

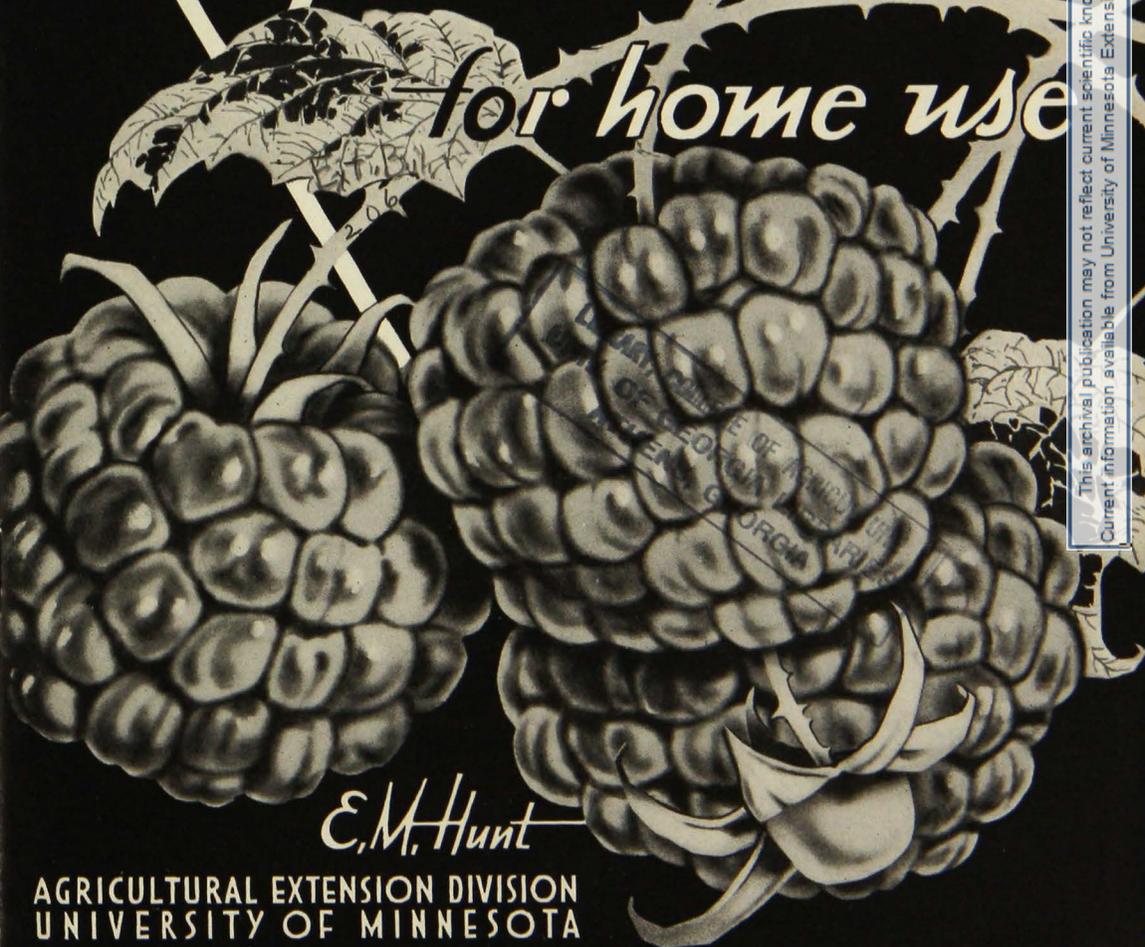
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GROWING,

Raspberries

for home use



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UNIVERSITY OF MINNESOTA

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Growing Raspberries for Home Use

E. M. HUNT

PROBABLY leading all other fruit plants in value for home growing in Minnesota is the raspberry. It can be grown on a variety of soils and is adaptable to the climate in every part of the state. With reasonable care, a raspberry planting bears a generous supply of fruit which is liked by nearly everyone. Fresh raspberries are a welcome addition to the family meals. Preserved for later use, they are palatable and fill an important need in the diet.

Raspberries bear heavily. One hundred plants usually yield upwards of one hundred quarts of fruit per year, an ample amount for the average family. Planted either in the hedge-row or hill system, one hundred plants fill only two rows 150 to 250 feet long. Thus, planted in the home garden or as a supplement to the home orchard, they require a relatively small space and little labor.

Raspberries respond readily to good care. Even when somewhat neglected they often bear well for 2 or 3 years. By giving attention to the factors discussed in this bulletin, the yields can be increased and maintained over a period of 8 to 10 years or more.

VARIETIES FOR THE HOME GARDEN

Hardiness is extremely important in selecting raspberry varieties for Minnesota since in every section of the state there is danger of winter injury.

Some variation in fruiting season can be obtained through selection of varieties. This may be valuable to the home grower who is interested in having a supply of fruit over as large a part of the season as possible.

Red Raspberries

Latham is by far the most common red variety in Minnesota as well as in the entire region east of the Rocky Mountains. It is exceptionally hardy and heavy yielding. The berries are large and of good quality. If only one variety is to be planted, this is the best all-round variety for both home and commercial uses.

Chief (Minnesota No. 223) is slightly earlier than Latham and is also hardy and high yielding. The berries are somewhat smaller but are of slightly higher quality. In the home planting, it may be desirable to have both Chief and Latham in order to obtain berries as early as possible as well as a dependable late crop.

Black Raspberries

No dependable hardy variety of black raspberry has been found for Minnesota. The varieties being grown require winter protection to escape injury most years. The black varieties are very susceptible to mosaic and anthracnose, making it undesirable to plant them close to red varieties to which the diseases may be transmitted.

Cumberland (black) is a heavy yielder, of good quality and, although slightly late, is perhaps the most popular variety of black raspberries.

Purple and Yellow Raspberries

These varieties are no longer recommended for Minnesota and cannot, for the most part, be obtained from Minnesota nurseries. Their lack of hardiness, plus a high susceptibility to disease, makes them unsuitable for home planting.

Blackberries

The culture of blackberries is very similar to raspberries except that the canes are very tender and must be covered with soil each winter. The rank canes and the abundance of thorns on them make this operation very difficult. Although the fruit is excellent, the work of producing them is discouraging to most growers. Varieties commonly planted are Alfred, Eldorado, and Ancient Briton.

New Varieties

Many new varieties are offered for sale from time to time. These should be planted on a trial basis only until their value for home use has been proven. In addition to red varieties, this group might include the Boysenberry and Youngberry. These new fruits, although very productive and of good quality in some cases, probably are not hardy enough to be of practical value in Minnesota.

SELECTION OF PLANTING SITE

For the sake of convenience, the home raspberry planting should be near the house. Although the planting will not require a large amount of labor, its nearness to the center of activity on

the farm will make more convenient the giving of care at the proper time. As is the case with vegetable gardens, nearness to the house also increases the convenience in using the crop to the best advantage.

Slope and Exposure

In selecting the site, considerable attention should be given to drainage. Raspberry plants are particularly sensitive to poorly drained soil. Sites should be selected in which the water table remains at least 3 or 4 feet below the surface. To insure good surface drainage, select a gentle slope on which there is no possibility of water standing after a heavy rain or a spring thaw. Sites sloping to the east or north may also have other advantages. Soils with these exposures will retain their moisture somewhat better during the hot summer days thus favoring fruit production. East and north exposures may also keep a better covering of snow in the winter protecting the plants against winter injury.

Raspberries must be exposed to the full sun if they are to be productive. Do not plant closer than fifty feet to windbreaks or other large trees.

Soils

Raspberries will grow on almost any soil; however, the growth and yield will usually be best on a deep clay loam. A soil whose texture will retain moisture is also desirable. In selecting such a soil, however, care should be taken that the soil is at least 3 or 4 feet deep before hard-pan rock or other impervious subsoils are reached. The moisture-holding capacity of soils can be improved by plowing under green manure crops or applying stable manure.

Light soils can be built up by plowing under crops such as rye, buckwheat, and sweet clover, or by applying 15 to 20 loads of manure per acre.

If grass or clover sod is plowed under, the growing of a cultivated crop for a year before the raspberry plants are set will greatly lessen the danger of injury from white grubs. In any case it will be advisable to plan a year or two ahead as it is difficult to improve soil after planting is established.

PREPARING THE SOIL FOR PLANTING

A finely prepared soil encourages root growth and usually results in high survival of plants set and good cane growth the first year.

If possible, plow in the fall. When spring plowing is necessary, plow as early as possible. Disk early in the spring. Immediately before planting give the soil what additional tillage is necessary to put it in a smooth, finely divided condition.

ESTABLISHING THE PLANTING

Under most Minnesota conditions spring planting is advisable. Plant as early as the soil conditions will permit. Delay usually results in heavy losses, especially to the black varieties.

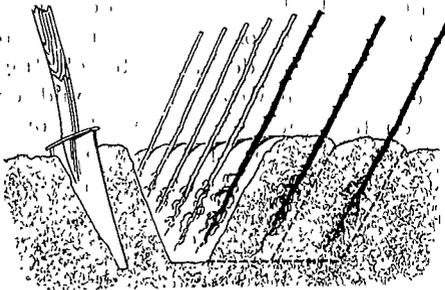


FIG. 1. HEELING-IN PLANTS

Fall planting is recommended only in localities where heavy soil or frequent spring rains are apt to delay spring planting. To avoid possible winter injury, use only sturdy well-matured stock. Shorten the canes to stubs 2 inches in height and cover late in the fall with soil or strawy manure.

SOURCE OF PLANTING STOCK

Plant only stock which is free from disease. Since raspberry plants are subject to several serious diseases which spread rather quickly in an old patch, the planting of certified stock is advisable in most cases. With the aid of the State Nursery Inspection Service, Minnesota nurserymen are offering the finest type of raspberry stock available. A list of growers of certified raspberry stock may be obtained from the State Entomologist, University Farm, St. Paul.

If an old planting is known to be free from disease, stock for a new planting may be obtained from it. Dig the one-year-old plants arising between the rows and between the old plants as suckers from the old plants.

Use only the year-old plants having a vigorous root system. These should be dug at planting time and set as rapidly as possible in the new field.

CARE OF STOCK AT PLANTING TIME

Avoid injuring the plants before or during planting. If the plants are obtained from a nursery, open the package immediately upon its arrival and sprinkle the plant roots unless they are already thoroughly moist. Keep the plants cool and the roots covered. Unless it is possible to plant within a

short time, remove the plants from the bundles and heel-in in moist soil. In planting, remove only those few plants at a time which can be set within a few minutes.

SETTING THE PLANTS

The plants should be set about two inches deeper than they were in the field or nursery. Firm the soil carefully to establish good contact between the roots and soil. Immediately after planting, the canes should be shortened to 4 to 6 inches.

There are several methods of setting the plants. When large numbers are being planted, much labor can be saved by opening single plow furrows lengthwise of the rows. The plants' positions along the furrows can be determined by cross marking. The plants are then held at the proper depth and dirt pulled into the furrow with a hoe or spade. Firm the soil around the plants by tramping.

If this method is used, open the furrows and distribute plants only a short distance ahead to avoid excessive drying.

Raspberry plants can be set without digging the usual holes or opening furrows. Insert a spade in the soil to its full depth at the desired position. By a backward and forward movement a wedge-shaped opening will be made. Place the roots into this opening to the proper depth taking care to spread them as much as possible.

Remove the spade and insert again 3 inches behind the plant. By a forward thrust, push the soil firmly against the roots. This method is practical only when a limited number of plants are to be set and when the soil is in a proper physical condition.

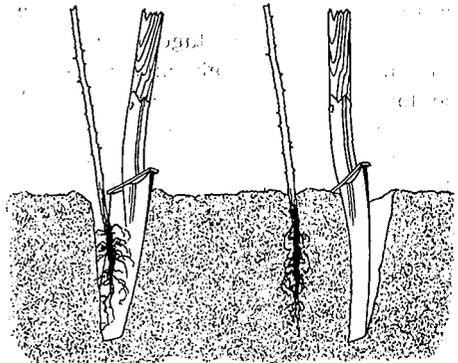


FIG 2. SETTING PLANTS WITH SPADE

SYSTEMS OF PLANTING AND TRAINING RED RASPBERRIES

Several training systems suitable for home growing are used in Minnesota. The choice between these will depend mainly on the grower's preference. However, he must know ahead of time what training system he intends to use since the spacing of the plants at planting time is dependent on this.

Proper spacing of the original plants is of little value unless definite steps are taken to maintain the adopted spacing and training system. Year after year the excess canes must be cut out and the hills or rows narrowed, or the planting will become a hopeless thicket. Too many such patches exist in Minnesota. The harvest of small, crumbly berries from these stunted and usually diseased plants is not to be compared with the production from a well-cared-for planting.

The Hill System

In the hill system the plants are maintained as individuals. The spacing between the hills may vary considerably but is usually $4\frac{1}{2}$ by 6 feet or 5 by 5 feet. Such spacing allows horse

cultivation along the rows as well as crosswise. The advantages of this system are that thorough cultivation can be done with a minimum of hand work, picking and pruning operations are easier, and better control of insect and disease pests can be obtained.

Cane Supports—Red raspberry canes of normal vigor should be allowed to grow to 4½ to 5 feet in length to obtain the maximum crop. Unsupported canes higher than 3 feet have a ten-

dency to fall over, interfering with picking and various cultural operations.

It is obvious, then, that some type of cane support is needed both for convenience and satisfactory yield.

There are several methods which can be used depending on the spacing system followed and the preference of the grower.

The Staked-Hill System—For plantings spaced in the hill system, the staked-hill method of support is most popular.

In using this system, drive a stake firmly into the center of each hill. The stakes may be metal, tamarack poles, or sawed lumber approximately 1½ inches square. They should be long enough to project about 5 feet above ground.

Select five to eight of the strongest canes originating close to the stake and tie them securely to it. Ordinary binder twine or any soft, stout twine may be used. Two or three ties are necessary, one not more than 6 inches from the top of the canes.

Place the lower ties wherever they are needed to hold the canes securely to the stake. Tight tying is essential. Draw the canes up snugly to the stake so that no movement is possible. There is no danger of injuring the canes and they must be held firmly if the system is to be satisfactory. Any remaining canes should be cut off at the ground and the hill strictly confined to the five to eight canes selected each year. Tying should be done in summer after the berries are harvested and when the old canes are being pruned out.

The Tepee-Hill System—The spacing between hills is the same for this system as for the staked-hill. The main difference between the two systems is

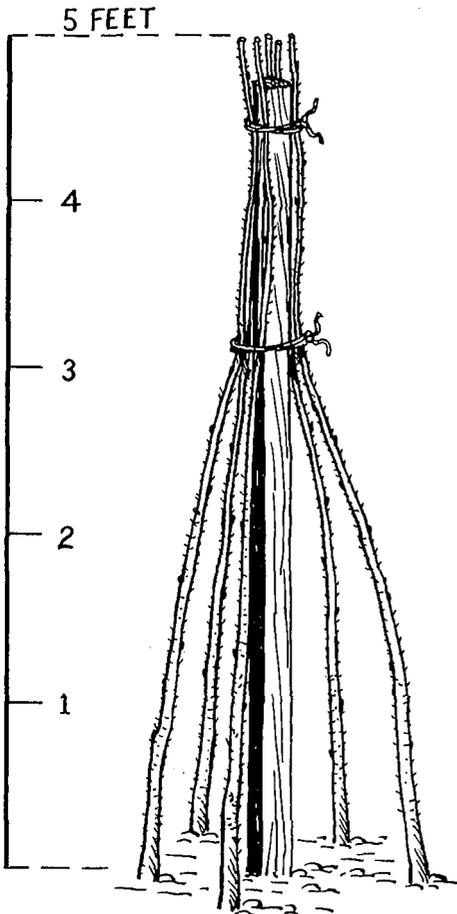


FIG. 3. STAKED-HILL SYSTEM

that no supporting stake is used in the tepee system. This means that canes must be selected and tied in such a way that the hill or "tepee" will stand up by itself.

Select five to eight canes far enough apart to make the base of the hill about 15 inches wide. Draw the canes together at the top and tie tightly. Two ties are necessary. Make the first as near the top as possible and the second about 8 inches below the first.

Unless properly made the tepee hill may have a tendency to twist and fall over. To avoid this, make the hill with a wide base, shorten the canes to 4 feet, and tie very tightly.

The tepee system may require a little more work in keeping the hills free from grass and weeds, and some yield may be sacrificed in shortening the canes to 4 feet. Other than these, it has most of the advantages of the staked-hill system and in addition eliminates the inconvenience and cost of stakes.

The Hedge-Row System

In the hedge-row system, the plants do not retain their individuality but send up numerous suckers which eventually make the row continuous. In this system the red raspberry rows may be 6 or 7 feet apart and the original plants set $2\frac{1}{2}$ to 3 feet apart in the rows. This system has the obvious advantage over the hill system of providing the maximum number of plants per acre with the possibility of a slightly higher yield per acre. The common difficulty with the hedge row is that the canes often are not kept properly restricted. Best results will be obtained if the row is kept narrow—not to exceed 12 inches. Three or four canes per running foot are sufficient.

If the canes are pruned back to $3\frac{1}{2}$ feet, no support is required. However, canes are usually allowed to remain $4\frac{1}{2}$ to 5 feet in height in order to obtain maximum yield. This makes support of some kind necessary.

Post and Wire Supports—There are many variations of this method, depending mainly on the materials available. Stout posts high enough to support wires approximately 36 inches from the ground are commonly used. These are placed every 25 feet along the row. In one system a simple horizontal wire is stapled to the posts, and the canes are tied to the wire individually.

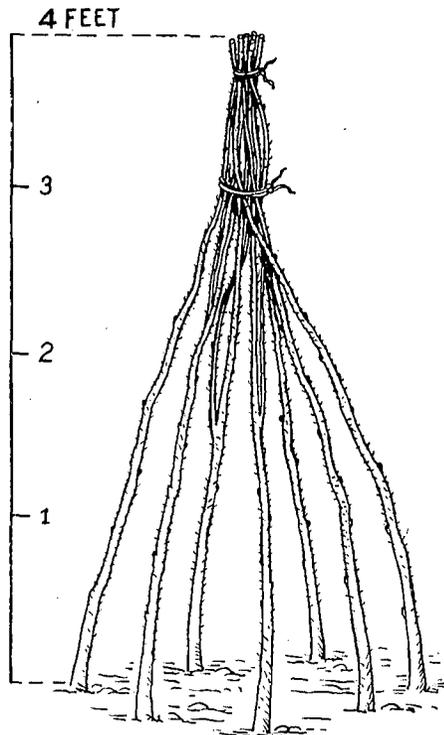


FIG. 4. TEPEE SYSTEM

A wire also may be strung along each side of the posts. The two wires are then tied together at intervals of a few feet with the canes held securely between them. A further variation of this system involves the use of a wooden crosspiece on each post to hold the wires farther apart. This allows for the support of the canes in a wide row.

Black Raspberries

Black raspberries produce new canes only from the crowns of the plants, and therefore they are naturally confined to hills. Because of their vigorous growth habit, they are usually given wider spacing than red raspberries. A spacing of 5 by 7 feet or 6 by 6 feet is common.

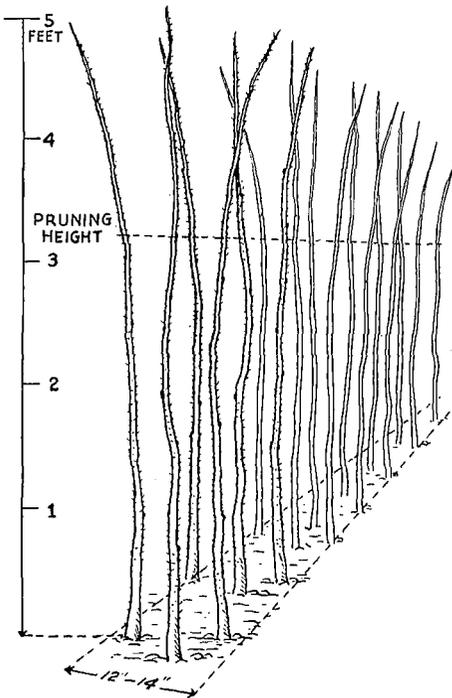


FIG. 5. NARROW HEDGE-ROW SYSTEM

Although various supporting methods may be used, recommended pruning practice, discussed elsewhere in this bulletin, eliminates need for supports.

MANAGEMENT OF RASPBERRY PLANTINGS

This bulletin thus far has dealt mainly with the steps involved in establishing a good raspberry planting. It is obvious that a good start in respect to stock, location, and careful planting is essential or else all later work may be useless.

Once put into effect, these steps may be considered as only the preparations which will now make it possible to carry out good management practices. Management, which will be discussed in the following pages, means those operations which must be faithfully carried out year after year in order to achieve the original goal—a continuous production of good fruit.

Cultivation

In new plantings, cultivation should begin immediately after planting. Intercropping with some low-growing garden crop may be practiced, but it is seldom advisable after the first year. In older, established plantings, cultivation should begin as soon as the soil permits in the spring and should continue at frequent intervals until the end of the picking season.

Cultivation during the picking season is desirable if done without damaging the berries with dust.

Although frequent and thorough cultivation is needed, care should be taken not to work the soil too deeply. Raspberries have shallow roots and are easily injured by deep cultivation with a consequent reduction of the crop.

In small home plantings a hay or straw mulch about 6 inches deep may be used to suppress weeds and conserve water instead of clean cultivation. If sufficient mulch material is available, and if additional attention is given to confining the new growth to the rows or hills, this practice is acceptable.

Maintaining Fertility

Profitable crops are dependent on vigorous cane growth. For desirable growth, the soil must be fertile and must retain moisture. Water retention and nitrogen fertility are both somewhat dependent on the humus content of the soil. Clean cultivation results eventually in a decrease of humus; therefore it is advisable to make additions to the soil every year in the form of barnyard manure. Efficient use can usually be made of an annual application, either in the late fall or early spring, of one to two loads of manure per five thousand square feet.

If manure is not available and there is an obvious lack of fertility, commercial fertilizer is often advisable. The proper amount to apply is difficult to determine, but as high as 25 pounds of ammonium sulfate for five thousand square feet is suggested for trial. This should be broadcast and worked into the soil between the rows early in the growing season. The feeding roots of raspberry plants extend outward several feet from the hills or rows. Applications of any fertilizer will, therefore, be of the most benefit if spread at the sides and between the rows instead of directly on the plant crowns. Remember that while commercial fertilizer stimulates growth, it makes no provision for the needed humus in the soil.

Too liberal applications of commercial fertilizer should be avoided. Quantities beyond the actual needs of the plant can not be utilized efficiently and may induce late, immature growth subject to severe winter injury.

Pruning

Raspberry roots are perennial, that is, they live over from year to year. Roots may spread as much as 12 feet from the crown and penetrate to a depth of over 4 feet. In red varieties, suckers or new canes may develop anywhere the roots spread. For satisfactory production, the new canes must be restricted to an orderly arrangement by the use of training systems.

The new canes grow rapidly, and as they mature they form the buds that pass through the winter and develop the next spring into leafy fruiting laterals. The longer and stouter the new cane, the more buds produced and the better the prospects for a large crop the following year. Cultivation and pruning to restrict the number of new canes per plant usually result in the production of longer and stouter canes.

The first berries to ripen are found near the tips of the canes. The last to ripen usually are produced on laterals arising near the base of the cane. The early berries usually are the smallest and the later ones the largest. The usual light pruning that is involved in cutting away the tips of the canes in the spring removes some of the small early berries. Pruning more severely will remove more of the crop without causing any appreciable increase in the size of the remaining berries. Pruning, then, must be done with understanding, and the training system must be chosen with care so that the canes may be left as long as possible to produce the best crops.

Raspberry canes differ from their roots in that they are biennial, that is, the canes live only two seasons. Pruning practice, therefore, requires that not only the excessive young canes but also the old canes which have already borne their fruit be removed each season.

The canes which have borne a crop should be removed as soon as possible after the picking season is over. If they are left in the row or hill, they merely rob the younger canes of plant food and water.

Only in years when the soil is very wet, or in cases where an excess of fertilizer has been applied, should the old canes be left until later. Under these exceptional conditions they may use up the oversupply of moisture or food, guarding against injuries which might result from oversucculent young canes.

When the old canes are being removed, the weak or crowded new ones should also be thinned out. In an established planting, there is invariably an oversupply of new growth. Thin to the recommended three or four canes per running foot in the hedge rows and five to eight canes in the individual hills.

Shortening Canes

Studies of the response of the raspberry to various pruning heights have shown that under normal conditions the canes should be left as long as the training system will permit.

Shortening the canes more than is necessary will considerably reduce the yield. Many factors usually combine, however, to make it impracticable to leave canes longer than 4½ to 5 feet. Dry weather may decrease vigor. Winter injury may kill the tip buds, and management operations may be hin-

dered by canes of a greater height. Such heading back as seems necessary should be done in the early spring. At this time it is possible to determine how much it is necessary to cut off because of winter tip-killing. The canes headed back this time will suffer less drying out at the ends than those cut back in the fall. The heading back can be done very rapidly with hedging shears or a small sickle.

Pruning Black Raspberries

Black raspberry canes require slightly different treatment. The new canes are usually pinched back during the growing season when they have reached a height of 18 to 24 inches. This encourages the early production of side branches and restricts the height of the cane. The side branches should be shortened to 12 to 18 inches the following spring. If this pruning system is carefully carried out, the plants will become upright self-supporting hills requiring no staking or tying.

Watering

During the picking season, raspberry plants need a great deal of water. In addition to the fruit which requires considerable water for development, the young canes, upon which the following year's crop depends, are growing rapidly. In most years watering at this time will be worthwhile if it is not too expensive.

In some cases the raspberry field may be so located that the overflow from a stock watering tank can be utilized.

No elaborate system of irrigation is necessary. A movable pipe or hose of a 1½-inch diameter or greater, through which the water can be directed into furrows between the rows, will be satisfactory.

Winter Protection

Whether or not the covering of hardy reds with soil is profitable is debatable. Considerable winter injury and consequent loss of yield may be suffered in unfavorable years if they are not protected. Some growers believe that they are repaid for the extra work of covering each year, thus insuring against crop failure from occasional severe winter injury.

Covering the canes with soil provides the best winter protection.

As late as possible in the fall before the ground freezes, bend the canes to the ground and cover with 3 inches of soil. Be careful not to break the canes in this operation.

Some growers use only enough soil at the tips of the canes to hold them down, then cover with straw or strawy manure. Although this provides considerable protection, it is not as efficient as a soil covering in the prevention of winterkilling, and it also allows possible injury from mice.

The covering must be removed in the spring while the canes are still dormant and before appreciable bud development starts. Uncovering is usually done as soon as the frost is out and the ridges are sufficiently dry. The soil must be carefully removed from the hills or rows to avoid building up ridges over a period of years.

DISEASE AND INSECT CONTROL

There are many insect and disease pests which may greatly reduce the yield and quality of berries. Many of these can be adequately controlled by careful management practices. Some may become serious enough to require special attention. Information on specific pests can be obtained by writing

to the Entomology Division or to the Plant Pathology Division, University Farm, St. Paul.

Insects

Raspberry fruit worm or *Byturus*—

This small, white worm tunnels through the fruit or the receptacle on which the fruit is borne and causes crumbly fruit. The eggs from which the worms hatch are laid in the blossoms by a small reddish or yellowish-brown beetle. Some control can be obtained by spraying the plants with lead arsenate (2 pounds per 50 gallons of water) when the beetles first appear.

In many cases thorough cultivation of the planting beginning in early spring and continuing well through the picking season is sufficient. Repeated stirring of the soil interferes with pupation and emergence of the beetle from the ground.

The hill system permits more thorough cultivation and thus favors control of the pest.

Cane borers—There are two types of borers. The adult of one deposits its eggs at the tip of the young cane causing wilting, and the other at the base of the cane, causing swelling. In both cases the infected cane should be removed well below the injury and burned.

Tree crickets—The rows of egg punctures running lengthwise of the cane cause it to split with a wind or a heavy crop of fruit.

The eggs are deposited in late summer or fall. The canes showing injury should be removed and destroyed. Additional control can be obtained by spraying with 2 pounds of lead arsenate per 50 gallons of water just before blossoming.

Red spider—This tiny, reddish-brown mite sometimes causes great damage by sucking the juices from the undersides of the leaves, leaving rusty brown blotches and fine, silken webs. In bad infestations, it may seriously reduce the crop as well as prevent proper development of the young canes.

Some control has been obtained by the application of lime sulfur (1 part to 40 parts of water) and also by a spray composed of one pound of glue per 10 gallons of water.

There is some danger of injuring the leaves with lime-sulfur sprays, and less caustic materials often are ineffective.

Since control methods are not very definite, it would be advisable to request the most recent information from the state entomologist when red spider is encountered.

Mosaic—Mosaic is perhaps the most common and serious of raspberry diseases. An infection of this virus causes a characteristic yellowing and curling of the leaves. A general reduction of the vigor of the plants follows resulting in reduced yields of crumbly berries.

Since mosaic infection in its early stages is difficult for the layman to identify, and since there is no control other than the thorough digging out and destruction of the infected plants, it is very important to begin with clean stock. Plantings should be established only from stock which has been thoroughly inspected and is known to be disease-free.

Crown Gall—Crown gall is a bacterial disease which enters the plant through injuries to the roots or crowns by insects or through injury by cultivation.

Crown-gall injury is characterized by abnormal lumpy growths on the roots or at the basal portion of the cane. The yield from infected plants is greatly reduced. Secure disease-free stock and plant on a site which has shown no previous injury from crown gall.

Anthracnose—This fungus disease while most prevalent on black raspberries sometimes becomes serious on other types.

Infected canes become weakened through drying and are subject to severe winterkilling. Infection of the small fruiting stems causes an immediate reduction of the crop.

Small purplish, slightly raised spots first appear on the young canes. As the canes grow older the spots enlarge becoming oval shape with a sunken grayish center and purple edge.

Begin with disease-free plants and keep the plantings cultivated and free from weeds.

If serious infection occurs, spray as follows: Bordeaux mixture 4-4-50 or lime sulfur 1 to 9 when the leaves begin to unfold in early spring; Bordeaux mixture 4-4-50 or lime sulfur 1 to 40 when the new shoots are from 8 to 10 inches high.

Third and fourth sprays of the same mixture as the second following at 10-day intervals may be necessary if the infection is heavy.

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