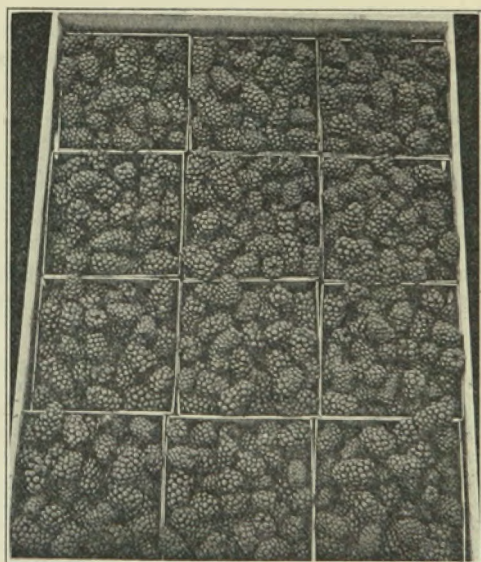


The Agricultural Experiment Station

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. Small Fruits for Colorado



By E. P. SANDSTEN

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Small Fruits for Colorado

By E. P. SANDSTEN

Small fruit growing is rapidly becoming an important industry in many sections of Colorado. The numerous mining towns and camps in the State afford an excellent market for the fruit, and since most of these towns are not surrounded by arable land, there is practically no local competition. An excellent market in many of the large cities in the Mississippi and Missouri Valleys is awaiting the Colorado growers, as these centers consume large quantities of berries, and since the Colorado berries ripen much later than the home-grown and southern fruits, there is little or no competition. With a large and growing market for these fruits, the Colorado growers should take advantage of their opportunity and supply this demand with first-class fruit, packed and handled in the most approved manner.

Soil Requirements.—All the small fruits, such as strawberries, red raspberries, black raspberries, currants, and gooseberries, require a well drained, loamy soil. While heavy clay or adobe soil will grow these fruits, the best results are obtained on soils that are more open or porous. The subsoil must be open to permit perfect drainage; otherwise the plantations will be short-lived. The land should have sufficient slope to insure perfect surface drainage.

Preparation of the Soil.—New land should not be planted to small fruits. At least two years should be allowed to subdue the land, meanwhile growing such crops as require deep cultivation and irrigation. Land on which alfalfa has been growing for a few years is generally in fine condition for a small fruit plantation, especially if the last crop or cutting is plowed under instead of harvested for hay.

The land should be plowed to the depth of 8 to 10 inches in the fall and cross-plowed to the same depth in the spring, after which it should be thoroughly pulverized and brought into a fine silt. Poor preparation of the land is often the sole cause of failure.

RED RASPBERRY.

Planting.—The planting should be done in the spring as soon as the soil is in workable condition. Strong yearling plants are better than older plants and will make more satisfactory growth. The plants should be set in rows six feet apart and four feet apart

in the rows. This distance gives ample room for thorough cultivation and irrigation. If planted closer, the roots will not have sufficient feeding room and the plants will crowd one another. Thorough cultivation is just as important as irrigation; in fact, more so, as the number of irrigations ordinarily given can be reduced by one-half if frequent and thorough cultivation is practiced. Ordinarily the plants are obtained from some nursery. Plants taken from a nearby plantation of known varieties and free from disease, give excellent results. Only young plants or suckers should be planted.

Few fruits are produced the second year, and the aim should be to grow strong, vigorous plants rather than early fruit production. After the plantation comes into bearing, each plant or hill should not be allowed to grow more than twelve new canes each year. These should be reduced to eight or ten in the spring. The extra canes are to replace those that happen to break in covering and uncovering. All others should be removed as soon as they appear. By keeping these young canes or suckers down, the strength is thrown into the main canes, thus promoting stronger growth and greater fruiting capacity.

As soon as the picking season is over, all the canes that bore fruit should be cut out and burned. Cut as closely to the ground as possible; otherwise the crown of the plant becomes elevated and thus increases the difficulty of covering in the fall of the year; also the root system tends to become shallow and concentrated in the ridge along the row. Keep the land around the bushes and the row as level as possible.

Pruning.—Extensive experiments have been made as to the value of pruning the red raspberry to encourage lateral branching and thus the production of more fruiting wood. Almost without exception, these experiments have been negative; in other words, no beneficial effect from the pruning has been obtained. In the case of healthy cane growth, it may be advisable to cut back the canes in the spring after uncovering. If pruning is done in midsummer, the secondary branches formed will be more or less destroyed in covering and uncovering and nothing is gained. The purple-cane varieties are generally cut back either in the fall or the spring. This cutting back is almost necessary, since the canes often grow to the length of ten or twelve feet. From one to four feet is cut off, depending upon the length of the canes.

While training or supports are not necessary in growing the red raspberries, for the purple-caned varieties and the black-cap, a

trellis is advisable, as it keeps the canes from bending to the ground and also prevents the canes from growing out of line, thus interfering with the cultivation. The best trellis is made by setting posts one rod apart in the row, then stringing two smooth wires one on each side of the post, then training the canes between these wires. If large posts are not available, a crosspiece of 2 by 4 is nailed on the post and the two wires strung from these. This will give a greater distance between the wires and consequently more room for the canes. If the crosspieces are bolted on the post the wire can easily be taken down in the fall when it is time to cover the canes.

Cultivation.—Commercial raspberry growing is not profitable unless the best care is taken of the plantation. Cultivation should start as soon as the bushes are uncovered in the spring and continue until the middle of August or first of September. One cultivation a week is not too much. The first two or three cultivations in the spring should be rather deep to thoroughly loosen and aerate the soil. Subsequent cultivations may be shallow. Many growers stop cultivating during the picking season. This is wrong, as the plant at this time needs plant food more than at any other time and if the plants have been set far enough apart and trellis used, shallow cultivation can be continued without damage to the plants and fruit. As soon as the crop is harvested, the old canes should be cut out and burned. About the last of August or first of September cultivation should cease so as to permit the wood to harden up and mature before cold weather sets in.

Winter Protection.—With few exceptions, winter protection is necessary to insure a crop in Colorado. In some cases the mere laying down or bending over the canes to protect them against the cold and drying winds is all that is necessary, though the safest and most efficient way is to bury the canes, that is, cover them with soil to the depth of three or four inches. The covering should be done as late as possible, but before the ground is frozen. Select days during which there is no freezing temperature; otherwise the canes are apt to break when bent to the ground for covering. With some varieties having strong and brittle canes it is often necessary to remove a spadeful of soil from the side of the cane towards which the canes are bent and in extreme cases the soil is removed on both sides. Generally, only enough earth is used to completely cover the canes and success is dependent not upon the thickness of the covering but upon the completeness of the cover. Strawy manure will

serve the same purpose as earth, if obtainable in sufficient quantity to make a complete covering.

The canes should be uncovered as late as possible in the spring to avoid early spring frosts, yet the covering should not be permitted to remain too long, as it is apt to injure the young growth. Ordinarily when the buds have well started the covering should be removed. Care should be taken in uncovering so as not to break or otherwise injure the canes and the soil should be leveled off completely; otherwise in a few years the bushes will stand on a ridge and the feeding area of the plants is greatly decreased. The number of canes left for fruiting depends greatly upon the variety and the fertility of the soil. Generally, from eight to ten canes are left in each hill. If too many are left, inferior size berries result, with correspondingly smaller profit.

Fertilizers.—If manure is used as a covering for winter protection, the finer portion should be left to be cultivated in, and in most cases this amount is sufficient as annual top dressing.

Varieties.—Practically all the standard varieties can be grown in Colorado, below the altitude of 7,000 feet in northern Colorado and higher elevations in the southern and western portions. At greater elevations greater care and precaution must be taken to protect the plants against late spring frost and early frost in the autumn. This is especially true for the northern half of the State. The best developed small fruit section in Colorado is around Loveland and Fort Collins. This section is admirably adapted to this industry and with the development of a well organized marketing system, it bids fair to become an important producing center. The standard variety for this section is the *Marlboro*, a large, firm, pale red berry possessing excellent shipping qualities. It is a vigorous grower, hardy and quite resistant to disease. *Cuthbert* is also extensively grown. *Cuthbert* is a large dark red variety of high quality and when not over-ripe possesses good shipping qualities. It is also a strong grower and for home consumption it is superior to the *Marlboro*. For special and particular markets the *Cuthbert* is the berry par excellence. *Turner* and *Loudon* are good hardy varieties, but inferior to the above mentioned varieties in size, vigor and productiveness. *Loudon* is perhaps the hardiest of the red raspberries and should be tested out in sections where the *Marlboro* and the *Cuthberts* are not sufficiently hardy.

THE PURPLE-CANE RASPBERRIES.

Varieties—*Schaffer's Colossal*.—An old variety extensively planted in the Mississippi Valley. It is a very strong grower, often

producing canes ten to twelve feet in length. This variety is now superceded in many localities by *Chicago*, where it has proven more productive and superior in quality. Both are standard purple-cane varieties for Colorado. In habit of growth they are very similar, both producing heavy crops of large purple berries.

The purple-cane varieties are best adapted for local markets, as the fruit does not possess as good shipping qualities when fully ripe as the red varieties. The price obtained for the fruits of the purple-caned varieties is generally higher.

BLACK RASPBERRIES, OR BLACK CAPS.

Black caps are not extensively grown in Colorado, though the price obtained for the fruit is generally higher than for the red or purple-caned varieties. The black caps require more care in cultivation and irrigation, as under careless cultural methods the fruit has a tendency to become small and dry. They are better adapted to a moister climate, though with good care and with favorable soil conditions they can be grown successfully where the red varieties are grown:

Varieties.—The following varieties have been grown at Fort Collins and are commended for the Eastern Slope:

Kansas.—One of the earliest varieties, fruit of good size and fine quality. An excellent dessert berry and when not picked too ripe stands shipment well. It is also a hardy and vigorous grower.

Gregg.—A medium late berry, ripens from a week to ten days later than Kansas. Like Kansas in size and quality, but not quite so juicy. Will stand shipment better than Kansas. It is also a productive and strong growing variety.

Conrath.—An early ripening variety, fruit large and coal black. An excellent variety for local market, but rather soft for long-distance shipment. The quality is of the best and the fruiting season long. Recommended for home use and for local market.

BLACKBERRIES.

The climate of Colorado, except in small isolated areas, is not adapted to blackberry culture. The blackberry, being a native of the shady, damp woods, would naturally not be expected to thrive on our dry, hot plains and valleys and the few attempts to grow this bramble have proven failures. In moist, narrow mountain valleys or on mountain slopes and on sub-irrigated land which carry little or no alkali, blackberries may be grown successfully.

The land intended for blackberries should previously to planting have been cultivated a couple years, at least. The land should

be plowed in the fall to the depth of eight to ten inches and in the spring put in thorough tilth before planting.

Planting.—The plants should be set in rows eight feet apart and the plants five or six feet apart in the row. Yearling plants should be used. Thorough cultivation should be practiced throughout the growing season. The blackberry requires a large amount of water during the fruiting season and if it is not supplied, the fruit will be small, hard, and worthless. The blackberry is more tender than the red raspberry and the black cap, and requires winter covering or protection. This is done as in the case of the red raspberry, by bending over the canes and covering with four or five inches of soil.

Pruning.—The blackberry requires constant and careful pruning. The first year after planting, the canes are permitted to grow undisturbed. The pruning begins with the second season. The growing canes should be cut off when two and a half to three feet high. This will start them to branch. Later in the season it may be necessary to pinch off the tips to prevent the canes growing too long. Only a small crop is obtained the second year. In the fall of the second year or as soon as the fruiting season is over, the old canes or the canes that bore fruit, should be cut out and burned, as they will die naturally after fruiting. From ten to twelve canes should be covered. This number provides for extra canes should any be broken during the process of covering and uncovering. Ordinarily four to six canes are all that each plant can support and the rest should be cut out; otherwise they will weaken the productiveness of the plants.

Winter protection is necessary in almost every locality in the State. While some years protection may not be necessary so far as the canes or wood growth is concerned, it has been found from experiment that the canes are considerably weakened if unprotected and that as a consequence the quality as well as the quantity of the fruit is considerably curtailed. The bushes are laid down and covered in the same manner as the red raspberry, only more care must be taken as the canes are more brittle and are apt to break if extra care is not taken in bending the canes.

In order to get abundance of soil as well as room for the canes they should be bent over so as to form an angle of 45 degrees with the rows. If the canes are bent in line with the row and covered, there is a tendency for the rows to become elevated or ridged. This encourages the roots to grow in the ridges and close to the surface, causing short-lived plants and making it more difficult to get water to the bushes.

DEWBERRIES.

The station frequently receives inquiries about the cultivation of the dewberry and a brief account of its culture will be given.

Dewberries are native to the moist woods and moist climate and do not do well on the open plains. In the high mountain valleys and with moist subsoil, the culture of the dewberry may prove a success. Western slope has a number of mountain valleys where the dewberry should prove a success and where at the present time a few commercially successful plantations are found. Yet we would not advise anyone to go into the business on a commercial scale without preliminary testing of varieties and their adaptability to local conditions. The land for dewberries is prepared in the same manner as for red raspberries. The plants should be set in hills five by five or six by six. One and two-year-old plants should be set. Plants should either be obtained from a known field or from



A profitable dewberry field on the western slope.

reputable plant dealer or nursery. The dewberry has been under cultivation for a relatively short time, and it may be said that reliable varieties have not as yet been developed. Further, the fruiting capacity of the existing varieties varies greatly within the individual variety, making the plantation an uncertainty unless the prospective grower has an opportunity to get his supply of plants from bearing hills. On these accounts, the growing of dewberries

on a commercial scale is beset by many difficulties and failures. The cultivation of the dewberry does not differ from that of the blackberries or red raspberries. Clean and thorough cultivation is essential to success.

Pruning.—In the eastern states no pruning is done except the removal of the old fruiting canes after the harvest. In the west and on fertile soil the plants are apt to produce too many canes at the expense of fruit production, and pruning should be practiced. From ten to fourteen canes should be permitted to grow and fruit. All others should be cut out. The tips on the canes are not cut back.

Winter protection is necessary the same as for the raspberries. A liberal application of well rotted barnyard manure is very beneficial to the plantation.

Dewberries are not trained but permitted to spread on the ground. All attempts at training either on trellis or on stakes have proven failures.

Varieties.—Only relatively few varieties are offered for sale and most of these are of uncertain value. *Lucretia* and *Bartel* are the two most reliable varieties and the former one is more extensively planted.

LOGANBERRY.

The Loganberry should be classed as a dewberry, as it resembles the dewberry closer than any other of the brambles. It is a cross between the red raspberry and the western dewberry, *Bubus vitifolius*. It is grown quite extensively on the Pacific Coast and in the inland valley east of the coastal range of mountains. Where the soil and climatic conditions are favorable, it is prolific and a profitable crop. Its value for Colorado has not been sufficiently tested to warrant us to recommend planting on a commercial scale. Two or three commercial plantations are found on the western slope which appear to be a success. It is probable that with careful selection of soil and site this may become an important industry. The fruit is on the average as large as the blackberry or larger. In shape, the fruit is decidedly oblong, individual fruits being often over two inches in length. The color is shining black and very attractive. In flavor, it approaches the red raspberry, but the quality is generally considered inferior. Like the dewberry and black raspberry they are propagated by tipping.

Planting and Cultivation.—The cultural requirements are the same as for blackberries. The young plants are not robust and require careful cultivation and attention. The plants set in rows five by five or four by six feet are trained on trellis as raspberries.

From four to eight canes should be permitted to grow to each hill. All others should be cut out. The loganberry is not sufficiently hardy to stand our winters without protection and should be covered and treated like the raspberry. The pruning is the same as for black raspberry.

STRAWBERRIES.

Soil.—Strawberries can be grown on almost any kind of soil, but thrive best on a rich sandy loam. Abundant moisture and good surface drainage are essential. Where irrigation is necessary, ground with a gentle slope is preferable, as the water will flow down the furrows without running over and flooding the rows. Land which, for two or three years, has been planted to crops requiring clean cultivation is best, as new land generally gives poor results.

Preparation.—Late in the fall, a heavy dressing of manure (the amount depending upon the condition of the soil) should be applied to the ground selected for planting and plowed under. The depth of plowing is important. Ten inches is none too deep; cross-plow again in the spring so as to obtain a perfect plant bed. A thoroughly prepared field is very important for the production of vigorous plants and first quality fruit. Poor preparation of the land cannot be remedied completely through cultivation after the plants are set.

Planting.—Rows are then laid off about four feet apart and the young plants are set twelve to eighteen inches apart in the row. In planting, care should be observed to use only young and vigorous plants. Such plants have long, light-yellowish roots, while the roots of old plants are black and should be rejected. About one-third of the length of the roots should be clipped off, and the planter must not allow the roots to be exposed to the sun. A brief exposure will sometimes make their subsequent growth very uncertain. In setting the plants, the roots are arranged fan-shaped and the earth carefully pressed around them, leaving the crown a very little lower than the surrounding earth, being careful not to cover it. If the ground is dry at time of planting, water should be used in the holes in which the plants are set. All blossoms that appear during the first season should be pinched off.

Cultivation.—Light surface cultivation should follow the planting. This should be given as often as is necessary to conserve moisture and keep down weeds. In July, runners will start, and these should be trained along the rows so as not to interfere with cultivation. Four to six runners are as many as should be allowed

to put out from one plant. Each runner should be allowed to set two, or at most three, plants, all others being cut off. In humid climates, these runners will take root and start new plants which will bear the following year, but in Colorado it is usually necessary to cover the runners at intervals with a small amount of earth. When winter comes on, the plants are mulched with straw to a depth of about six inches. The cleanest straw obtainable should be used in order to avoid weeds the following spring. This mulch protects the plants during the winter and spring, and may retard the blooming period a few days. In the spring, the straw is either removed from the field or worked around the crowns to form a bed



A promising field of strawberries—first season.

for the berries, keeping them out of the dirt, and helping to keep down weeds and retain moisture. The remainder is removed to allow irrigation and cultivation.

After the first crop of berries is harvested, the vines should be mowed down and the old plants hoed out, leaving only the younger ones. A top dressing of fine well rotted stable manure may be applied to advantage, and cultivation should be continued throughout the summer. The plants are mulched again in the early winter. After the second crop has been harvested the following spring,

the field is plowed up and planted to some other crop. While it is possible to grow three or more crops from the same bed, the yield decreases rapidly and it is more profitable to start a new bed. Some growers prefer a raised bed about two feet wide, leaving two feet for cultivation, claiming that the bed so made is easier to irrigate. Personally, we prefer planting on the level, as ridged beds dry out more quickly and the water has to run for a longer time. Where extra fancy fruit is demanded, hill culture is employed. The land is prepared in the same manner as for rows. The plants are set in hills three by three feet. Some growers set only one plant to the hill, others three, or four. In the latter case no runners are permitted to grow, at least not more than to provide for three or four new plants for the following year to replace the old ones. By this system extra large berries are obtained, though relatively few in number. The cost of cultivating and weeding is greatly reduced under hill culture system, as the field can be cultivated both ways, though it takes considerable time to cut off runners. The hill system is not recommended for the general grower or for the average market. The yield in quart per acre from hill culture is considerably less and the market is too limited for extra fancy fruit to warrant the average grower to employ the hill system of culture.

Varieties.—In selecting varieties, the grower ought to choose those that are best adapted to his particular conditions of climate, soil and market. There is hardly a single variety that is adapted to all localities and the grower must discover for himself what varieties will do best in his particular section. Some of the best varieties of strawberries have imperfect or pistillate flowers and must be pollinated by other varieties in order to bear fruit. In such cases the two varieties must be planted near each other, say three rows of the variety with imperfect flowers and one row of the variety with perfect flowers, alternately.

It is very difficult to give a list of varieties which will prove satisfactory in all parts of the state, because productiveness and quality are greatly affected by local conditions. It is always desirable that the prospective grower inform himself on varieties by visiting plantations in the neighborhood and by personal observation and talk with the successful growers he will avoid costly mistakes. The following varieties, however, have proven valuable both at the Experiment Station and in other parts of the State, and are recommended:

Bederwood	(Perfect flowers).
*Captain Jack	“ “

*Adapted to heavy land.

Ivanhoe	(Perfect Flowers).
Marshall	“ “
Parker Earle	“ “
Splendid	“ “
Thompson	“ “
Wm. Belt	“ “
Haverland	(Pistillate flowers).
Warfield	“ “

Bederwood and Thompson bloom at the same time as Warfield and Haverland, respectively, and are recommended for planting with the latter varieties.

CURRENTS.

Soil and Requirements.—Currants can be grown on almost all kinds of soils, though they prefer a deep, rich, moist loam. As in the case of raspberries, the land should be well prepared by deep and thorough plowing and subsequent pulverization of the soil. While fruit may be obtained from planting on dry land, the size and quantity of fruit produced is small and would not pay as a commercial proposition. For family use, however, enough can be grown with moderate expense and trouble. For dry land planting, fall plowing to the depth of ten or twelve inches is necessary. Planting should be done as early as possible in the spring, then thorough cultivation practiced until hot weather comes, or about the middle of June. Then the plantation should be carefully mulched with strawy manure or twelve to eighteen inches of short straw, which should be held in place by poles or other material to prevent blowing away and to compact the mulch to prevent evaporation from the soil below. Deep fall plowing should be practiced regularly so as to be able to store up all the rainfall during winter and spring. The bushes should also be planted farther apart to permit plowing and deep cultivation.

Planting.—One-year-old plants from cuttings should be used. The planting should be done as early in the spring as possible. Set in rows five feet apart and the bushes five feet apart in the rows. Cut back the plant to two or three buds to encourage branching. When severe pruning is practiced and when the bushes are grown to a single stem, four by four is sufficiently far apart, but where the bushes consist of a large number of canes, five by five is the proper distance.

Cultivation and Irrigation.—Cultivation should be frequent and thorough and the plants should at no time suffer from lack of water. Frequent irrigation should not be practiced, as it tends to

produce a shallow root system and encourages excessive wood growth. When irrigating, give a thorough soaking, saturating the subsoil to the depth of at least two feet. Then by frequent surface cultivation to prevent surface evaporation, the soil will be in moist condition and slowly supply the roots with the needed moisture. During the later period of ripening the fruit, more water is needed and the plants should be well supplied. Always cultivate in the irrigation ditches as soon as the land is dry enough to work. Never let the land become baked or crusted, as it injures the roots by raising the temperature of the soil and prevents a thorough aeration of the soil.

Pruning and Training.—Generally in commercial plantations no pruning is practiced. A required number of canes or shoots are permitted to grow and branch. When grown to a single stem or to a standard, we have a miniature tree with definite trunk and crown. To accomplish this, the lower buds are rubbed off and the shoot cut off to the height at which we wish to start the crown or head. Six to ten inches is the usual height of the trunk and the head is formed in the same manner as in apples or pears. The currants when grown in bush form require considerable pruning to produce the highest quality of fruit. On strong soil from one-third to one-half of the young canes or shoots should be removed each year, also about one-fourth of the old fruiting shoots. In pruning the currant, the age of the cane is a secondary consideration up to the age of five or six years. Vigor and productiveness should be the criterion in the removal of old canes, as well as the young ones. When the bushes reach the age of five or six years, fewer new canes are produced and only enough of these should be left as are needed to replace old ones cut out. If too many canes are permitted to grow, the fruit will be small and inferior. A strong, healthy annual growth is essential to the production of fine fruit.

Fertilization.—The best fertilizer for currants is stable manure. This should be applied in the fall of the year and scattered around the base of the bushes. This will give the crowns a protection for the winter besides adding fertility to the soil. In the spring of the year the manure should be removed from around the crowns and then scattered between the rows. Care should be taken to remove all the manure and to leave the ground level; otherwise the accumulation will raise the bush above the general level of the land and the root system will develop on top of the ridges. With good care a currant plantation should last eight or more years.

GOOSEBERRIES.

Gooseberries are only grown to a limited extent in Colorado. Few commercial plantings exist, though almost every kitchen garden has a few bushes. The gooseberry requires a deep, moist soil, well drained and abundantly supplied with vegetable matter. This bush fruit cannot be grown successfully without irrigation in Colorado and only the hardiest varieties should be planted. The soil for gooseberries should be prepared in like manner as for currants. Two-year-old plants should be used. They should be set in squares five by five and cultivated both ways.

Varieties.—Only the American varieties can be grown in Colorado. Some of the hybrids may do well in favorable localities. Where the hybrids can be grown they should be planted closer together, four by four feet being a good distance. They are less vigorous than the native varieties and, while the berries are much larger, the yield per bush is much less. Two-year-old plants are best for planting. Plant as early as possible in the spring. Always trim off the broken or torn roots but leave the top untouched. Thorough cultivation is absolutely necessary to success. Gooseberries stand drought poorly, so care should be taken to keep the soil moist, but not wet. Many experienced growers prefer to plant the gooseberries in the orchard to give the bushes partial shade and this practice is to be commended if the grower is willing to give thorough cultivation to both the fruit trees and the gooseberry bushes. On the open plain without at least partial protection by windbreaks or shade trees, gooseberry growing will not be a success and commercial planting should not be attempted. The following varieties are recommended for Colorado:

Downing.—One of the hardiest and best known varieties of the American type. It is hardy, vigorous, and productive. The fruit is of fine quality, but is apt to be small, especially under poor cultural methods. For culinary purposes it is superior to the large English berries.

Oregon Champion.—This variety is a favorite in the Arkansas Valley. It resembles Houghton and seems to be a selection from that variety.

Houghton.—A well known iron-clad variety widely planted in the north Mississippi Valley. Fruit smaller than Downing but a vigorous and productive grower.

Smith.—A probable hybrid between Houghton and an English or European variety. It is a hardy and productive variety. Fruit larger than Houghton and Downing and stands high in favor with many growers.

Red Jacket.—Another hybrid between Houghton and Red Warrington (European). One of the best varieties for fancy fruit. Fruit larger than any of the pure American varieties, of good quality. When fully ripe does not stand shipping well.

In some favorable sections of the state the English varieties may be grown successfully. The following varieties are recommended:

Crown Bob.—A dwarf variety producing large fruit of excellent quality.

Industry.—This is perhaps the most popular of the English varieties. It is vigorous and productive. Fruit large and of high quality.

Wellington Glory.—An excellent variety that has succeeded well in America.

Pruning.—The American varieties are vigorous growers and tend to produce a large number of branches or canes. This tendency should be checked to some extent; otherwise the fruit produced is apt to be small. The pruning may be done either in the spring or fall. Some of the old wood should be removed each year and a corresponding number of new branches be substituted. The balance of the new shoots should be cut out. About six or eight branches are all that should be allowed to fruit. The Hybrid and English varieties require practically no pruning. The English varieties may be pruned into tree form the same as the currants, as they are stocky and upright growers, while the American varieties have slender branches and often assume a weeping form. No training is necessary. The plants are left to grow in their natural way.

The following varieties are recommended: Houghton, Downing, Smith's Improved, semi-hardy for very favorable locations.

Winter Protection.—While the American varieties are considered hardy, it is advisable to give slight protection. This consists in scattering a liberal quantity of stable manure around the crown and in among the branches of the bushes. This should be carefully and completely raked out in the spring and scattered between the rows and later worked into the soil. In dry weather a heavy mulch of green alfalfa or other green material should be placed between the plants to keep the ground cool and moist. Coarse litter of any kind may be used so long as it does not contain weed seed.

INSECTS INJURIOUS TO SMALL FRUITS.

While there are a number of insects that infest the small fruits, hardly any of them are sufficiently injurious to cause any serious concern to the growers. The currant worm is sometimes present and does considerable damage. This insect can be kept in control by the use of White Hellebore when applied at the rate of one ounce to three gallons of water. In buying Hellebore from the drug store insist that it be fresh, for it loses its strength with age and has little effect as an insecticide.

FUNGIOUS DISEASES.

There are a number of diseases common to small fruits occurring in Colorado and some years cause considerable damage. While as yet we have had no serious and extensive outbreaks, their presence calls for preventive measures.

Anthracnose is more or less common to the red and black raspberries and is readily distinguished by greyish colored spots on the canes. When these discolorations or spots become numerous the canes are apt to die.

This disease is easily controlled by systematic cutting out of the affected canes and burning them. All the old canes should also be cut out as soon as the fruiting season is over, and burned. The young canes should be sprayed with Bordeaux Mixture, full strength, starting early in the spring before the leaves come out and before the disease appears. It is a preventative and not a cure and should be applied as a safeguard against the appearance of the disease. Later applications should be given after the young canes have started to grow, using Bordeaux Mixture half strength. (Avoid diseased plants in setting out a plantation.)

Root Gall.—A disease quite common on the raspberries in many sections of the state. Nothing can be done in the way of treatment. As the name indicates, the disease appears on the roots, forming tumors or galls which greatly interfere with the distribution of food materials and when these galls are present in large quantities the canes become sickly, stunted, and shriveled. In setting out a new plantation, great care should be taken to eliminate all plants that show indications of root gall. Even doubtful plants should be thrown out.

Orange Rust.—This disease infests the gooseberries and currants. It is readily recognized by the orange colored spots usually on the under side of the leaves. When this disease has gained a foothold nothing can be done to eradicate it, as the fungus lives within the tissue of the leaf.

Preventative measures can be taken by applying Bordeaux Mixture half strength to the plants with the first appearance of the spots or, better still, before the spots appear. In badly infested cases the infested portion of the plant should be burned and the remaining portions thoroughly sprayed with Bordeaux as indicated above.

Raspberry Cane Blight.—This fungous disease is widely distributed through the eastern and middle states, doing considerable damage to raspberry plantations. It is also found in Colorado, though up to the present little damage has been done.

The disease generally starts near the ground on the fruiting canes in small patches which gradually enlarge and often completely girdle the cane, causing death. Generally the patches move upward on the canes without girdling. The diseased spots are usually lighter in color than the natural color of the cane, but the dead tissue below is dark brown. At later stages these spots become darker in color with a smoke-like appearance due to presence of spores. Diseased canes are brittle and easily broken, due to the dead and dry areas.

Remedies.—The surest way to control this disease is to cut out and burn all infested canes as soon as the disease is discovered. The old fruiting canes should also be cut out and burned as soon as the harvest is past. Remove and burn all litter and dead branches or wood among the bushes. Give a thorough application of Bordeaux Mixture, full strength, early in the spring before the leaves come out and one or more applications during the summer, using Bordeaux half strength.

Sphaerella, Cane Blight.—This disease of the raspberry has been quite destructive in northeastern Colorado, and Professor Sackett, of the Experiment Station, has made a thorough study of it during the past three or four seasons. The results of Professor Sackett's work will be presented in a bulletin soon to be published.

The presence of the disease is indicated by bluish brown patches on the lower portions of the canes, the wood underneath turning dark brown and dying. The fruiting canes generally suffer most and often the fruiting buds on the lower half or three-quarters of the stems are killed, thus greatly reducing the yield. Spraying with Bordeaux Mixture, full strength, early in the spring before growth starts and two or three weeks later, using Bordeaux Mixture, half strength, is recommended. Precautions should be taken in planting by setting only healthy plants. Diseased canes should be cut out and burned as soon as discovered.