growth is very heavy. Very little hand labor is needed when the plants are set according to this plan, as the cultivation keeps down both weeds and suckers.

CROPS BETWEEN ROWS

During the first summer after the plants are set some crop may be grown between the rows. This crop should be one requiring constant cultivation throughout the growing season of the blackberry, and its growth should not be large enough to shade the plants. A suitable intercrop should greatly reduce the cost of the berry field during the first summer, without injuring the plants. Truck crops,

FIGURE 2.—Blackberry plants from the nursery, heeled in to keep the roots moist until the field is ready to plant

such as cabbage and potatoes, are preferred, while corn and the small grains should be avoided. Only a single row of most truck crops should be grown between the blackberry rows. By the second summer the plants should be large enough to occupy the entire space.

CULTIVATION

Whether an intercrop is grown or not, cultivation should be begun as soon as the plants are set in the spring, should be continued at intervals of one to two weeks throughout the season, and usually should be discontinued at least a month before freezing weather. The purpose of this clean cultivation is to provide a dust mulch to retain moisture and to keep down suckers and weeds. Since the roots of the blackberry ordinarily are close to the surface of the ground, cultivation must be shallow. Breaking the roots not only weakens the root systems of the plants but increases the number of suckers. The deeper the soil and the more thorough its preparation before the plants are set, the deeper will be the roots. Frequent cultivation is of greater importance during the growing and ripening season of the berries than at any other time, since they require more moisture then.

FERTILIZERS

The fruit, foliage, and canes of the blackberry remove a large quantity of plant food from the ground each year. Most soils, however, have sufficient nitrogen, potash, and phosphoric acid to grow fair crops of fruit for many years. Some are better supplied with one element than with others, and each grower must know his own soil before he can make profitable use of commercial fertilizers. Nitrogen alone should be used with caution after the berry field is in bearing, as it may cause a rapid cane and leaf growth at the expense of fruit bearing, but combined with other elements it will usually prove profitable.

Stable manure, where it can be obtained, is the best fertilizer, for in addition to supplying the elements of plant food it adds much humus to the soil. An annual application of 20 tons of stable manure to the acre will usually be sufficient, although there is little danger of using too much, especially after the field is bearing. In order to supply humus, leguminous and other cover crops should either be plowed under before the plants are set or grown between the rows of blackberries each year. When such crops are grown, less stable manure will be required.

TRAINING THE PLANTS

If all the suckers that come up were allowed to grow, by the end of the second year the field would be a dense thicket of blackberry canes, and the berries could be picked only with great difficulty. The suckers would compete with the parent plants for food, moisture, and light, and the whole plantation would be inferior. The plants, therefore, must be kept in rows or hills, and all suckers appearing between the rows must be destroyed by the frequent use of cultivator and hoe. Suckers do not come up again so quickly if they are pulled, but this requires much hand labor. If all suckers are destroyed, the plants will have much stronger roots and canes, and the berries will be larger and better.

As soon as the last berries have been picked, the old canes which have just borne fruit should be cut out and burned. This allows the young canes more room in which to develop, conserves the moisture supply, and destroys any insects or diseases on the old canes. Rarely will it be necessary to leave them to support the new canes during the winter snows. Wire trellises usually are preferable where support is needed. Not more than three or four new canes to each plant of the erect-growing sorts and 12 to 14 canes to each plant of the semi-trailing sorts should be allowed to grow in one season, and all in excess of this number should be cut out not later than at the time of removing the old bearing canes. The remaining canes will be larger and stronger because of the thinning.

The systems of training differ with conditions in different sections of the country. In some sections where the plants do not grow large and where the soil does not wash, the new canes may be "topped"—that is, the tips pinched off with the fingers—when they reach a height of not more than 2½ feet. When the bushes are very vigorous, the height may be increased to 3 feet. As not all the canes reach the height of 2½ feet at the same time, the plantation must be gone

over several times at frequent intervals. The pinching causes the canes to branch and to be better able to stand up with a heavy crop of berries. Figure 3 shows plants trained in this manner.

Even when this method of training is used, the canes may be bent over and broken in cultivating or picking, the number of canes and

FIGURE 3.—Close view of the bases of plants of the Erie blackberry. The plants are about 3 feet apart in the row and all suckers have been removed

the yield of fruit being thus materially reduced. If this is the case, a wire trellis will save enough fruit to be a profitable investment. Such a trellis consists of posts set 15 to 30 feet apart in each row of blackberries, with a wire stretched between them about 2½ feet above the ground. The canes are tied to this wire, which keeps them upright and makes cultivation and picking much easier. Figure 4 shows a detailed drawing of such a trellis. In southern New Jersey, where the Evergreen (*Black Diamond*) is grown, the wire is 4½ to 5 feet high, and the canes are tied horizontally along it. A variation of this trellis is made as follows: Crosspieces about 18 inches long are nailed to the top of each post. Two wires, instead of one, are stretched along the line of posts at the ends of the crosspieces. The blackberry canes are simply kept inside these wires, which support them on either side. Figure 5 shows such a trellis.

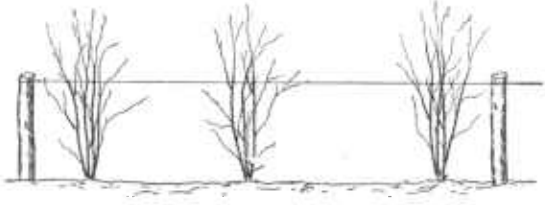

FIGURE 4.—Blackberry canes of the upright type tied to a single wire

These systems of training are adapted to certain varieties and to those regions where the bushes do not grow very high. When the canes grow very long or are inclined to run somewhat like a grape-

vine, a much higher trellis is used, with two wires, one about 5 feet and the other about 3 feet from the ground, the height depending upon the size of the plants. Figures 6 and 7 show such trellises. The canes of the upstanding varieties are simply fastened to the wires, while those of the trailing varieties are tied either horizontally along the wires or in a fan-shaped position.

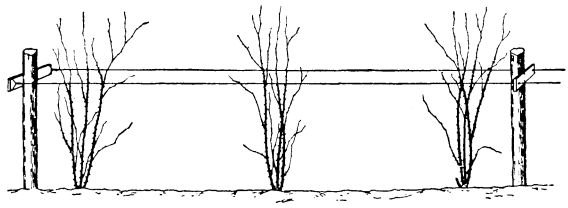

FIGURE 5.—Blackberry canes of the upright type held between two wires

A variation of this trellis is used in some sections where the trailing varieties are grown. Two crosspieces 18 or 20 inches long are nailed to each post, one near the top and the second about 2 feet below. Wires are strung along the ends of the crosspieces. Short pieces of wood held in place by notches are laid across the wires at intervals of 24 to 30 inches, and the trailing canes are strung along the trellis on top of these or trained above and below the alternate cross strips. Sometimes both bearing and nonbearing canes are trained to the same wires. More frequently, the nonbearing canes are placed on the lower wires and the bearing canes on the upper wires and sometimes vice versa. Figure 8 shows the arrangement of the wires for this system. Figures 9 and 10 show variations of this arrangement in which the lower wires are left off.

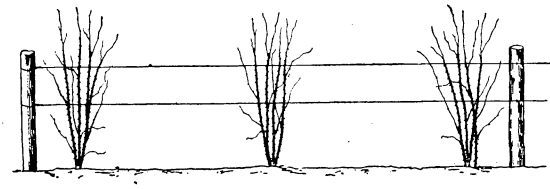

FIGURE 6.—Blackberry canes of the upright type tied to two wires, one placed above the other

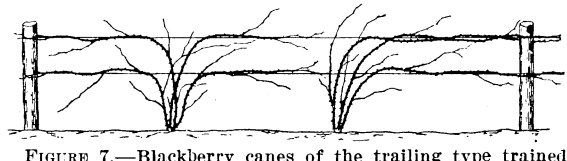

FIGURE 7.—Blackberry canes of the trailing type trained along two wires

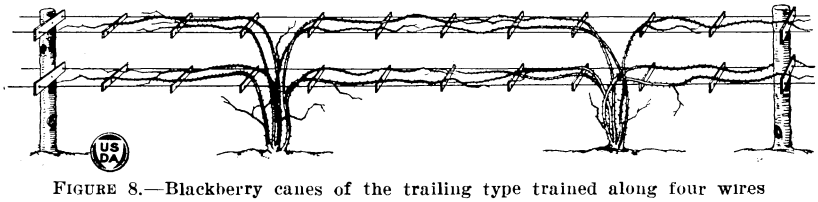

FIGURE 8.—Blackberry canes of the trailing type trained along four wires

The systems of training described above are the ones usually followed, but they are often varied to suit particular conditions or the convenience of the grower. When the plants are set in hills 5 feet or more apart each way, the canes may be pinched back at a height of about 3 feet in order to make a stocky growth. Frequently, when the plants are set in hills, a post is set by each plant and the canes

tied to it as shown in Figure 11. The trailing varieties rarely are trained according to the hill system. In New Jersey the Evergreen (*Black Diamond*) has been trained to stakes like the dewberry, but a pole trellis 5 to 5½ feet high has come into use and is replacing the stakes.

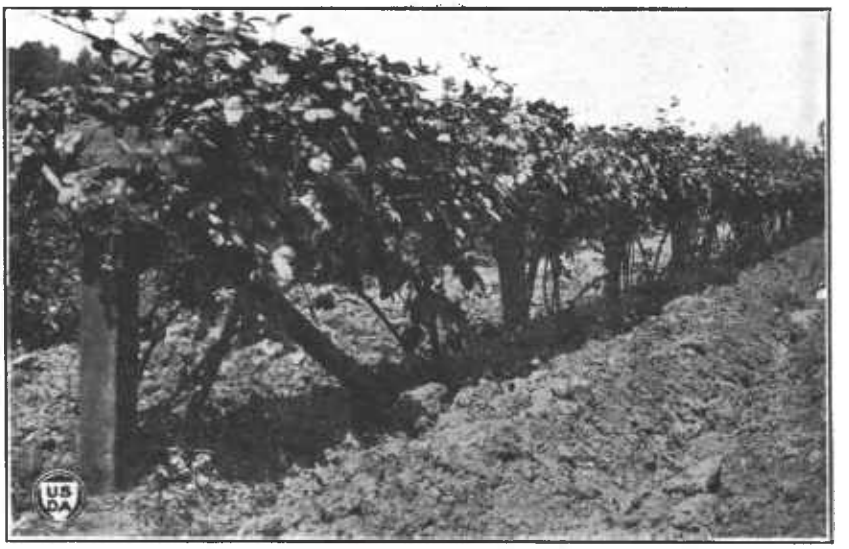

FIGURE 9.—Himalaya blackberry trained to a high 2-wire trellis

MULCHING

Putting straw, leaves, etc., on the land to check evaporation and protect the roots is very expensive and more practicable in home gardens than in commercial blackberry fields. In localities where mulching materials are very cheap and where there is no serious danger from fire, they may profitably be used on a commercial scale. If the mulch is deep enough, it will assist in keeping down suckers; and as it removes the necessity for cultivation, no roots are broken from which suckers may spring. A mulch will greatly retard the evaporation of moisture from the ground and in this respect will be more effective than the best cultivation. It should not be applied, however, in localities where there is danger of water standing on the soil at any time.

HARVESTING

Each variety must be harvested according to its particular season of maturity. Some varieties, the Eldorado for example, may be picked soon after the berries turn black, while most turn black before they are ripe. The berries should be picked while still firm enough to be marketed in good condition, but not before they become sweet.

The keeping quality of any variety depends largely upon the care exercised in picking and handling. If the berries are bruised or injured, molds and decay fungi quickly spoil them, while berries carefully picked and stored in a cool place will keep fresh for several days.

A plantation is usually picked over every other day or every third day. The Evergreen variety, however, has very firm fruit, and a field of this sort is sometimes picked but once a week, while in the Northwest it is picked once in 10 to 14 days.

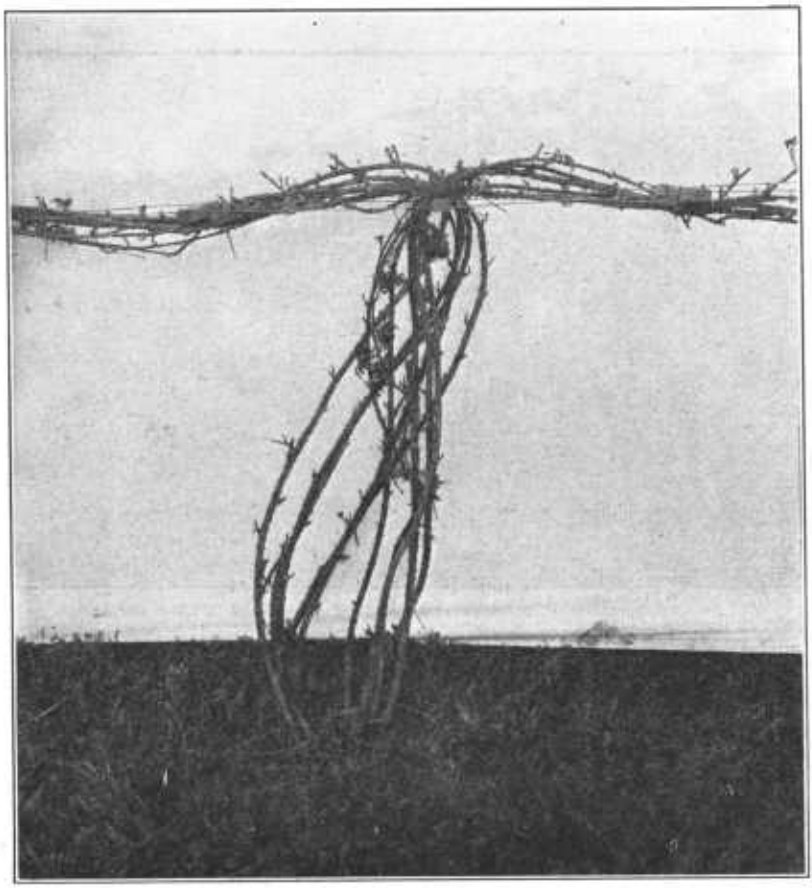

FIGURE 10.—A 2-wire trellis

Since blackberries ripen in midsummer when the afternoons are often very warm, picking is usually done in the morning if only a part of the day is required. The berries become even warmer than the air. As berries at a high temperature spoil quicker than at a lower temperature, those picked in the afternoon, especially on hot days, will not keep so well as those picked in the early morning.

FIGURE 11.—Blackberry canes of the upright type tied to posts

The berries should be placed in the baskets, not thrown. To make careful handling easy, waist carriers such as those shown in Figures 12 and 13 should be used. As the baskets are filled they are placed in a hand carrier (fig. 12), which is set in the shade of the bushes until it is taken to the packing house.

In transporting the fruit to the market or shipping points, spring wagons or trucks with pneumatic tires should be used to lessen as much as possible the injury from bruising and to avoid the settling and mashing of the fruit in the baskets.

FIGURE 12.—Desirable types of waist and hand carriers. This waist carrier is so balanced that it will not tip over when the picker leans forward. The hand carrier holds eight pint or six quart baskets

YIELDS

The yield of blackberries depends on the variety and the conditions under which the crop is grown. In certain sections where the soil is very deep and rich, yields of 5,000 quarts or more per acre may be obtained. Under average conditions of good management, about 2,300 quarts per acre can be harvested. In some seasons this will be greatly exceeded, while in other years the yield will be smaller. The Mammoth, Evergreen, and Himalaya varieties regularly yield much more than 2,300 quarts in those sections of the Pacific slope to which they are adapted. With good care, 10,000 to 20,000 pounds per acre of the Evergreen and Himalaya berries can be produced there.

WINTER PROTECTION

The hardy varieties of blackberries will withstand tem-

peratures of −30° F., if water does not stand in the soil around the roots and there are no severe drying winds. Many varieties are hardy enough to survive −40° without injury. In localities where there is real danger from cold, drying winds, as in the Central Western States, or from severe winter temperatures, the canes are bent over in the fall and a layer of earth, straw, or coarse manure is thrown over them. This should be done before the ground is frozen, yet after all danger of warm weather is past. Few canes will break if they are bent over while the sap still circulates. Sometimes the soil is drawn away from one side by means of a hoe or plow and the plants inclined to that side before being covered. The canes will bend over to the ground with less danger of breaking when this is done, although the roots may be injured somewhat when the earth is removed. The plants are uncovered in the spring after severe weather is past.

FIGURE 13.—A waist carrier designed to hold a tray used in picking blackberries

PRODUCTIVE LIFE OF THE PLANTATION

The roots of blackberry plants live for many years, but the length of time during which a plantation is profitable differs with conditions in different parts of the country. Where the humus burns out of the soil quickly and the soil washes readily, the plantation should be abandoned after five or six crops. In other sections, where the humus supply is maintained and where the crowns of the plants do not become diseased, the plantation may be kept longer.

INSECTS[2] AND DISEASES

It is essential to success with blackberries that only plants free from insects and diseases be planted. Crown gall and orange rust are serious and incurable, and all plants infected with these diseases must be dug out and burned. For information on the control of

[2] Consult Farmers' Bulletin 1286, The Red-Necked Raspberry Cane-Borer. This bulletin may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents.

any insect or disease, write to the nearest State agricultural experiment station or to the United States Department of Agriculture, Washington, D. C. Send samples of the affected parts of plants. Specific information to suit local or individual needs will be sent.

WHERE DIFFERENT VARIETIES DO BEST

The blackberry is cultivated throughout the United States, except in southern Florida, the colder parts of Wisconsin, Minnesota, North Dakota, South Dakota, Wyoming, Colorado, and Montana; and those sections of the arid Western States where hot, dry winds destroy the ripening fruit. In the Northern States just mentioned the canes and frequently the roots are killed by cold, dry winds. By protecting the plants in winter, however, blackberries can be grown in some parts of this region.

The different kinds of blackberries are classified according to their resistance to severe weather conditions. They are termed hardy, half-hardy, or tender. A hardy variety should be able to withstand a winter temperature of −30° F. in a protected place, as well as the changing temperature of the Middle Western States, where comparatively high winter temperatures sometimes occur. A half-hardy variety winterkills in places where the temperature goes as low as −30° F. It may pass through some winters safely, but in others it may freeze to the ground. This half-hardy class is also severely injured by the frequent temperature changes which occur in winter in certain sections of the Middle Western States. The tender varieties are suited to the Southern States, where mild winters prevail. They will not stand low temperatures and should be planted only where the thermometer seldom reaches zero.

Certain varieties originated in the Southwest are peculiarly adapted to the semiarid conditions there. These varieties, which include the Dallas, McDonald, and Haupt, are somewhat drought resistant and mature their fruit before the season becomes too warm.

In the Pacific coast region are grown many of the varieties that are common in the East as well as some that are not adapted to cultivation in other sections of the United States. The varieties usually grown on the west coast are the Lawton, Eldorado (*Stuart*), Crandall, Himalaya, Evergreen, and Mammoth. Of these, the Crandall and Mammoth are rarely grown successfully elsewhere. Even on the Pacific coast there is such wide variation in temperature, winds, and moisture supply that these varieties can be grown only in certain sections.

In considering what sorts to grow in any particular section, first decide whether the local conditions will permit the cultivation of the tender or half-hardy blackberries. It will not be profitable to plant varieties which are not sufficiently hardy. Inquiry among neighboring growers will determine the varieties which have already proved successful, and the most promising of these should be selected.

CHARACTERISTICS OF VARIETIES

The following characterizations are intended to aid prospective growers in selecting varieties adapted to their sections and to the purposes for which they intend to grow blackberries. Only those vari-

eties successfully grown throughout large areas of the United States have been included:

Blowers.—New York origin. Berries large, firm, acid till ripe, quality good; season medium, but the variety ripens over a long period. Bush vigorous, hardy, productive. Adapted to the Northeastern States; also grown successfully in Kentucky and Michigan.

Brainerd.—This variety, originated by the United States Department of Agriculture, is a hybrid of the Himalaya and an eastern sort, being introduced by nurseries cooperating with the department. It is essentially a Himalaya, with fruit averaging about 50 per cent larger and canes that are hardy as far north as New Jersey. Its growth and training are similar to those of the Himalaya.

Briton (*Ancient Briton*).—Wisconsin origin. Berries large, not very firm, very good quality; season medium to late. Bush moderately vigorous, thorny, very hardy, very productive. Grown chiefly in Wisconsin and Minnesota. Grown somewhat throughout the Northern States east of the Rocky Mountains.

Crandall (*Macatawa, Santa Cruz Seedless, Navlet Seedless, Everbearing*).—Texas origin. Berries large, firm, sweet, quality very good; season very early, and the variety ripens through a long period. Bush vigorous, productive, makes few suckers, tender, limits of hardiness not known. The leading variety in southern California; not adapted to the Northeastern States.

Dallas.—Texas origin. Berries large, firm, very good quality; season early. Bush vigorous but low growing, hardiness not known, productive. Grown in Texas, Oklahoma, and Florida.

Early Harvest.—Illinois origin. Berries medium size, firm, quality good; season very early, and the variety ripens through a long period. Bush moderately vigorous, and does not sucker so much as some others. Very productive in the South. Very susceptible to rust. Not hardy in the North. Would be a most desirable variety in the South except for rust; it is the most widely grown there.

Eldorado (*Stuart*).—Ohio origin. Berries medium to large, firm, sweet, quality very good; season early to medium and long. Bush very vigorous, hardy, and productive; one of the most resistant to rust of the widely grown varieties. One of the best varieties in most of the sections adapted to blackberries except the extreme South and northern New England. Grown in Oregon and Washington as the "Stuart."

Erie.—Pennsylvania origin. Berries medium to large, very firm, acid till ripe, quality very good; season medium. Bush very vigorous, hardy, very productive. Susceptible to rust. Grown to a limited extent near Cleveland, Ohio.

Evergreen (*Black Diamond, Star, Wonder, Ewing Wonder, Everbearing, Bushel, Atlantic Dewberry*).—Origin unknown, but grown in Europe since 1809. Berries large, exceptionally firm, sweet, dessert quality good, seeds large; season late to very late and long, ripening after other blackberries. Bush vigorous, half-hardy, productive, deep rooted and drought resistant. Canes semitrailing, root at tips. Perennial in the extreme South and West if new canes are kept out. However, they should always be trained as though they were biennial like other varieties, as to a 2-wire or 4-wire trellis in Oregon and Washington (fig. 10) and to a pole or wire trellis 5½ feet high or to stakes, like dewberries, in New Jersey (fig. 11). One of the best varieties in Oregon and Washington, but not generally adapted to the States east of the Rocky Mountains because the fruit is small and worthless, except in New Jersey, where it is grown profitably. It may be grown south to Maryland along the Atlantic coast, if care is taken to control the double-blossom disease by picking off affected buds early in the spring. Planting distances, 6 by 8 feet in New Jersey; 16 by 8 feet in Oregon and Washington, according to conditions. This variety is found growing wild in Oregon and Washington. Plants for commercial fields have been grown from seed. The Delsweet seems to be a semibroad-leafed variety of the Evergreen with a better quality of fruit. The Thornless Evergreen is a thornless sport very similar to the Evergreen but which comes thorny from its roots, hence is propagated by tip plants only.

Haupt.—Texas origin. Berries large, fairly firm, quality good; season very early. Bush very productive, probably tender except in Texas and other Southern States; canes trailing the first year, more upright the second year, root at tips. Grown in central and eastern Texas, where it is a desirable variety, ripening about two days after the McDonald. Not liked in Missouri.

Himalaya (*Theodor Reimers*).—Generally supposed to have originated in California, but apparently same as the Theodor Reimers variety, which originated in Germany. This variety is now the standard blackberry for its season in California, both for the home garden and for local markets. It is also grown a little in Oregon and Washington, but is not generally liked there so well as the Evergreen. It is not adapted to the northern part of the United States east of the Rocky Mountains, but, because it ripens later than other blackberries, it has proved of some value for home use and local markets in some parts of the South. In California the berries are of medium size, rather soft, sweet, dessert quality good to very good, seeds large; season late. Bush very vigorous, half-hardy, very productive in some sections. Canes semitrailing, root at tips, perennial in California and in some other regions, but biennial unless new canes are removed. Planting distance, 8 by 8 feet in southern California to 8 by 20 to 30 feet in Washington, the distance differing according to vigor. Where grown in South Carolina and Georgia, it is trained to a high 1-wire or pole trellis and pruned severely. When trained in this manner it has proved valuable, and when not properly trained and pruned it has been worthless. Figure 9 shows this variety trained to a trellis in California. The Brainerd is a larger fruited hybrid which is being tested to replace the Himalaya.

Iceberg.—California origin. Berries large, amber white, soft, quality very good, season medium; desirable for home use because of its color. Bush half-hardy. Not adapted to market use.

Joy.—New Jersey origin. Berries large, fairly firm, sweet, dessert quality good, season medium. Bush vigorous, hardy, productive. Grown chiefly in New Jersey.

Lawton (*New Rochelle*).—New York origin. Berries large, soft when fully ripe, sweet, quality good; season medium. Bush vigorous, nearly hardy, productive, free from rust. Grown on the Pacific coast and somewhat in all parts of the United States eastward except in the South. Liked especially for canning.

McDonald.—Berries large, firm, quality very good; season very early, two weeks before Dallas and Early Harvest. Bush very vigorous, range of hardiness not known, very productive, drought resistant; canes trailing the first year, more upright the second year, root at tips. A blackberry-dewberry hybrid. Self-sterile; should be planted with another variety which blossoms at the same time. Grown in the Gulf region.

Mammoth.—California origin. Berries very large, soft, sweet, quality very good; season very early. Bush very vigorous, tender, very productive; canes semitrailing, root at tips. Adapted to the milder parts of the Pacific coast, especially in California. Planting distances, 8 to 15 feet by 8 feet when planted in rows; in hills the same as for others. This variety is self-sterile and hence should be planted with another variety that blossoms at the same time. Figure 14 shows fruit of this variety.

Mersereau.—New York origin. Berries large, firm, sweet, quality very good; season medium and short. Bush vigorous, hardy, productive, susceptible to rust, fairly drought resistant. Grown throughout the northern part of the Central-Western and Eastern States, but is being replaced by Eldorado in some sections.

Nanticoke.—Maryland origin. Berries medium size, soft, sweet, dessert quality very good; season very late and long, ripening during August and September in Maryland. Bush vigorous, hardy in Maryland, productive, drought resistant, very thorny. Not adapted to general market, but especially adapted to home use, beginning to ripen after Eldorado has finished.

Rathbun.—New York origin. Berries large, firm, quality good; season early to medium. Bush a vigorous grower, suckers sparingly, half-hardy, rarely productive. Canes semitrailing, root at tips. A blackberry-dewberry hybrid. Not always a good pollinizer. Susceptible to rust. Grown slightly in sections with mild winters east of the Rocky Mountains and in Oregon.

Snyder.—Indiana origin. Berries of medium size, not very attractive, firm, quality good; season medium and short. Bush vigorous, hardy, productive, does not produce many laterals. Does not rust as badly as most varieties. Susceptible to dry weather. Not adapted to heavy clay land. Grown in all parts of the United States from the Atlantic to the Pacific except the South.

Taylor.—Indiana origin. Berries medium size, soft, quality very good; season late. Bush vigorous, very hardy, moderately productive. Not very suscep-

tible to rust. Grown for a late berry from the Rocky Mountains eastward, except in the extreme South.

Ward.—New Jersey origin. Berries large, firm, sweet, quality good; season late. Bush vigorous, hardy, productive. Grown in New Jersey and somewhat in the northern part of the United States east of the Rocky Mountains.

FIGURE 14.—Fruits of the Mammoth blackberry (at right) and of the Logan blackberry (at left)

HYBRIDS AND NOVELTIES

Several hybrids of the blackberry and dewberry have been classed in this bulletin with the blackberry. Hybrids of the blackberry and raspberry have not been discussed. None has proved of value in this country, though some of the hybrids produced by the Texas experiment station are promising.

Several thornless sorts have been introduced. Of these, the Cory, a sport of the Mammoth, is grown where the Mammoth is of value, but it is not hardy in the East. It seems best adapted to home use and the local market in California. Among promising new sorts are the Pocono and Russell from New Jersey and the Alfred from Michigan. The Thornless Evergreen is a thornless sport of the Evergreen and is fully as productive as the Evergreen.

BLACKBERRY BY-PRODUCTS

Besides being eaten fresh, the blackberry is dried, canned, made into jam, jellies, and other preserves, and pressed to extract the juice. Dried blackberries are not used so much as formerly, because more convenient methods of preserving have been developed.

The introduction of the lacquered-tin can, which does not discolor the contents as does the ordinary tin when it comes in contact with this acid fruit, has assisted in the rapid expansion of the blackberry-canning industry. The berries may be preserved in a sugar solution or, as is more customary, preserved by heating without sugar. The latter process is inexpensive and is satisfactory for the trade, since berries put up in this way can be used for many purposes for which berries preserved with sugar would be unsuitable.

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