

# Black Raspberry Growing

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# Black Raspberry Growing

By

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**T**HE BLACK RASPBERRY "blackcap" fruit is similar to the red raspberry except that it is dark purple to nearly black in color and usually less juicy. It is commonly known among growers as "blackcap."

The black raspberry plant has many of the characteristics of trailing blackberries. The canes are long, growing upright at first and then bending over and in the autumn taking root at the tip of the cane as do trailing blackberries. Since this and other growth characteristics differ from red raspberries, cultural requirements for blackcaps are somewhat different.

The black raspberry is one of the native fruits of the United States; the cultivated varieties belong to the species *Rubus occidentalis*, the common wild black raspberry found in the eastern and central states. Another form of the black raspberry known as *Rubus leucodermis*, is native to the Pacific Coast and is found growing in western Oregon. This species does not seem to have any special value and no varieties are under cultivation. Cultivated varieties of the black raspberry have resulted from the selection of superior wild plants and crossing such selections. The first selections were made about 100 years ago.

## The Black Raspberry in Oregon

Cultivation of black raspberries in Oregon began about 60 or 70 years ago, soon after the introduction of superior cultivated varieties. At first the production of black raspberries was rather small, but, as markets developed, the production of black raspberries in-

creased, and very rapidly in recent years.

Oregon is now one of the leading black raspberry-producing states in the United States. The present heavy-producing area in the state is west of the Cascade Mountains in a district commonly referred to



as the northern Willamette Valley. Climatic conditions here are especially favorable for the production of this fruit, so that injury from cold is usually not a great hindrance. Up to the time of harvest, soil moisture supply is usually ample, temperatures are favorable, and there is usually plenty of sunshine. Humidity during the fruiting season, while not excessive, appears to be about right for black raspberries.

The acreage of black raspberries in Oregon in 1949 was 3,600—con-

fined almost entirely to the Willamette Valley. For many years the acreage has been largest in Washington and Yamhill counties. In recent years there has been a marked increase in Clackamas County. At present the latter leads in black raspberry production. Considerable acreages are also found in Linn, Marion, and Multnomah counties, while acreages in other Willamette Valley counties are relatively unimportant.

## **Factors in Locating Plantings**

Great care must be taken in selecting a location for growing black raspberries for commercial production. Markets, soils, and location with reference to drainage and elevation are some of the important factors to be considered. Oversight of any one of these may result in high production costs, low yields, or short life of plantings.

### **Markets**

One of the principal considerations in locating a commercial black raspberry planting is nearness to a processing plant. Almost the entire black raspberry crop has to be marketed outside of Oregon and mostly in the Eastern States; consequently, the fruit must be shipped in some processed form. In the past, most of the crop has been dehydrated and a considerable portion is still marketed in this form. Accessibility to dehydration plants has been important, although sometimes growers provided their own plants. Since many other crops are now frozen in the northern Willamette Valley, freezing plants are generally accessible and an increas-

ing proportion of the black raspberry crop is handled in this form.

Frozen berries are shipped to population centers, particularly the Eastern States where they are made into jams and jellies or used for flavoring purposes. The black raspberry is a favorite flavor for ice cream, sherbet, and the soda fountain trade. A small portion is canned. Unlike Eastern States, there is no outlet for any large quantity of fresh black raspberries in local markets.

### **Drainage and soil type**

A well-drained, loose-textured soil seems to be preferred for black raspberry production. This soil type provides good drainage, yet has a high water-holding capacity for use of the plant during the summer. Such soils are needed because the demand for moisture is heavy during the summer when rainfall is often rather limited.

At the present time, most of the black raspberry production is found in the red soil areas of the northern part of the Willamette Valley or along the lower foothills





Figure 1. Vigorous growing and productive black raspberry plantings are often found in the lower foothill areas of the northern Willamette Valley.

of the Cascades where soils are fairly well drained and fertile (Figure 1).

Soils of the Dayton, Amity, and Wapato series are unsuitable as they are poorly drained with a tight subsoil which usually is waterlogged during the rainy season. Even in the hills subsoils are sometimes heavy clays which allow the water table to be rather high, even though the surface may be well drained. Such soils are unfavorable for black raspberries. High water table over a long period causes plants to die or so weakens them that yields are very low (Figure 2).

When water covers the roots of black raspberries for a considerable time during the rainy winter months, resulting injury to the

plants has the appearance of winter injury due to cold (Figure 3).

Poor choice of site or soil often results in low yielding plantings. Yields of less than 1 ton per acre generally are not profitable. Yields of 2 tons or more per acre are usually regarded as necessary for profitable production. Black raspberries are grown with a lower production cost than are the red varieties. They can therefore be grown profitably with lower yields. Growers experience difficulties in getting berries picked unless yields are good.

Naturally fertile soils are almost essential for best yields. Soils that lose their fertility quickly should never be planted to raspberries. The shallow, coarse-textured types of



**Figure 2. Black raspberry planting in the foothill area where poor drainage has caused plants to die out.**



**Figure 3. Injury from high water in winter resembles injury due to cold temperature.**

red soils and the gravelly river bottom soils are in this undesirable class. Naturally fertile soils that have been cultivated for a long time often become depleted of plant nutrients and organic matter which should be restored before raspberry plantings are made. For the best production of black raspberries, the soil should be fertile with a deep, loose, open-textured subsoil that is retentive of moisture, but well drained. Soils of the Olympic, Melbourne, Powell, Willamette, Newberg, and Chehalis series are usually satisfactory, and more often meet the above requirements than soils of other types in the Willamette Valley.

#### **Rotation**

Raspberries are susceptible to certain root diseases, such as crown gall and *Verticillium* wilt. Crown gall may be present on the roots of orchard trees and cane fruits. Several years should intervene, therefore, before making a raspberry planting on soil where affected plants of these fruits have grown. *Verticillium* wilt organisms often remain in the soil after the growing of such crops as potatoes, tomatoes, or eggplants. For this reason, raspberry plantings should not immediately follow these crops.

Raspberry plants are sometimes attacked by the strawberry crown moth (borer) when raspberries immediately follow an old strawberry planting. Also, it is not known

whether the little-understood organisms causing black root in strawberries attack raspberries. Until more knowledge is available, growers are advised against planting raspberries on soils where strawberries have had black root.

#### **Weeds and grass**

Weeds and such grasses as quack grass are often hard to control after a planting has been set. Soil known to be infested with hard-to-control weeds or grasses should not be set to black raspberries. Many such infested soils are fertile and suitable and the eradication of such weeds may be well worthwhile. Eradication is especially desirable if there has been a good grass sod.

#### **As an intercrop**

The black raspberry may often be profitable in young orchards as an intercrop, especially if the soil is very fertile. In this way, an income can often be obtained while the orchard is too young to produce a crop. Intercropping an orchard is more successful when trees are not planted close together and when varieties do not come into bearing quickly. Many young walnut orchards of Oregon have been intercropped to black raspberries in the past. When trees grow large, however, and come into bearing, they compete with raspberries for soil nutrients and moisture. Injury to the trees, and low yields of black raspberries, may follow.

### **Soil Preparation Before Planting**

A program of soil improvement is generally necessary before setting a new plantation of raspberries since most soils now available have

long been in cultivation. After a planting has been made, soil fertility may be maintained by use of established practices. It is difficult,



however, to improve the soil conditions when a planting is in full production. Soils long in cultivation are often in poor physical condition and usually low in organic matter.

### **Organic matter essential**

Organic matter is a most essential constituent of a fertile soil. Ample organic matter makes a soil loose and easy to cultivate, prevents stickiness or cloddiness, as well as slightly increasing its moisture-holding capacity. Major plant food elements are made more available and minor elements usually become available when sufficient organic matter has been incorporated into the soil. Minor element deficiencies are less likely to be a problem later, if organic matter or manure is used.

Farm manure is the best source of organic matter, but it is now seldom available in sufficient quantities. Heavy applications of 20 to 30 tons per acre before planting, in soil of average fertility, are usually sufficient. Poultry manure should be applied at about half the rate of ordinary manure, or at about 10 to 15 tons per acre. Soils known to be very deficient in organic matter may require a combination program of manure and cover cropping for a period of 1 or 2 years.

Cover crops are valuable in maintaining organic matter content but they do not materially increase the amount in the soil. The growing of cover crops before setting out a new planting, however, is a good practice. Such crops grown for a year or two before planting aid in controlling weeds and greatly improve the physical condition of the soil (Figure 4). Crops most generally grown are vetches or Austrian



Figure 4. Incorporating a cover crop into the soil before raspberries are planted pays big dividends.

winter peas in combination with winter oats, barley, or rye. Willamette vetch is suitable for western Oregon. Rye is preferred to barley or oats when a large quantity of organic matter is desired. Rosen rye is hardy in western Oregon. Abruzzi rye is faster growing in early spring than most other cereals and is also suitable for western Oregon. These cover crops are seeded in the fall and plowed under in the spring.

Crop refuse, such as straw, spoiled hay, vegetable tops, and similar materials may be used provided they do not present a weed or disease problem. Weed growth on some soils is often very heavy and may be plowed under as a cover crop. Some of these materials may be slow in decomposing, but the addition of nitrogen fertilizers, such as ammonium sulphate or am-

monium nitrate at the rate of 300 to 400 pounds per acre, will increase the rate of decomposition. A large cover-crop disk is usually necessary to mix the material thoroughly into the soil. Various types of rotovators, or rototillers, have come into general use in recent years for this purpose.

Land that has been in hay or pasture for a few years is most desirable for raspberry plantings. Such land that has been in grass for seed or pasture purposes will be higher in organic matter content and have a better physical structure than most any other available land. A year should intervene between plowing sod land and planting raspberries in order for the sod to become decomposed before planting.

#### **Tillage requirements**

Preparation of soil for planting is usually done just prior to the time plants are set in early spring.

Fall plowing for spring planting is advantageous as the soil will be in shape for planting much earlier. This practice, however, is unwise if there is danger of soil erosion or washing. Since erosion is a problem, especially on steep slopes, it is usually best to seed a fall cover crop such as barley, oats, or rye, plowing it under early in the spring. Land should be prepared early in the spring as soon as it is fit for cultivation without harm to the physical structure of the soil.

For spring planting of raspberries, the soil should be prepared as for any other cultivated crop. Deep plowing and thorough disking to break up lumps and eliminate large air spaces are always necessary. Some leveling of the surface with a harrow is usually needed. It may be necessary to use a float, drag, or roller if the soil is very rough or lumpy; the surface, however, should generally be left loose.

### **Selecting Planting Stock**

The profitable life of a planting may be cut short at the very beginning if superior planting stock is not obtained. Plants should be obtained from vigorous-growing plantings which are known to be free from injurious insects and diseases.

The selection of varieties in black raspberries has not been as important a consideration for Oregon growers as have been some other factors. Most varieties, if well grown, will yield well, and yield has been the primary consideration in Oregon. Growers have several varieties to choose from, but, at the

present time, only about two varieties are generally grown in Oregon: the Munger and Plum Farmer. Other varieties adaptable to Oregon conditions are the Bristol, Dundee, Evans, and Morrison. Older varieties such as the Cumberland and Winfield have also been grown although not so successfully as the first-named varieties. Fruit and foliage of all these varieties are very similar in appearance and it is difficult to distinguish between varieties. Plants of some varieties respond quite differently to certain conditions than do others.

## Propagating Planting Stock

Since there is evidence of the spread of diseases on planting stock, more attention should be given to the propagation of good black raspberry planting stock. Conditions in Oregon are almost ideal for growing nursery stock of all types. The presence of diseases and insect pests makes it unwise to use plants from ordinary commercial plantings. Anyone interested in nursery stock propagation should be familiar with the problems of raspberry plant production, particularly diseases and insect pests, as well as propagation techniques.

The best soil management practices for raspberry fruit production must be observed. The first consideration must be a naturally good propagating soil. The best type is a fertile sandy soil or at least one that is loose-textured. Such soils allow the maximum root development and make it possible to dig plants without excessive injury to the root system. Propagating soil should be retentive of moisture, and if possible, irrigation should be provided.

Parent planting stock should be carefully selected for freedom from diseases and insect pests. It is always necessary to examine plants frequently and rogue out those suspected of having disease. Virus diseases can be controlled only by roguing. Some fungus diseases and insect pests can be controlled by spraying. When a grower has secured a start of disease-free planting stock, and has reasonable assurance he can continue to produce such stock, he should make the production of planting stock his pri-

mary objective. The best planting stock should come from new plantings.

Plants should be kept growing vigorously throughout the summer in order to get strong, vigorous plants. Early planting is essential if one is to get the best possible growth the first season. As soon as growth starts the following spring, canes should be cut out. By not allowing canes to fruit, a more vigorous growth can be maintained. If pinching is done early, a large number of lateral branches are forced out, increasing the number of possible plants. Propagating areas should be changed every 2 or 3 years to prevent the build-up of diseases or insect pests.

The Oregon State College Ex-

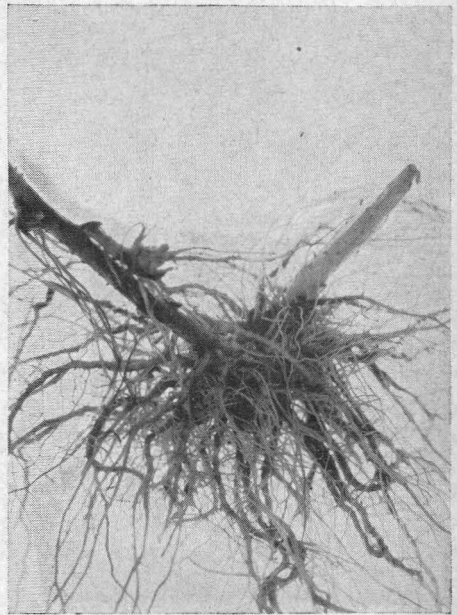


Figure 5. Black raspberry planting stock with a well-developed root system has the best chance of succeeding.



tension Service is endeavoring to locate the very best fields that are apparently free of disease and listing them as "register of merit stock" suitable for new plantings.

Tip plants are used in the propagation of black raspberries. New plants originate from the ends of canes that have arched over, taking root in the soil the previous autumn. These plants should have an extensive root system and come from canes of a good diameter (Figure 5). Smaller tip plants may grow successfully if care is taken in the planting and growing conditions are favorable. When growing

conditions are unfavorable, the larger plant is more likely to succeed.

Propagators cover the ends of canes with 2 or 3 inches of soil in late September or early October. Tips which take root naturally are quite suitable for propagation. Natural rooting takes place when the soil is loose and moist. It is always difficult to get suitable plants when the soil is hard and dry. Strong winds often cause tips to be whipped about and made unfit for use in tipping. Plants resulting from fall tipping are used the following spring for planting.

## Planting Operations

When a tip plant is dug in early spring it can stand considerable handling, but when the new shoots start to grow, and new leaves appear, considerable care is necessary. At this stage the new shoot is easily broken, delaying new growth. After new growth has started it is often advisable to dig the tip and transplant it with the soil attached. This practice, however, is not recommended if there is any danger of the spread of diseases or insect pests which might be in the soil. When digging tip plants, a portion of the original cane is left attached, usually about 8 to 12 inches. This attached portion is termed the "handle."

When plants are dug early they may be "heeled in" if they cannot be planted immediately. This is done by placing plants along the side of a trench and covering the roots with soil. Soil should be pressed tightly against the roots without injury to the young shoot. Plants may be held in cold storage

in the packing bundle or box, if the temperature remains constant at about 31° to 33° F. Moist packing material, such as damp burlap, moss, sawdust, or similar material, should be placed in the container and among the plants to keep them from drying out. Plants cannot be held for long periods if dug after growth has started in the spring.

The new planting should be established early in the spring. Black raspberries are seldom planted in the fall because new plants have not developed an adequate root system by late fall. Root growth necessary for good strong plants is made during the late fall and early winter months.

## Planting systems

The system under which raspberries are to be grown and trained should be determined before setting the plants. Various systems are used and growers often modify them to suit their particular needs or desires. The systems most com-



Figure 6. A young planting where stakes are used for supports. Plants are set close together in the rows so that cultivation can be in only one direction.

monly used are described under pruning.

Black raspberries are generally planted in rows (Figure 6) with cultivation in only one direction. Occasionally they are planted on the square with cultivation in both directions.

Width between rows should be determined by the kind and type of cultivating implements to be used. Very small tractors, such as the garden tractor, or single-horse cultivators, usually require rows at least 8 feet apart. With riding tractors, growers prefer rows 9 to 10 feet apart with some as wide as 12. Rows should always be far enough apart to allow cultivation without injury to untrained canes or plants.

Plants in rows are set at various distances apart; however, 4 to 6 feet are the most practical distances used. Close planting of 3 feet apart allows for a greater plant popula-

tion but makes cultural operations such as weed control, pruning, and harvesting, more difficult. Where soil moisture and fertility are lacking, greater distances may be more practical.

Table 1 gives the number of plants per acre needed for spacings in common use.

Table 1. Number of Plants Per Acre

Distance between plants	Width between rows	Number of plants per acre
<i>Feet</i>	<i>Feet</i>	
3	8	1,815
3	10	1,452
4	8	1,361
4	10	1,089
5	8	1,089
5	10	871
6	6	1,210
6	8	907
6	10	726
8	8	681

The number of plants required per acre can be easily determined by the following method. Multiply the contemplated distance between rows by the distance between plants in the rows. Divide this figure into 43,560—the number of square feet in an acre. The answer will be the number of plants needed for an acre.

Some system of marking out rows is generally used in order to give the planting an orderly appearance and make cultivation practices easier. Rows are often laid out with a line of cord or wire. Hand- or tractor-drawn markers or a corn planter may be used. In addition, small stakes are sometimes put in where each plant is to be set, especially if cultivation is to be in two directions.

### Setting the plants

Plants should be set so they will start growth as quickly as possible after planting. Particular emphasis should be placed on pressing the soil tightly against roots so no open pockets remain. The root system should be spread out so soil is in contact with each root. When roots are folded, or in a ball, air spaces remain and only part of the root system is in contact with the soil.

Most raspberries are planted by hand. A spade or shovel is used to make the hole. The plant should be set about 1 inch below the original depth at which it grew, with sufficient space allowed for spreading the roots. The growing point should be set so it is at the surface of the soil. Press top soil firmly against the roots. When planting is done in loose soil and plants are not over-

sized, satisfactory planting may be done by plunging the spade well down and moving it forward or backward to open a hole. The plant is then set down into the opening. As the spade is drawn out, the soil falls against the roots and is firmed by packing with the feet.

Some growers plow a deep furrow and place the plants along one side of it. The soil is then returned without delay by plowing another furrow. This method is satisfactory only if care is taken to see that the soil is always pressed tightly against the roots and the plants are set at the proper depth.

In planting black raspberries, some growers believe plants should be set rather deeply (for example, in a deep furrow) so plants can develop a strong root system as an anchor to prevent canes from being blown over or uprooted when the crop is heavy, especially in windy locations. Soil may be drawn to the plant after growth is a few inches above the surface. Other growers attempt to obtain the same results by mounding the soil or plowing a furrow toward the plants after growth has started in order to encourage a greater production of roots higher on the canes. This gives the plant more support. Surface drainage is also obtained by this method. Many growers see no advantage, however, in either of these practices in keeping their plants from being uprooted. The usual practice is to keep the base of the plant level with the soil.

The portion of the black raspberry cane attached to the plant called the "handle" may be cut back to the surface of the soil at the



time of planting. Such cutting back reduces leaf surface and transpiration, and if not done, may delay

the rapid development of new growth. The possible spread of some diseases may be reduced also.

## Care of the Planting

Much of the success obtained in growing black raspberries is due to the care the planting receives. Care involves cultivation, moisture control, elimination of weeds, as well as maintenance of soil fertility and pruning.

### Cultivation

Cultivation should be primarily for the control of weeds. Weeds compete with the raspberry plant for moisture and plant food and should not be allowed to develop during the growing season. Deep cultivation, or that in excess of 2 inches in depth, should never be practiced. Black raspberry roots are found in great abundance just beneath the surface and deep cultivation destroys many of these roots. Many raspberry plantings have been permanently damaged by deep cultivation.

Early spring cultivation is important. If the cover crop, grass, or weeds are allowed to remain too long, they may seriously compete with the raspberry plant for moisture and nutrients. Disking down a cover crop is usually preferable to plowing since plowing depth is usually deep enough to cut many roots. A grape hoe and the newer power rotary hoe are often very useful in clearing grass and weeds from between the plants in the row. Various implements may be used for summer cultivation, such as cultivator attachments to the tractor, spring-tooth harrow, and weeders of various kinds. Very little if any

cultivation is necessary during the harvest season. Some hand hoeing is usually necessary to get the weeds and grass close to the plant.

*Caution:* All implements used in raspberry cultivation should be adjusted so they do not disturb roots that are more than 2 inches beneath the surface.

### Intercrops in young raspberry plantings

Intercrops may be grown the year a raspberry planting is set. This practice is satisfactory if the soil is fertile and retentive of moisture. Cultivated crops are satisfactory, but grain and hay crops are not suitable. Crops that are heavy users of water may check raspberry growth in unirrigated plantings. Generally intercrops are more satisfactory where irrigation is provided. Crops that might spread raspberry root diseases, such as potatoes and tomatoes, should be avoided.

Intercrops should not be planted the second year following the planting of raspberries. This is the year when a very vigorous cane growth is desired for producing the first crop of fruit the following year. During the second year roots spread rapidly to occupy nearly all the soil area between plants. Many growers in western Oregon do not grow intercrops because of the danger of reducing raspberry plant growth in case the summer months should be especially dry.

### **Irrigation**

Experiments on the Oregon Agricultural Experiment Station have shown that irrigation increased yields. Experimental evidence, however, is not available on the time

and amount of application. In general, black raspberries have not been grown in areas where irrigation has been available; consequently there has been little interest in their irrigation.

## **Maintaining Soil Fertility**

The life of a raspberry planting may be greatly prolonged if plans for maintenance of soil fertility are made at the time of planting. Growers should not wait until yields begin to decrease before taking steps to stop a further decrease in fertility. All plans may fail, however, if the planting is in a poor location and on poor soil.

### **Use of manure**

The annual application of manure is probably the best insurance against depletion of soil fertility. Applications of 10 to 15 tons of animal manure per acre, or about one-half that amount of poultry manure, have given good returns. Manures may be supplemented with commercial fertilizers, using particularly those elements known to be most deficient in the soil. Growers should realize there is the possibility of a weed or grass problem whenever barnyard manure is used.

### **Cover crops**

Cover crops are difficult to handle in established black raspberry plantings because the arching new cane growth interferes with the seeding of fall-sown cover crops. Early seeding may be resorted to before the new cane growth is great enough to interfere with drilling. Broadcasting by hand may also be done at the time fall rains begin. Although cover crops may help in

the maintenance of organic-matter content in the soil, they cannot be expected to increase it. Often they are a problem in years of much spring rains when incorporation into the soil becomes difficult without injury to the roots.

### **Commercial fertilizers**

Experimental evidence is inconclusive regarding the benefits of commercial fertilizers on raspberries. The different soil types in which black raspberries are grown, along with the differences in fertility, probably account for these results. Many growers report better plant growth and increased yields from their use. Various fertilizers are used. Complete fertilizers are most common. Applications are usually made in early spring with rates varying with the grades used. Because of the wide variation of fertilizer requirements on different soil types, growers are advised to follow local recommendations. At the time of planting some growers feel that in order to get the most growth some application of fertilizers is necessary. Use of a nitrogen fertilizer, such as ammonium sulphate or ammonium nitrate, is now becoming more general than formerly. Some of the booster solutions, such as those used in the transplanting of vegetable crops, have been used by some growers.

They believe such use has been very helpful in getting the plants to start growth quickly after planting.

Nitrogen fertilizers are generally not recommended for fall application in Oregon since it is desirable that plants go into the winter in as dormant a condition as possible. On many soils, nitrogen fertilizer applications in the spring have given higher yields while phosphorus and potash applications have not shown responses.

The black raspberry has been found to differentiate fruit buds in November or even later and consequently little development takes place until early spring. Thus, early spring applications of fertilizers seem most effective for the development of fruit buds as well as new

cane growth for the succeeding year. It is essential a vigorous cane growth be established as early as possible the first season. For best production there should be at least 6,000 to 8,000 vigorous individual canes produced per acre. A quick, fast growth is consequently essential if the highest yield is to be expected.

Roots of black raspberries are more numerous in the area 18 to 24 inches from the base than close to the plant. There is a reduction in the number of roots at distances of 3 feet or more from the plant. Applications of fertilizers, therefore, should be such as to place the fertilizing materials where most of the roots would receive benefit of the application.

## Pruning

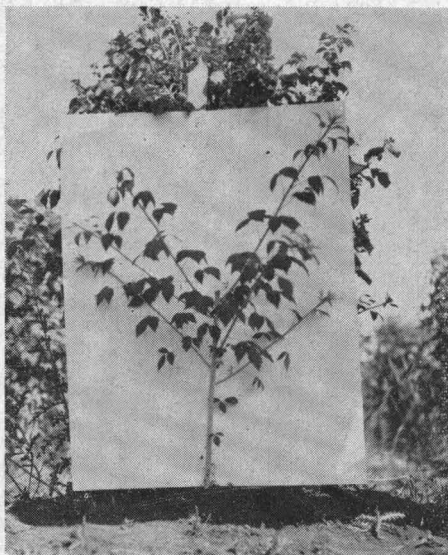


Figure 7. Cutting off the end of the main canes forces out strong side branches just below the cut.

Black raspberries normally produce canes that make a rapid growth upward to about 4 or 5 feet and then arch over and finally trail along the ground until the end of the growing season. Only a few side branches normally appear. Many side branches, however, are produced if the terminal of the cane is cut off (Figure 7). Black raspberry plants produce from 3 or 4 to 10 to 12 main canes from the base. Yields, however, have been greatly increased by forcing out many side branches by pinching off the ends of main shoots when quite short. The largest yield can be expected from plants with a large number of canes bearing large numbers of strong side branches. Several systems of pruning and training are in use by growers in order to obtain this objective.



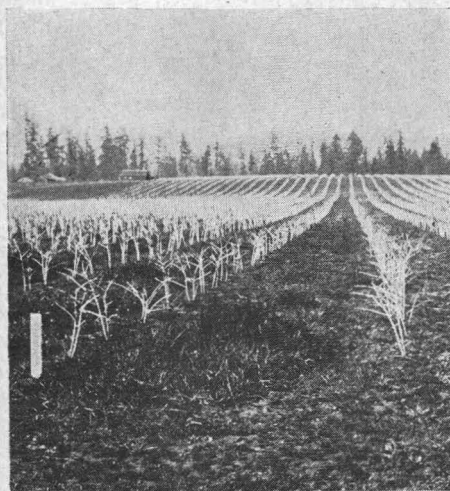


Figure 8. No supports are required when black raspberry canes are pinched off early forming a low head.

### Low head system

The system of pruning which seems to most nearly achieve the grower's objective for large yield is the "low head" system where no trellis or support of any kind is used. This system is also popular because no expense is involved in training materials and pruning is relatively simple (Figure 8).

Plants may be set at distances apart in the row which best suit

the grower's conditions. Plants set 3 feet apart may be too close but 4 and 5 feet apart are very common distances. Yields no doubt would be reduced when distances are 6 or more feet apart.

Early pinching or cutting off of the terminal, 3 or 4 inches of the shoot when it is about 12 to 15 inches above the surface, forces out strong lateral branches. Plants with many strong lateral branches give the highest yields. Pinching of cane terminals must be done in May or early June. To obtain uniformity in height of head for all the canes, pinching must be done several times at intervals of 4 or 5 days since all canes do not attain the same height at the same time. Terminals may be pinched off with the fingers or cut off with a knife or pruning shears (Figure 9). No more attention is paid to the canes after pinching until time for pruning in late winter.

Since pinching must be done early, side branches developing quickly are in the way of pickers at harvest time. This is the principal objection to the low-head system. There is also the necessity of stooping low in picking. Uprooting

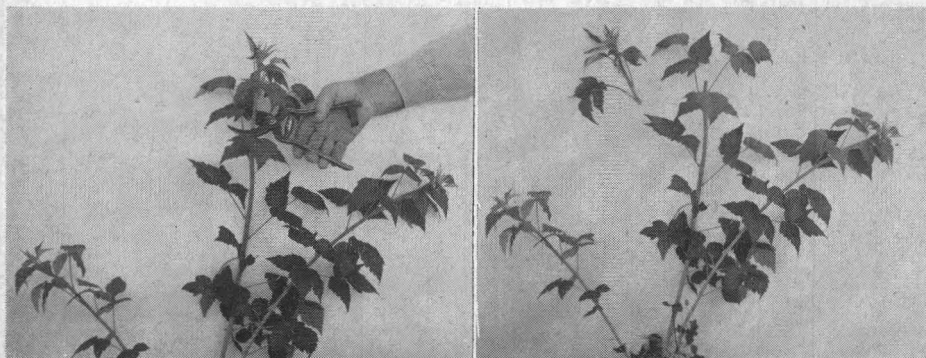


Figure 9. A. Pruning shears being used to cut off terminal portion of the cane. B. Shows the cane after terminal has been cut off.

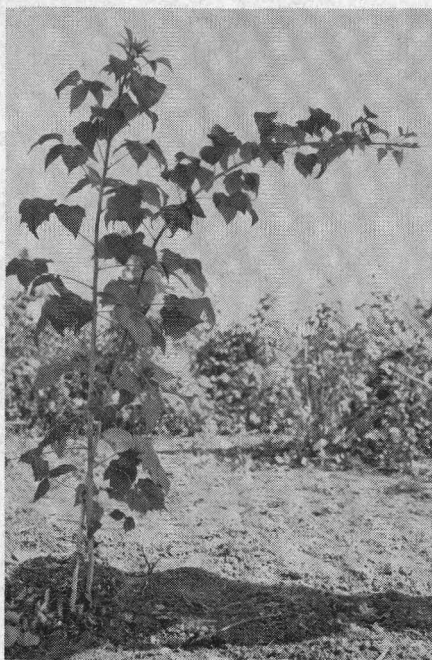


Figure 10. When allowed to grow tall, pinching must be high resulting in a high-headed plant.

may also be greater, especially in windy locations.

#### High head system

To make picking easier, growers often delay pinching until just before harvest time (Figure 10). With

the low-head system, much of the cane must be cut off in order to obtain the low head. This practice is harmful since side branches forced out are weak and yields reduced.

For high heading, where less of the cane is cut off, late heading is necessary if side branches are to develop. Some support is necessary consequently to prevent high-headed plants from being uprooted or the canes broken over at the crown by the weight of fruit (Figure 11).

Since a material for stakes is usually readily available, split cedar stakes of 2 to 4 inches in diameter are often used. Stakes of fir and other species are suitable but would be short-lived unless treated with a wood preservative.

Wire trellises (seldom used) have posts set every 20 or 30 feet. Usually a wire is placed on each side of the post or on cross arms attached to the posts. Wires are usually placed a little lower than the height of the plant when headed. Canes may be tied to either one or both of the wires or not tied to the wires at all.



Figure 11. High heading requires stakes for supporting the plants when in fruit.

Terminals of the canes are pinched off the same way when supports are used as when they are not. Higher heading is practiced, however, when supports are used. Heights preferred usually range from 30 to 42 inches above the ground. The same pruning in late winter is practiced for high heading as for low heading. Since weaker side branches may develop with high heading, shorter lengths probably should be used.

### Winter pruning

Winter pruning of black raspberries consists of cutting out the old fruiting canes and cutting back the branch canes or laterals (Figure 12). Ordinarily there is no advantage in pruning out the old fruiting

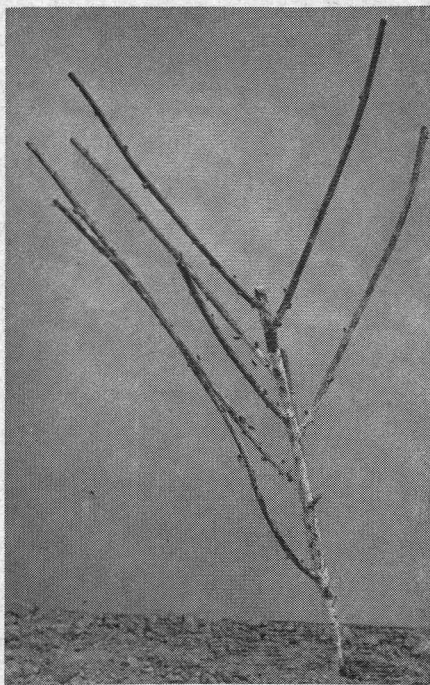


Figure 13. Long lateral branches mean more fruit, if plants are vigorous and canes large in diameter.

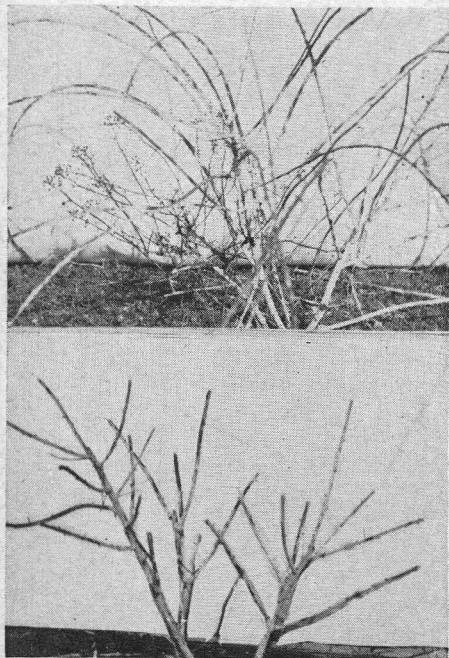


Figure 12. A black raspberry plant before pruning, above; after pruning, below.

wood in the late summer or fall. It is usually more economical to do it with the winter pruning. In case of a bad disease infestation, summer removal of old fruiting wood is advisable. During January, February, and early March, weak canes are cut out and branch canes or laterals are cut to a length that will give the greatest quantity of marketable fruit. The length to leave is determined by general vigor of the plant and diameter of the canes. No hard and fast rule can be made for the best length of laterals and much depends upon good judgment of the grower. Laterals 12 to 18 inches long may be left if plants are vigorous and laterals large in diameter (Figure 13). If plants are weak and



canes small in diameter, laterals should be cut back to 2 or 3 inches. Canes that have not been headed, as in Figure 14, can be cut back to the height of the average plants and tied to supports of wire or stakes if used.

Most growers use hand shears or long-handled shears in pruning. Some growers use power-driven hedge shears to quickly prune the canes to the proper length. After going over with the hedge shears, old fruiting canes and weak canes are taken out easily with long-handled hand shears or a pruning hook.

### Disposal of pruning wood

Pruning wood in the past has been generally disposed of by gathering and removing it from the planting and burning. In recent years, prunings often have been left in the rows and broken up with a disk. Several growers have devised machines for breaking up the canes and the rotovator attachments to tractors are also effective in incorporating canes into the soil. Growers feel this is advantageous, since broken and decaying pruning wood improves physical properties of the soil.

## Harvesting

Harvest season for black raspberries usually begins in the latter part of June and continues to the end of July. The season is influenced by the location of the planting, particularly as regards altitude. Plantings in the lower portions of the valley

ripen first and those in the hills later. Plants growing vigorously and well supplied with moisture often send up basal shoots which bloom and fruit after the main harvest period. Berries on such shoots are often very large.

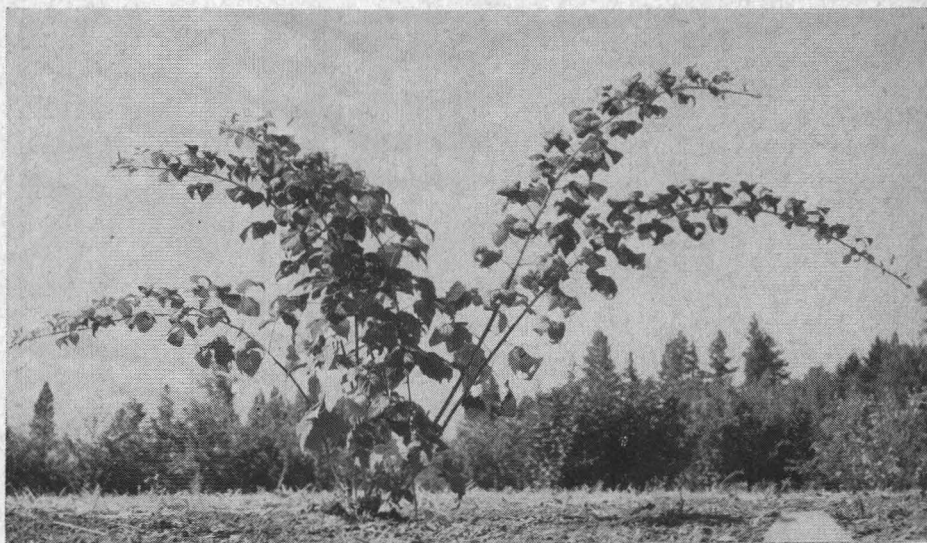


Figure 14. Canes that have not been headed need to be tied to a stake or trellis for support.

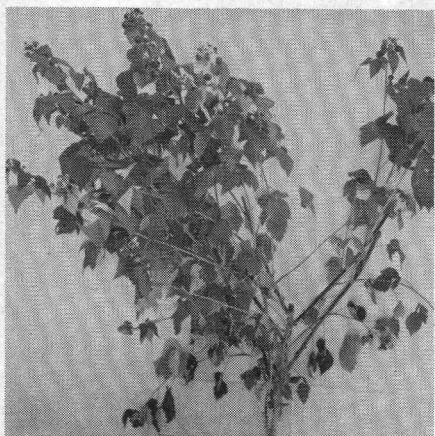


Figure 15. Fruit of the black raspberry is borne on long fruiting laterals.

The period of peak harvest is shorter in duration than for most other small fruits. Since black raspberries do not deteriorate so fast as red raspberries, they do not need to be picked so often. Intervals of as much as 7 days may intervene between pickings. Sometimes the entire crop can be harvested in 2 or 3 pickings.

When berries are to be dehydrated, greater intervals between pickings become possible. Occasionally growers have allowed berries to dry on the plants, later cutting out the fruiting canes (Figure 15). The fruit is then beaten off the canes either by hand or by machine. Sometimes grain harvesting machines have been used for this pur-

pose. Most of the fruit, however, is picked by hand in the usual way—women and older children making up most of the picking crew. Growers provide their pickers with gallon buckets or cans that can be fastened to the body of the picker. When full, cans are emptied into boxes in carriers which, when filled, are taken to a conveniently located packing or assembly shed. Boxes are taken from carriers in the assembly shed and placed in crates or in the lug boxes provided by packing plants (Figure 16). After picking there is danger of molding and decay in containers. Berries should be transported to market or the packing plant as quickly as possible.



Figure 16. Processing plants furnish crates filled with 1-pound veneer boxes.

## Diseases and Insect Pests

Black raspberries are subjected to the ravages of certain diseases and insect pests which have caused serious losses to Oregon growers. Growers therefore should carefully consider their control before making a black raspberry planting. Be-

cause of the nature of these problems, growers are advised to consult their local county agent for further information for their particular situation. This bulletin discusses only those problems related to cultural practices.

*See your local  
County Extension Agent  
for current information on  
other cane fruits.*



