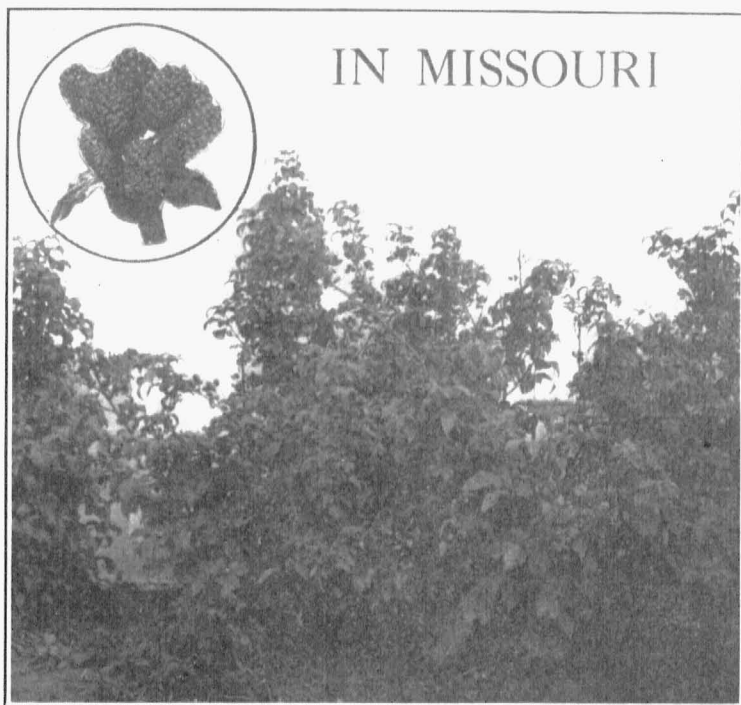


UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE
AGRICULTURAL EXPERIMENT STATION
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SMALL FRUIT GROWING



IN MISSOURI

COLUMBIA, MISSOURI

MAY, 1921

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Small Fruit Growing In Missouri

H. G. SWARTWOUT

INTRODUCTION

The commercial production of raspberries, blackberries and dewberries in Missouri is only in its infancy. The possibilities for future development of this industry are very great, considering the areas adapted to the growing of these fruits, and the great demand that is now but poorly supplied. At present nearly all the plantings of the bramble fruits are located near a few of the larger cities, and even there the production is far below the demand. True there is still a fairly large acreage of wild blackberries in certain sections of the state, but this acreage is not nearly so large as formerly and what is left is rapidly disappearing as more and more land is cleared and put under cultivation.

There are practically no commercial plantings near a large number of the smaller Missouri cities and towns, each one of which would consume locally all the fruit produced from several acres. If one is interested in large commercial plantings, there are plenty of opportunities for locating near the larger cities or along railroads that have direct connection with the large consuming centers.

There are, of course, a number of problems encountered in the production of small fruits, which are not met in the production of the tree fruits. The berries are a soft, perishable product which must be handled carefully and quickly. The fruit ripens rapidly and in a comparatively short period of time, necessitating large picking crews; and it moulds or sours quickly, making immediate disposal imperative. The bushes are short-lived, shallow-rooted and subject to injury from the summer droughts occurring in the middle west.

On the other hand, there are two big advantages in the growing of the small fruits: First, returns can be expected within two or three years from the time of planting and, second, large returns are possible from a small acreage, in fact an acreage so small that one man can easily handle the entire plantation, except at picking time. These two advantages make it possible to conduct the business upon high-priced land advantageously located for quick and easy disposal of the fruit.

TYPES OF THE BRAMBLES

Of the raspberries there are three types, the black, the red and the purple, that are grown commercially in this country; while a second type of red, bearing yellow berries, is grown for special markets and as a curiosity, but is not adapted to general commercial purposes. Of these the black raspberry, commonly known as the blackcap, is the most important for commercial planting in Missouri, adapting itself to a wider range of environmental conditions and producing berries that are firmer, more

easily picked, handled and marketed and adapted to a more varied use than the red or purple raspberries.

Our cultivated blackberries have been derived from several different native species and combinations of these different species. There is consequently a great variation between the different varieties of the blackberry group, especially if the dewberry and the various hybrids between the dewberry and the blackberry be considered as belonging to the same general class.

CHARACTERISTICS

Under favorable conditions for development the black raspberry produces strong, vigorous, arched, blackish purple canes with stiff pricklers.



Fig. 1.—The Cuthbert (red raspberry) as grown on the trial grounds at Turner, Mo.

The canes of the purple raspberry make the same general type of growth but are lighter in color and more vigorous than those of the blackcap. Both produce their new shoots from underground buds on the old canes, near the base of the original plant.

The red raspberry canes are light brown to reddish brown in color, and generally rather slender and upright in habit of growth. The Cuthbert, as it has been grown on the Station grounds, often branches, producing long laterals, which do not have the stiff, arched appearance of the black and purple raspberries, but present a rather loose, straggly appearance.

The red raspberry produces new canes, both from buds near the base of the old plant, and growth coming from adventitious buds on the roots. This sucker producing habit is a very undesirable one, sometimes making it very difficult to keep the plants within bounds.

The blackberry has the same sucker-producing habit as the red raspberry, and anyone who has tried to exterminate a blackberry patch knows with what tenacity it will hold on and continue to send up shoots from every root or piece of root left in the ground.

The blackberry canes have a decidedly upright habit of growth, while the dewberry trails over the ground. The hybrids between the blackberry and dewberry occupy, in habit of growth, a position intermediate between the two and might be classed as semi-upright or semi-trailing. Some of these hybrids are rather upright with fairly long laterals; while others, like the McDonald, are only slightly upright with long trailing laterals, reaching in some cases the length of the dewberry runners.

With all the brambles, the fruit is borne in terminal clusters on lateral shoots arising the same year the fruit is produced. These shoots come out from buds on the main cane, or from laterals that grew the year before. As the fruit is produced on the terminals of the shoots, no further growth is made after the fruit is produced, and the canes die as soon as the crop is matured. Thus, we have in our ordinary varieties perennial plants with biennial canes, a new crop of these canes being produced each season to replace those that have fruited and died.

With some of these fruits, especially the blackcap and some varieties of blackberries, the clusters of berries are very dense and compact; while with others, notably the red raspberry, and to some extent the dewberry, the fruit clusters are loose. Typically the center flowers of the dewberry and raspberry clusters bloom first, and generally the fruits produced from these flowers ripen first. In the case of the true blackberry the lower and outer flowers of the clusters open first.

PROPAGATION

The black and most of the purple raspberries naturally propagate themselves from plants produced at the tips of the branches. In order to secure new plants, then, it is only necessary to make sure the tips are covered with soil in early fall. This can be most conveniently and easily done by cultivating the bed very thoroughly in August, which will result in a large percentage of the tips being covered either from the process of cultivation or through the action of subsequent rains. The rooted tips are generally left attached to the parent plant until the following spring when the laterals are cut several inches above the ground and the rooted tips lifted, packed and stored, or set directly in the permanent bed.

The red raspberry and blackberry which produce new plants from roots may be propagated either by lifting and transplanting the sucker plants, or by making root cuttings. When using the former method for establishing a new plantation, root sprouts which are one year old are best adapted for transplanting, although the young succulent sprouts can be transplanted if a portion of the mother root is removed with the sprout.

When propagating by root cuttings on a large scale it is necessary to dig up and destroy the old rows. Roots the size of a lead pencil are the best, but roots somewhat larger or smaller can be used. They are cut into lengths of two or three inches, packed and stored in damp sand or sawdust, where they will not freeze, until spring, when they are dropped two or three inches apart in shallow furrows and covered with about three inches of loose, sandy soil. No buds are on the roots when cut, but adventitious buds develop later, and by spring two or three of these buds can be seen. Generally, after one year, the plants will have made enough growth to be removed to the permanent plantation. If the growth has been slow they should be allowed to remain another year in the nursery row.

The red raspberry suckers very freely, so in ordinary practice propagation by means of root cuttings is seldom resorted to. With the blackberry, however, both methods are in use. Those varieties which sucker freely are propagated by sprouts, while those that naturally sucker very little are generally propagated by root cuttings.

Additional plants of the dewberry may be secured either by rooting the tips, or by using suckers or root cuttings.

SITE

The most important factor in the selection of a site for the berry plantation is the soil. In general the land should be fairly rich, and well supplied with humus, for the production of strong vigorous canes. If the soil is not already well supplied with humus, it can be added by plowing under cover crops, or by the addition of barnyard manure. Although the brambles must be well supplied with water, the soil in which they grow must be well drained.

The black raspberry will adapt itself and do well upon a greater variety of soils than any of the other raspberries, but it does best in a rich clay loam topsoil with a more clayey subsoil which is retentive of moisture. It will, however, do well on a rather sandy soil well supplied with manure and water. In fact a better yield will be secured on such a soil well handled than on the ideal soil poorly managed.

The red raspberry thrives on a lighter and more sandy soil than the black, but does well on any soil from a sandy to a clayey loam, provided other conditions are suitable for its growth. The purple raspberry, as might be expected from the fact that it is a cross between the black raspberry and red raspberry, is intermediate between the two in its soil requirements. It does best upon a silty loam soil.

The blackberry, like the black raspberry, requires a rather clayey loam, but not so rich as the black raspberry demands. A soil too rich will stimulate vegetative growth at the expense of fruit production. A sandy or gravelly soil, unless underlaid with porous clay subsoil, is not at all suited to the growing of blackberries. Such a soil tends to become too hot and dry just at the time when the blackberry is maturing its crop and in need of a great amount of water.

The dewberry is found in the wild state growing upon rather sandy

well-drained soils, and it is on such soils that it will probably do its best under cultivation.

The next factor in importance after soil, in the selection of a site, is drainage, both atmospheric and soil. Since these fruits ordinarily bloom late enough to escape the spring frosts atmospheric drainage is not so important from the standpoint of spring frosts as from the standpoint of winter injury. If the plantation is located on a hillside high enough that the cold air can drain away to lower lands, the amount of winter injury to the canes will be found to be less than where the plants are located in "pockets" or on low lands. A location which has good atmospheric drainage generally has good soil drainage. All poorly drained spots should be avoided, as the canes are more liable to winter injury in such places.

If a north or northeastern exposure is available it should be used, as such a slope is more moist and cooler than other slopes. This is, however, the least important factor in the selection of a site and should be the last insisted upon when it is impossible to find the ideal location.

PREPARATION OF THE SOIL

Preparatory to planting it is advisable to grow on the land some intensively cultivated or hoed crop to rid the land as much as possible of weeds, or if the land is lacking in humus better still to plant it to some cover crop to be turned under.

The plowing may be done either in the fall or early spring. The land should be deeply plowed, especially the heavier soils, and reduced to a fine state of tilth. Plowing to a depth of about 8 inches, using a steep moldboard to pulverize the furrow slice, followed by a thorough disking and harrowing will put the land in good condition. If a cover crop is not turned under it is advisable to work in a liberal supply of manure, as the bed will probably stand five to ten years and humus can be more easily added to the soil at this time than after planting.

NURSERY STOCK

Very often in putting out a new plantation a grower will select plants from his old one, or from his neighbor's. This may be done without danger, if the old plants are healthy, vigorous and practically free of disease; but generally it is better to buy nursery stock from reliable nurserymen who make it a practice to grow their plants from young and healthy stock.

Any plants affected with crown gall should be thrown out as they are generally weakened and will not prove as productive as perfectly healthy ones. Crown gall can be recognized by the knots which appear on the roots and about the crown of the plants.

If the plants are not to be set as soon as received, they should be unpacked and heeled in to prevent drying out or rotting. For heeling in a trench is dug with the back side sloped at an angle of about 40 degrees and deep enough that the plants can be covered as deeply as when they stood in the nursery. The plants should be spread out one layer deep

along the trench and covered with moist soil well packed about the roots. If the plants are dry they should be watered.

Just before setting, if the day is warm and sunny, the roots should be dipped in a puddle of clay and water to protect them from the drying effect of the sun and wind, and the old canes cut back to 4 to 6 inches to prevent them from throwing out flowering shoots which will weaken the small and poorly established plants. There is no harm in cutting the cane shorter as the main purpose it serves is to mark the row after setting. For protection against dry weather it is advisable to set the plants a little deeper than they stood in the nursery. Care should be used, however, with the black and purple raspberries, not to set the crown deeper than two inches as there is danger of smothering out the plants. Ordinarily the red raspberry and blackberry are set 2 to 4 inches below the surface of the ground.

SETTING THE PLANTS

The best time for setting plants is in the early spring, but they can be planted in the fall, if mulched with a fine layer of straw for protection during the winter. It is very important that they be set early in the spring before growth has started. If setting is delayed too long there is danger of breaking off the shoots or their tender tips. Furthermore, the roots which have started growing will be injured in moving, and drought may set in before the plants have become well established, with a resultant reduction of the stand to a half or a third. There will be no trouble in securing a full stand if the plants are set at the right time and with proper precautions.

The actual setting may be done, either by digging holes into which the plants are set; or by pushing a spade into the ground, then pushing it forward and dropping the plant into place, removing the spade and tamping the soil firmly about the plant, much as sweet potato slips are set. Still another method of planting is to plow deep furrows along the rows and in these the plants are set. No trouble need be taken to fill the deep furrows between the plants, as this can be done by later cultivation.

PLANTING DISTANCES

As grown in Missouri, raspberries and blackberries are generally set in rows, the plants 3 to 4 feet apart in the rows, and the rows 6 to 8 feet apart. Distances less than this often result in crowding, while distances greater than this generally involve a waste of land. If land is comparatively cheap, it may be advisable under some conditions to set the rows far enough apart to cultivate the middles with a disk. For planting one acre with plants set 3 feet apart in rows 7 feet apart 2,074 plants will be required. With plants set 4 feet apart and the rows 8 feet apart 1,361 plants will be necessary. Dewberries are generally set 3 feet apart in rows 6 to 7 feet apart.

CULTIVATION

Because of their habit of growth the purple and black raspberries do not spread, but grow in clumps from the plants originally set. With them it is no trouble to keep the plants within bounds and the rows as originally set. The red raspberry and the blackberry, which may send up shoots anywhere from the roots, are in many cases allowed to form a matted row from 20 to 24 inches wide. With them it is sometimes quite a problem to keep the middles clean, and the rows straight and of proper width. This can, however, be accomplished by shallow plowing in the spring, throwing the furrows away from the rows. Plowing to the depth of 3 or 4 inches is sufficient and in no case should it be deeper than 4 inches as so many roots will then be injured as to cause a dense growth of sprouts.

Cultivation with a spring tooth cultivator or five-shovel cultivator should begin at once after the plowing, keeping up a constant and thorough stirring of the soil until picking time. If plowing is not done, cultivation should begin early enough to keep ahead of the weeds and suckers.

It is desirable to maintain a dust mulch, but the soil should not be stirred to a depth of more than 2 or 3 inches as some of the roots are so near the surface that they will be injured. Some growers shorten the cultivator teeth or set them shallow on the side next to the rows so as not to disturb the small feeding roots near the surface. During the ripening season of the raspberries cultivation is sometimes discontinued, but it is generally better to continue to cultivate the middles unless it stirs up enough dust to injure the berries. Cultivation so close as to injure or knock berries from the canes is to be avoided.

Thorough cultivation and conservation of moisture in the case of the blackberry cannot be over emphasized as the blackberry is supporting and maturing a heavy crop of fruit when the weather is normally the hottest and driest.

To keep the weeds out of the matted rows at least two hoeings will be necessary, one in the spring and one in the fall; and, if the weeds are very bad, a third hoeing in midsummer will be necessary. It is impossible to keep the matted rows clean by the use of a horse cultivator.

Cultivation late into the fall, which tends to develop new growth and to prevent the hardening off of canes, is undesirable.

For the home garden the berry patch can be mulched to very good advantage. Straw applied to the depth of about 6 inches will prove satisfactory. Such a mulch keeps down weeds, checks evaporation and does away with the necessity of cultivation. Its use cannot be recommended at present for large commercial plantations.

FERTILIZATION

The question of fertilization is a very much disputed one, some growers favoring it, some condemning it. This doubtless is due, in large part, to the many different soils on which the brambles are grown. Unfortunately there are not at present enough reliable experimental data along

this line to warrant any definite fertilizer recommendations. Each grower must determine the needs of his soil, by the application of fertilizers to small blocks and by noting the effect upon cane growth, yield and quality of fruit.

Of the fertilizers used, barnyard manure is the most popular, adding nitrogen and humus to the soil, both of which favor the development of strong, vigorous canes. It should be applied in the late fall or early spring. The use of commercial fertilizers containing large amounts of quickly available nitrogen, or the excessive use of barnyard manure, apparently is danger-

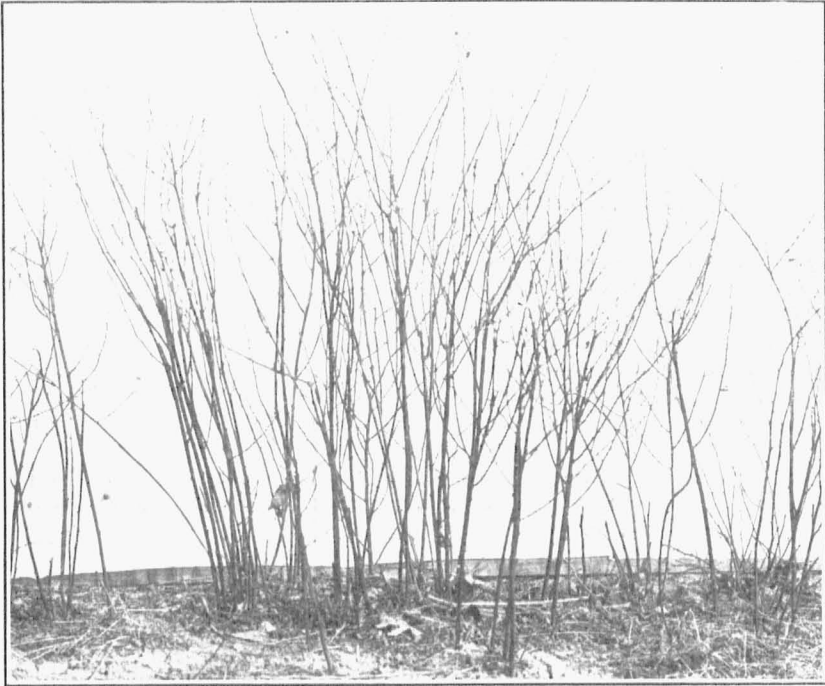


Fig. 2.—The Robinson blackberry before thinning and pruning. Note the mass of canes and laterals near the center. Compare with Fig. 3.

ous, as it causes excessive cane and leaf growth at the expense of fruit production. The usual application of barnyard manure is from 5 to 10 tons per acre.

PRUNING AND TRAINING

Each spring the raspberries, blackberries and dewberries send up many new shoots from near the base of the old crown, or from adventitious buds formed on the roots, to replace the fruiting canes which die as soon as the fruit is matured. The method of pruning and training these shoots will vary according to the kind of fruit or variety grown.

The pruning practices for the blackberries and the raspberries, with the exception of the red raspberry are very much the same. In order to prevent the new shoots from making long, weak canes to bend or break down into the dirt with a heavy crop of fruit, the tips are pinched out as soon as they have reached a height of 18 to 20 inches (possibly longer with the purple raspberry and the ranker growing varieties of blackberries). This shortens, thickens and strengthens the shoot and induces the formation of from four to six laterals near the top. It is on these laterals that the fruiting shoots are later produced. To prevent overbearing, these laterals must be shortened, preferably in early spring

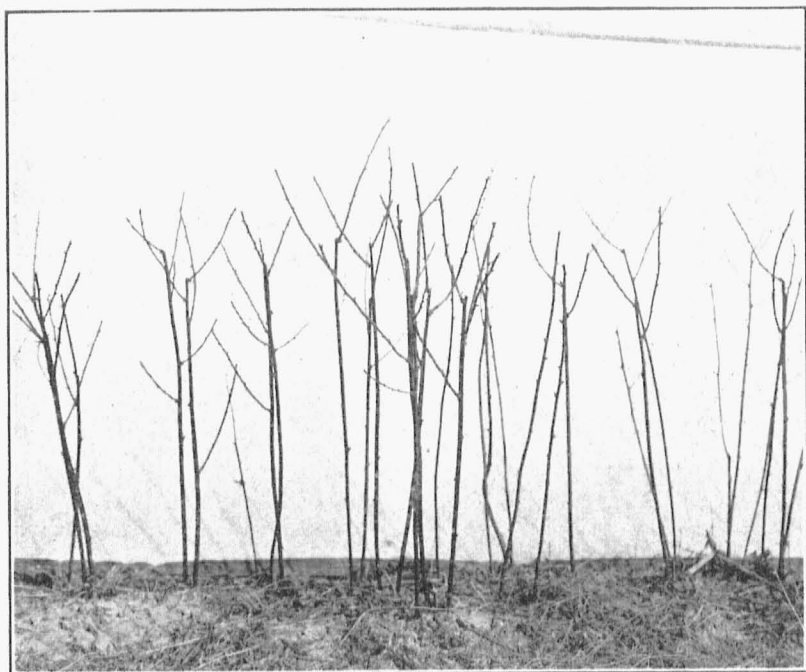


Fig. 3.—The Robinson blackberry after thinning the canes and laterals and shortening the vigorous laterals remaining.

before growth starts. Shortening the laterals of the blackberry and black raspberry to 8 to 12 inches leaves enough buds to produce a good crop of large, well-formed berries. In the case of the purple raspberry, which produces its fruit farther out on the laterals it is necessary to leave them 12 to 18 inches long.

As soon as the fruit is produced the old canes die and should be removed at once to give the young canes more room and sunlight, and to check the spread of disease and insect pests. At this time the new shoots of the raspberry are thinned so that there will be four or five strong, vigorous canes to each plant. Blackberries, because of their ten-

endency to throw up new and weak shoots, should not be thinned until spring at the time the laterals are shortened. They are then thinned to leave strong, vigorous canes 8 to 10 inches apart.

Because of the likelihood of producing tender laterals, pinching out the tips of the red raspberry shoots is not practiced in this section of the country. The only pruning done is the removal of the old canes as soon as they have fruited, and in the spring thinning the fruiting canes to stand about 8 inches apart.

Ordinarily no method of supporting or trellising is used in growing raspberries in Missouri, but it has been found advisable on the trial grounds

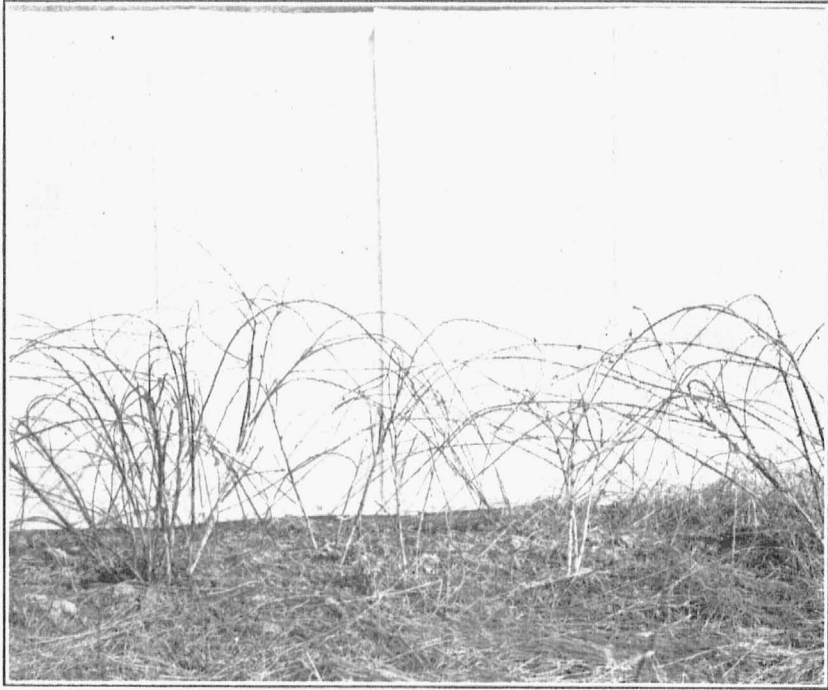


Fig. 4.—The black raspberry as it looks before pruning. Note the mass of long laterals, also the thickness of the clump to the left. Compare with Fig. 5.

at Columbia to support the canes of the black and purple raspberries with a horizontal trellis. If this is not done and the plantation is exposed to strong winds, many of the new shoots are likely to be broken down. This will have a decided effect upon next year's crop for it is then too late for these shoots to be replaced with others. Besides trellising, this brings out the advisability of locating the plantation in a sheltered spot whenever it is possible.

The horizontal trellis may be constructed by setting large posts at the end of each row, with lighter posts at intervals of 20 to 30 feet. Cross-

arms 18 inches long are nailed to each post at a height of 20 to 30 inches, depending upon the vigor of the cane growth. A wire is then stretched tightly on either side of the row and securely fastened to the ends of the cross-arms.

Such a trellis is easily constructed, permanent and of neat appearance. It prevents the new growth from being whipped about by the wind or bent over and broken, and it supports the fruiting canes, holding them out of the mud and dirt and out of the way of cultivation.

A trellis has not been found necessary for blackberries and the red raspberries, except the Cuthbert which sometimes forms long straggling laterals.

Under Missouri conditions, probably the best method of handling the dewberry is simply to allow it to trail on the ground. This is much cheap-

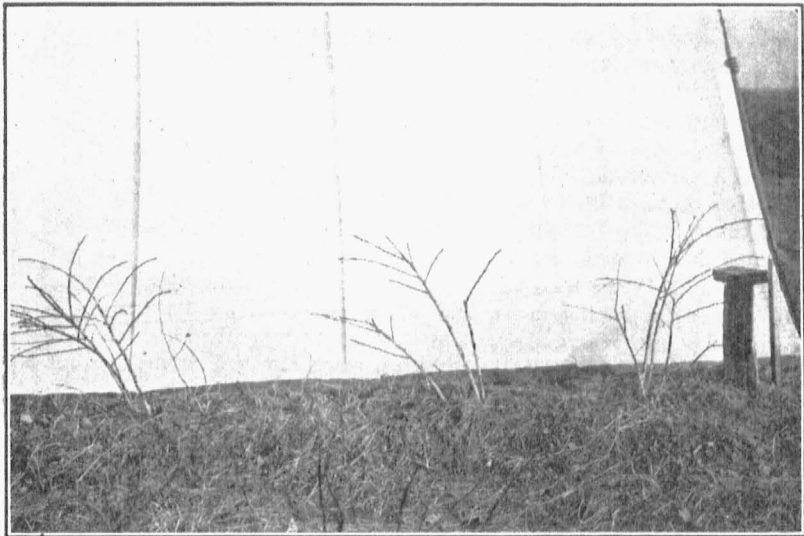


Fig. 5.—The black raspberry as it looks after pruning. The end post and wires of the trellis are also shown.

er than tying or training it to stakes or wires, and the yield is probably as large. The only serious fault of this system is the difficulty of making clean pickings, as the berries are concealed by the foliage. A modification of this system, which may facilitate picking, is that of stretching a wire along the row and over this the vines are thrown.

The only pruning necessary is the removal of the old canes, and the cutting out of the weak growth in the spring.

LIFE OF PLANTATION

The length of time a plantation will remain profitable depends upon soil conditions, diseases and care. If the moisture supply is inadequate or

if the plants are allowed to overbear, few, if any, new canes are developed and the plants are weakened or killed. This is particularly true of the black raspberry. Under present conditions and cultural methods the life of a plantation in Missouri is from five to ten years. In some parts of the country plantations twice that age are still bearing good crops.

HARVESTING

Raspberries are ready to pick as soon as they will readily separate from the receptacle. At that time they are not so easily bruised in picking and handling, will hold up better under shipment and are not so subject to the attacks of fungi as when allowed to become fully ripe.

Blackberries do not reach their highest state of perfection until fully ripe and to be at their best must be eaten soon after picking. As the fruit colors before it is ripe, it should be allowed to become soft before picking for home use. For shipment the blackberry should be picked as soon as it separates fairly easily from the cluster. This lessens deterioration in marketing.

In picking, three fingers should be used and but few berries should be held in the hand at one time. The fruits should be placed, not dropped, into the containers. They are picked directly into the pint or quart boxes in which they are to be marketed. Additional handling of these soft fruits will result in broken skins and this detracts from their appearance and hastens deterioration.

The pickers use trays or carriers holding from four to six boxes. The use of carriers holding more than six quarts is to be discouraged, as the berries first picked are exposed to the sun so long that the fruit becomes overheated and damaged. Blackberries, when exposed to the sun for long periods, turn red and develop a bitter taste.

All grading, except where the packer separates the boxes of fruit according to the picker or the appearance on top, is done by the picker. The picker reserves one or two boxes in the carrier for the decayed, over-ripe, green, misshapen, and injured berries. The carriers when full should be placed in the shade under the canes and gathered up later by a person whose duty it is to bring in the full trays, or they may be brought directly to the packing shed by the pickers.

The best time for picking is in the morning as soon as the dew is off and while it is still cool. At this time the berries are cool, and the pickers do much better work than in the heat of day. Not only are warm berries harder to cool, but the thin membraneous covering is weaker and more easily broken in picking and handling.

PAYING THE PICKERS

Two general methods are used in paying pickers; one by the hour, the other by piece work. Both have their advantages and disadvantages. The great disadvantages in piece work include the tendency of the pickers to fill their boxes as fast as they can with little regard to grading and

careful handling, and their fondness for picking where the berries are the thickest and leaving the scattering fruit. Better grading can generally be secured by paying slightly more per box for the cull berries. Most pickers must be watched constantly and checked to secure clean picking and careful handling. In order to hold pickers at the end of the season when the berries become scattering it is often necessary to give them more per quart or give a bonus to those who stay throughout the season. On the other hand paying by the hour is expensive as few if any of the pickers will work at a maximum speed.

There are three general methods of keeping a record of the number of berries gathered by each picker. The first and least satisfactory is the daybook system where the foreman merely enters the pickers name, the date and the number of quarts picked. The two better methods are the check system, and the punch-card system. In the check system each picker is given a check for each quart or tray brought in. These checks are kept by the picker and turned in on pay day. They are best made of some metal such as aluminum and stamped with the design of the fruits being harvested; they are generally in denominations of 1 pint or 1 quart, and 1 tray (4 to 6 boxes). In the punch-card system each picker is given a card much like a shipping tag in outline. On this card is written the picker's name and the rate per quart he is to be paid, and around the margin are printed numbers which are punched according to the number of quarts brought in by the picker. In using this system the punch must be changed frequently to prevent the picker securing and using a punch of like design. Various modifications of this system as to arrangement, the length of time the cards will last and the number of cards used, are in use.

With any system frequent pay days are necessary to prevent discontent and to avoid chances of error.

PACKAGES

The 24-quart crate as used for strawberries is perhaps the best crate in which to market dewberries, blackberries and black raspberries. A 32 or 48-quart crate might be used when marketing locally, but for shipping such crates are too large. The added weight of fruit above tends to crush the berries in the boxes near the bottom. Furthermore the 24-quart crate best meets the demands of the customer buying in crate lots for putting up at home.

The American style one-quart box is one of the best and most popular of the quart boxes. They are made up at the factory and shipped nested, and there is no expense or inconvenience of making up at home. They fit into the American 24-quart crate in three tiers of eight boxes each, with a divider between each two tiers.

The purple and red raspberries are best marketed in shallow pint boxes. They are rarely marketed in quart boxes, except where the markets are very conservative and demand the quart box. The weight of the extra berries in the quart box will crush those near the bottom; and

generally, because of the high price of the red raspberry, the consumer prefers to buy in pints.

To comply with the rules and regulations of the Net Weight Amendment to the Food and Drugs Act, the shipper, when shipping to another state, must stamp plainly on the outside of the package the contents and number of open packages contained, in terms of the largest unit contained. For example, the 24-quart crate would be marked,—“Contents 24 dry quarts,” or “This crate contains 24 dry quarts.” Further, the standardization of the berry box makes it illegal to ship from state to state, berry boxes which do not contain in cubical contents one pint, one-half pint, one quart, or multiples of one quart, all dry measure.

PACKING SHED

Some sort of packing shed is essential in the small fruit industry. It protects the fruit from the hot sun and rain, creates a central packing point and provides a storage place for packing material and equipment. It may be a very cheaply constructed affair, consisting only of a frame-work and roof that will keep out the sun and rain, or it may be more substantially constructed with a storage room or loft, thoroughly protected from the weather. Such a place provides a permanent storage place for packing material.

YIELDS

As may be seen by referring to Tables I to IV the yields vary considerably from year to year, with different soil and environmental conditions, and with different varieties. Under ordinary conditions and with good care the black raspberry should yield from 1200 to 1800 quarts per acre, the purple raspberry about the same, and the red raspberry, under Missouri conditions, 500 to 800 quarts. Sometimes very large yields will be secured as with the Kansas grown at Columbia, which made in 1919 over 4000 quarts per acre. Those blackberry varieties, which, when given good care, will not average 1200 quarts per acre, when planted 4 feet by 10 feet, are not adapted to commercial planting. Averages of 1800 to 2000 quarts per acre may be regarded as good yields.

Upon examination of the tables of yield of blackberries and raspberries, it will be seen that there are varieties which run consistently low in yield. Such varieties may be adapted to planting in the home garden because of some other quality they possess in a superior degree, but they should never be planted in a commercial way. The red raspberry, even with the additional price paid for it, is not nearly so profitable as the blackcap. However, the fruit of the purple-caned varieties is usually sold as a red raspberry for which, as a matter of fact, it is an acceptable substitute and there are varieties of this group that are profitable under Missouri conditions.

VARIETIES

Black raspberries—Almost all of the black raspberries tested are recognized standard varieties, and consequently the differences in yield are not

TABLE I.—YIELD OF RASPBERRIES 1919.

Varieties	Original	Yield in Quarts			Total Yield	Perc't stand	Yield per acre in qts. 4'x8'	Gross returns-per acre†	No. of berries per qt.
	No. of Plants	June 14 to June 19	June 20 to June 25	June 26 to July 7					
Blackcaps									
<i>Turner</i>									
Kansas	80	23.5	18.0	5.0	46.5	88	904	\$ 271.20	705
Black									
Pearl	160	48.25	58.5	22.0	128.75	90	1217	365.10	509
Cumberl'd	160	43.0	93.5	42.0	178.5	92	1647	494.10	488
Plum									
Farmer	160	56.5	53.25	14.5	124.25	94	1127	336.10	596
Gregg	80	5.5	55.0	34.75	95.25	91	1769	531.70	512
Improved									
Gregg	80	15.25	28.75	11.25	55.25	93	1017	305.10	488
Blackcaps									
<i>Columbia</i>									
Kansas	42	24.75	50.0	9.5	84.25	100	4148*	1244.40*	589
Conrath	42	13.5	35.5	10.25	59.25	100	2924*	877.20*	546
Cumberl'd	42	8.25	42.75	13.75	64.75	100	3194*	958.20*	517
Purplecano									
<i>Turner</i>									
Cardinal	80	.25	32.0	57.75	90.00	98	1565	547.75	465
<i>Columbia</i>									
Cardinal	42		8.25	36.00	45.00	100	2219*	776.65*	
Red									
<i>Turner</i>									
Louden	80	8.0	8.0	5.25	21.25	94	386	135.10	672
Cuthbert	160	5.75	18.25	12.75	36.75	97	322	112.70	445
King	80	2.0	8.0	16.25	26.25	94	480	168.00	568
Red									
<i>Columbia</i>									
Eaton	42		1.75	5.0	6.75	48	699*	244.65*	
Cuthbert	42		4.0	14.0	18.0	100	901*	315.35*	
King	42	.25	5.75	13.0	19.0	95	985*	344.75*	

*3 feet by 7 feet.

†Blacks at 30c per qt., Reds and Purple at 35c per qt.

Explanation of Tables I to IV.—The blackberries, and those raspberries marked Turner were grown on the trial grounds at Turner, Missouri, in a soil which is a mixture of the loess soil and silty loam. Those marked Columbia were grown on the trial grounds at Columbia in a heavy silty loam, rich and reasonably well drained.

The blackberries at Turner were set 4 feet apart in rows 8 feet apart. At Columbia the raspberries were set 3 feet apart in rows 7 feet apart. As was to be expected very few of the varieties came into bearing with a full stand, so the percent of a stand bearing each year is given; and the yields per acre, as given, were calculated for a full stand at the distance planted.

so great as they otherwise might have been, except where the influence of the two types of soil is felt. As might be expected, the soil at Columbia, being richer and better supplied with humus than that at Turner, gave much larger yields, even when the difference in distance planted is taken into consideration. Of the varieties grown at Turner, the Cumberland and Gregg gave the largest yields, while at Columbia the Kansas and Cumberland were the highest yielding varieties. Although very little is known of the adaptability of different varieties to various soil types, the data given carry the suggestion that Cumberland and Gregg are good varieties

TABLE II.—YIELD OF RASPBERRIES 1920.

Varieties	No. of Plants	Yield in Quarts			Total Yield	Perc't stand	Yield per acre in qts. 4'x8'	Gross re- turns per acref	1 acre Aver. yield of 2 yr. 4'x8'
		June 19 to June 26	June 27 to July 5	July 6 to July 14					
Blackcaps -									
<i>Turner</i>									
Kansas	80	11.0	3.25	.25	14.25	54	459	\$137.70	681
Black									
Pearl	160	22.75	11.0	.25	34.0	70	414	124.20	816
Cumberl'd	160	12.75	19.0	2.0	33.75	76	380	114.00	1013
Plum									
Farmer	160	30.75	10.25	.25	41.25	81	431	129.30	779
Gregg	80	8.0	9.0	4.5	21.5	75	487	146.10	1128
Improved									
Gregg	80	8.25	4.0		8.25	81	256	76.80	636
Blackcaps									
<i>Columbia</i>									
Kansas	42	30.5	6.5		37.0	100	1827*	548.10*	2987*
Conrath	42	24.75	13.0	2.0	39.75	100	1962*	588.60*	2443*
Cumberl'd	42	19.75	16.25	.75	36.75	100	1815*	544.50*	2504*
Purplecane									
<i>Turner</i>									
Cardinal	80	1.25	28.75	16.0	46.0	91	857	299.95	1211
<i>Columbia</i>									
Cardinal	42	1.0	22.25	5.0	28.25	100	1396*	488.60*	1807*
Red									
<i>Turner</i>									
Louden	80	16.0	12.5	3.0	31.5	94	573	205.55	479
Cuthbert	160	13.25	32.0	8.5	53.75	96	476	166.60	399
King	80	10.0	9.75	8.0	27.75	88	539	188.65	509
Red									
<i>Columbia</i>									
Eaton	42	Most of canes winter killed.....			Few scattering berries....			349*	
King	42		4.25	1.75	6.0	100	309*	108.15*	647*
Cuthbert	42	All canes winter killed to ground							450*

*3 feet x 7 feet.

†Blacks at 30c per qt., Reds and Purple at 35c per qt.

to grow on the poorer soils, while the Kansas is a very good one for the richer soils. All three varieties, Kansas, Cumberland and Gregg are strong, vigorous growers and hardy enough to meet Missouri conditions. The Kansas is a few days earlier than the Cumberland, while the Gregg is the last of the three to ripen. The Kansas is sweeter than the other two, but runs a little smaller in size.

Purple raspberries—The Cardinal was the only purple raspberry tested, but the yield was large enough to make it a very profitable berry to grow wherever it can be disposed of quickly.

Red raspberries—None of the red raspberries proved to be of commercial value. The Cuthbert, although its yields were a little less than those of some of the other varieties, is the best red for the home garden because of its superiority in quality and flavor. The berries do not have the tendency to crumble so much as those of some of the other varieties.

TABLE III.—YIELD OF BLACKBERRIES 1919.

Varieties	Original		Yield in Quarts				Total Yield	Percent stand	Yield per acre Rows 10 ft. apart	Returns per acre at 20c per qt.	No. of berries per qt.
	No. of plants	June 17 to June 25	June 26 to July 4	July 5 to July 13	July 14 to July 21	July 22 to July 29					
McDonald	80	109	3	3.75	...	...	115.75	96.2	1658	331.60	264
Early Harvest	160	136	64	13.25	...	...	213.25	84.4	1738	347.60	508
Robinson	160	89	114	67.	3.	...	273.	67.5	2792	458.40	360
Blowers	80	...	1	33.	41.5	14.	89.5	86.3	1429	285.80	270
Ward	160	...	1	79.	90.5	16.75	187.25	81.3	1588	317.60	385
Snyder	160	...	...	148.75	129.	11.25	289.	93.8	2126	225.20	471
Ambrosia	80	...	...	7.75	8.	1.75	17.5	50.0	485	97.00	460
Lagrange	80	...	...	7.25	28.	18.5	53.75	75.0	988	197.60	231
Eldorado	80	...	...	53.5	46.	9.25	108.75	87.5	1715	343.00	221
Ancient Briton	80	...	...	3.	24.5	16.5	44.	68.8	886	177.20	355

The everbearing raspberry, of late introduction, has been widely advertised and many questions have been asked as to its value. None of the varieties of everbearing raspberries have been grown on the Station grounds, but it is doubtful if this type will prove profitable under Missouri conditions, except, possibly, in a few special districts where the consumer will buy regardless of the price, or in the home garden where cost is of no consideration.

Blackberries—The blackberries may be divided roughly into the early and late maturing sorts. The early varieties include the Robinson, Early Harvest, and McDonald, the last named a hybrid between the blackberry and dewberry. The late varieties include; Blowers, Ward, Snyder, Ambrosia, Lagrange, Eldorado and Ancient Briton. In general the early varieties are to be preferred, because they ripen before the wild plants and thus avoid competition with them and because they escape or partly escape the hot, dry weather that so often prevails during the ordinary ripening season of the later varieties.

Of the early varieties mentioned, the Early Harvest is the best. The McDonald, although producing very large dewberry-like berries, is too uncertain because of winter killing. The low yield in 1920 was due to winter injury of the fruiting wood. Also, because of its semi-trailing habit of growth and formidable thorns, picking is slow and unpleasant. The Robinson because of its great susceptibility to rust and its thick habit of growth, which hides many of the berry clusters, is not so good a variety commercially as the Early Harvest. The Snyder was the only late variety grown that can be classed as a good variety. The Blowers, Ward and Eldorado are fair, while the Ambrosia, Lagrange and Ancient Briton produced yields too low to be recommended as commercial varieties.

Dewberries—No tests were made with the dewberry, but the Lucretia is the standard variety and is probably the best.

TABLE IV.—YIELD OF BLACKBERRIES 1920.

Varieties	Original		Yield in Quarts				Total Yield	Percent stand	Yield per acre Rows 10 ft. apart	Returns per acre at 20c per qt.	Aver. yield for 2 yrs.*
	No. of plants	June 21 to June 28	June 29 to July 5	July 6 to July 12	July 13 to July 19	July 20 to July 26					
McDonald	80	30	...	...	...	...	30.	96.2	432	\$ 86.40	1045
Early Harvest	160	88	110	33.	14.	...	245.	85.6	1871	394.20	1854
Robinson	160	14	81	32.	3.	...	130.	62.5	1433	286.60	2112
Blowers	80	..	...	29.5	33.25	11.5	74.25	87.5	1168	233.60	1298
Ward	160	..	...	39.5	64.	21.5	125.	79.4	1085	217.00	1336
Snyder	160	..	...	61.	114.5	35.75	211.25	93.8	1552	310.40	1839
Ambrosia	80	..	...	7.75	8.	1.75	17.5	50.0	256	51.20	370
Lagrange	80	..	...	7.25	28.	18.5	53.75	72.5	406	81.20	697
Eldorado	80	..	...	53.5	46.	9.25	108.75	87.5	750	150.00	1232
Ancient Briton	80	..	...	3.	24.5	16.5	44.	70.0	1028	205.60	957

*Rows 10 feet apart.

A SUCCESSION OF FRUITS

For the small fruit farm the average grower will want an assortment of fruits and varieties that will ripen continuously, or nearly so, throughout the summer. In this way the work is spread out over a period of several months, instead of being bunched within a period of two or three weeks.

For a full succession the grower can start with the strawberry which will start ripening in May and last until June. The standard variety for south Missouri is the Aroma, while the Dunlap is the best for north Missouri. The strawberry may be followed by the raspberry, and to secure succession the following varieties are to be recommended, in the order named: Kansas, Cumberland and Gregg. The blackberry type of fruit might be begun with the Lucretia dewberry which, although overlapping with the raspberry, will pay well for the extra effort necessary to handle

it at this time. After the dewberry will come the Early Harvest blackberry followed by the Snyder or Eldorado, carrying the season to about the first of August.

For a fall crop the grape may be planted, beginning with some of the early varieties such as Daisy (black) and Moore's Early (black) followed by the midseason varieties like Concord (black), Worden (black), Wyoming Red (red), Niagara (white) and Diamond (white). For a later grape the Catawba might be grown. The average grower will find it best to make the most of his planting of Concord or Worden.

The above is merely a suggestion, and the grower must decide for his own particular conditions whether it will be profitable for him to attempt to grow all the small fruits or only a part of them. Also he must decide the amount of each particular fruit and variety to grow. This will depend somewhat upon whether the grower intends to ship his fruit or sell it locally.

INSECTS AND DISEASES

Insects—Of the insects attacking the brambles, none is of sufficient importance in Missouri at present, to necessitate the use of any special remedial measures.

Diseases—*Crown gall*—This is the gall or swelling which appears on the roots or at the crown of the plant and weakens it, the affected plant having a sickly appearance.

PREVENTION. Plant only healthy nursery stock that is free of the galls on land which is not already infected with the disease organism.

REMEDY. Dig out and destroy all affected plants.

Anthracnose—This is a very common and very serious disease of the black raspberry. It attacks the canes, the leaves, and the fruit, but is more noticeable on the canes on which it produces small gray elliptical spots from a mere speck to three or four times the size of a pin head. They are bordered with a dark, blackish purple, indefinite and narrow band. As the spots near maturity they often split lengthwise of the stem and the interior assumes the color of dead wood. When abundant the spots coalesce forming large patches of diseased bark. In bad infestations canes may be girdled.

CONTROL. This disease can be controlled by spraying, but this is not to be recommended as the extra yields secured do not pay for the added cost of spraying. The plan generally recommended for holding this disease in check is to cut out all the old canes as soon as they have fruited and all the badly infected new growth. This partly removes the source of infection and opens up the interior of the rows, allowing better ventilation and more sunlight. The infected canes should be burned.

Orange Rust—This is a very serious disease of the blackberry, but not so troublesome on the raspberry. The first appearance of the disease is on the leaves in the spring, when they assume a sickly, yellowish green color. A little later a glistening orange color appears on the under surface of the leaves and from this the small, dustlike orange-colored spores break. The spores may alight upon some other plant where they germinate, the mycelial growth spreading through the leaves of the host plant and eventually down the stems and into the roots where it lives from year to year.

CONTROL. Because of its habit of growth it is impossible to control Orange rust once it has gained entrance to the plant. To prevent it from spreading to nearby plants the affected plants should be dug up completely before the orange-colored spores break out. Also, any affected wild plants near the plantation should be cut out.

STRAWBERRY VARIETIES FOR MISSOURI

The strawberry is by far the most important of the small fruits grown in Missouri. This is due to many factors, chief among which are the almost universal demand for this fruit when it is in season and the fact that certain sections in this state seem to be particularly well adapted to its commercial production. The commercial strawberry industry of this state is based largely upon a few well-tried varieties. Many new varieties, however, are introduced to the trade each year. The amateur grower is often unacquainted with those that have proved desirable, and is at a loss to know which among old and new to select for planting. The commercial grower also is eager to obtain stock of any newly developed sort that may be really meritorious with promise of netting greater profits. The Missouri Agricultural Experiment Station has had some of these varieties under trial on its grounds, and the records as to what they have done are sufficient to justify an opinion as to their probable performance under average Missouri conditions. It is not considered either necessary, or desirable, at this time to present detailed descriptions and detailed performance records of each of these varieties. The following account of our strawberry variety trials, therefore, is limited to a brief statement summarizing our observations with the standard or spring maturing varieties and to a somewhat more detailed statement of results and observations upon the varieties of the everbearing type.

The Spring Bearing Varieties—The very early varieties are not extensively grown in Missouri, and probably none of them yields heavily enough or is the type of berry that should be extensively planted except in those districts where an early berry will command an exceptionally high price. Two of the more promising early varieties for this section are the Early Ozark and Michel. The Early Ozark is a low growing plant, but is vigorous, reasonably resistant to fungous diseases, makes a fairly good plant growth and, for an early berry, is productive. The berries are large for their season and are of very good quality. Michel (Michel's Early) is moderately vigorous and moderately disease-resistant, but is of only medium quality. It is firm, however, and will probably ship well. As a second early the Klondike is a very good commercial variety for south Missouri, but it cannot be recommended for north Missouri. The plants of this variety are vigorous and the leaves are very resistant to leaf spot. It bears a moderately heavy crop of large, regular berries that are firm and excellent for shipping but are rather poor in flavor. Where it does well it is a very good commercial berry, but for the home garden there are other early varieties of much better flavor.

For a midseason berry the Dunlap (Senator Dunlap) is the standard variety for north Missouri. It is an excellent plant maker, vigorous and

very productive. The berries are medium in size, conical and often slightly necked. It is of very good flavor and will ship reasonably well for short distances, but is too soft for long shipments. It is also an excellent pollenizer and is one of the best varieties to grow with pistillate varieties.

The Dunlap does not do so well in south Missouri and has given way almost entirely to the Aroma which is the leading commercial variety of the Ozarks. The Aroma is peculiarly adapted to the heavy silty loam to clay soils found in the Ozarks. It is a little later than the Dunlap and might be termed a midseason to late variety. The plants are vigorous, of good size, moderately good plant producers and very productive. The berries run uniformly large, are roundly conical in shape and very attractive. They are of only fair flavor, but are firm and excellent for shipping.

TABLE V.—SHOWING THE NUMBER OF PLANTS PRODUCED FROM THE MOTHER PLANTS AFTER THE FIRST SEASON'S GROWTH; AND THE AVERAGE WIDTH OF ROWS AFTER TWO SEASONS CONTINUOUS GROWTH.

Variety	Irrigated			Not Irrigated				
	No. of original plants	No. of plants fall '18	Av. width row in in. fall 1920	No. of original plants	No. of plants fall '18	Av. width row in in. fall 1920.	Percent increase in plants*	Percent increase in width*
Superb	50	241	13	50	164	9	147	144
Progressive	50	648	17	50	496	12	131	142
Peerless	50	2221	56	50	554	30	401	187
King of the Autumn	50	521	18	50	260	9	200	200
Ideal	50	1590	22	50	218	12	729	183
Francis	50	930	21	50	237	10	392	210
Arizona	50	2405	50	50	477	22	503	227
Americus	50	454	21	50	129	10	352	210

*Percent increase produced in irrigated plot over that not irrigated.

In some years the Aroma does well in north Missouri, but through an average of a number of years it has not proved equal to the Dunlap as a commercial variety north of the Missouri river.

For a midseason variety of high quality the Warfield is one of the best. It does equally well in north and south Missouri, but is not so vigorous a grower or so disease-resistant as either the Dunlap or Aroma. The berry is only of medium size, but is a dark crimson in color and of excellent dessert quality. It is to be highly recommended for the home garden. Being a pistillate variety, the Warfield must be grown with some good pollenizing variety.

For a late variety the Gandy is probably one of the best. It is a heavy producer on rich soils, but tends to bear "buttons" on thin soils. The berries are large, regular, round-conic in shape and firm, making them good for shipping. The flowers are perfect or semi-perfect, but the

pollen is not abundant, consequently this variety generally does its best when planted with some good pollenizer.

The Everbearing Strawberry—The everbearing type of strawberry has been developed in this country within comparatively recent years and has been very widely advertised, especially for the home garden and has been quite extensively planted for home use. Instead of producing all its berries within a period of two to four weeks in late May and June, the ever-

TABLE VI.—EVERBEARING STRAWBERRIES FOR 1919.

Varieties	Yield in quarts from a 100 ft. row		Yield in quarts per acre		Precent culls		Total yield per acre
	Spring 5/17--10/26	Fall 10/26	Spring	Fall	Spring	Fall	
Irrigated							
Superb	18.66	.36	2351	46	.(*)	.(†)	2397
Progressive	25.91	.83	3271	105	....	....	3376
Peerless	48.33	...	6090	...	....	....	6090
King of the Autumn	21.84	.42	2752	53	....	....	2805
Ideal	45.03	1.0	6049	126	....	....	6175
Francis	5.72	.08	722	10	....	....	732
Arizona	19.43	...	2828	...	....	....	2828
Americus	7.81	.43	981	55	....	....	1036
Non-Irrigated							
Superb	18.12	.14	2283	18	....	....	2301
Progressive	20.77	.28	2747	35	....	....	2782
Peerless	24.97	.06	3145	8	....	....	3153
King of the Autumn	25.87	.03	3260	4	....	....	3264
Ideal	17.25	...	2188	...	....	....	2188
Francis	1.89	...	251	...	....	....	251
Arizona	22.12	...	2787	...	....	....	2787
Americus	11.32	.08	299	10	....	....	309

*Actual amount of culls was not kept throughout the season but observation showed it to run well over 50% on the average.

†Not enough berries from which to calculate percentage of culls.

bearing strawberry matures its crop at intervals, more or less continuously throughout the summer and fall. Very often blossoms, green berries and ripe fruit may be found on a single plant at one time.

As a commercial proposition, however, the everbearing strawberry has proved to be somewhat of a disappointment under Missouri conditions, because of the light and scattered crop produced after the main crop in the spring. This light production is probably due in part to the small number of runners formed the year before. This lack of plant growth may be due to two causes: First, strawberries do not produce runners while they are fruiting, the heavy runner growth on ordinary sorts always coming af-

ter the crop has been removed; second, the dry weather here during July and August is also a limiting factor in plant growth, because the runners cannot be produced without a plentiful moisture supply.

In view of the above facts it was thought advisable to investigate the possibilities of irrigation with everbearing strawberries, as fruit borne at other times than the usual strawberry season, commands good prices and, if the yield could be raised to a satisfactory point, the everbearing type would become very profitable.

For this work two different blocks were planted with 50 plants each of Superb, Progressive, Peerless, King of the Autumn, Ideal, Francis,

TABLE VII.—EVERBEARING STRAWBERRIES FOR 1920.

Varieties	Yield in quarts from a 100 ft. row			Yield in quarts per acre			Percent culls		Total yield per acre
	Spring 6/7- 6/21	Summer 7/21- 8/14	Fall 10/8- 11/1	Spring	Summer	Fall	Spring	Summer & fall	
Irrigated									
Superb	15.48	3.98	.3	1697	563	38	64	50	2568
Progressive	16.6	18.71	1.67	2094	2739	212	77	53	5045
Peerless	37.66	1.64	.05	4756	176	6	80	61	4938
King of the Autumn	31.0	6.66	.13	3912	741	16	72	53	4669
Ideal	56.2	9.43	.15	7075	1189	19	52	56	8283
Francis	11.45	3.94	...	1446	497	...	70	73	1943
Arizona	12.63	...	...	1597	....	...	79	....	1597
Americus	8.45	4.97	.03	1071	632	3	86	69	1706
Non-Irrigated									
Superb	10.61	1.87	.11	1341	263	13	67	66	1617
Progressive	5.58	1.33	.88	704	169	109	86	88	982
Peerless	16.99	.22	.05	2146	28	6	77	100	2180
King of the Autumn	7.6	1.49	.07	963	79	9	70	72	1051
Ideal	6.16	.8	...	777	100	...	74	72	877
Francis	2.13	.65	...	278	81	...	70	92	359
Arizona	1.41	.8	...	178	41	...	77	24	219
Americus	.6	.28	...	75	35	...	88	55	110

Arizona and Americus. They were set in rows $3\frac{1}{2}$ feet apart with the plants 2 feet apart in the rows. One block was supplied with moisture as needed by means of an overhead irrigation system while the other received only the natural rainfall.

After the first season's growth counts were made for each variety in each block to determine how many plants had been produced from the mother plants. During the second and succeeding seasons the time of

harvest and the quantity of fruit produced upon the irrigated and non-irrigated rows of each variety were recorded.

Table V shows that there were appreciably more plants produced from the mother plants on the irrigated plot than on that which was not irrigated. With some varieties, notably the Ideal and Arizona, the additional plant growth secured the first year from irrigation was very great.

The average width of rows as given in Table V represents the total growth in width of the different varieties after two growing seasons, since the rows were not molested in the spring of 1920 as they were in 1919 when the rows were cut down to 8 inches in width after the main crop had been removed.

Although the increase in width of rows in the irrigated plot over that not irrigated was not so great with all the varieties, as the increase in number of plants, the irrigated rows averaged from one and one-half to twice the width of the corresponding rows in the plots which received only the natural rainfall.

Although the yield in general was greater on the irrigated plot than on that not irrigated, the increase was not due altogether to the increased number of plants produced, but to the better growing conditions under irrigation. In fact the varieties under irrigation had a tendency to produce too many new plants that were small and weak, rather than a few strong healthy daughter plants which were capable of yielding a large crop of high-quality fruit.

The increased yields secured from irrigation on the trial grounds at Columbia, however, were not sufficient to make the everbearing strawberry of commercial value from the standpoint of the fall crops. Not only was the total fall yield low, but the individual pickings were so small that few, if any, would pay for the cost of picking and handling. Furthermore about 50 percent of the berries harvested graded out as culls.

At first glance, it would seem that the spring yield was high enough, when compared to the yield of the spring bearing varieties, to make some of the everbearers more profitable to grow, but if the light pickings which would pay little, if anything, above the cost of handling are discarded, the yield would be cut down from one-fifth to one-fourth. Also upon examining Tables VI and VII, it will be seen that the percentage of culls runs well over 50 percent and in some cases over 80 percent. This is far more than the percentage of culls from the spring bearing varieties grown under similar conditions. In fact the high percentage of culls (with some of the varieties small berries) produced by the everbearers, as grown under conditions existing here, is one of the serious drawbacks to their culture. Irrigation decreased the percentage of culls a little, but so very little that it is within the probable experimental error. Also, the everbearing varieties do not, as a general thing, have the flavor and quality of the spring sorts.

In view of the results secured by this Station, the everbearing strawberry cannot be recommended for general commercial planting, in this section of the country. There may be, of course, a few special localities, where the price paid by the consumer for strawberries out of season is sufficiently high so that the everbearer can be grown with profit.

For the home garden this type of strawberry may be grown where the space required to grow a reasonable quantity, the care required and the cost are items of no consequence. Probably the two best varieties for Missouri conditions are Progressive and Superb, as these varieties will meet general conditions better than the other varieties tried here.