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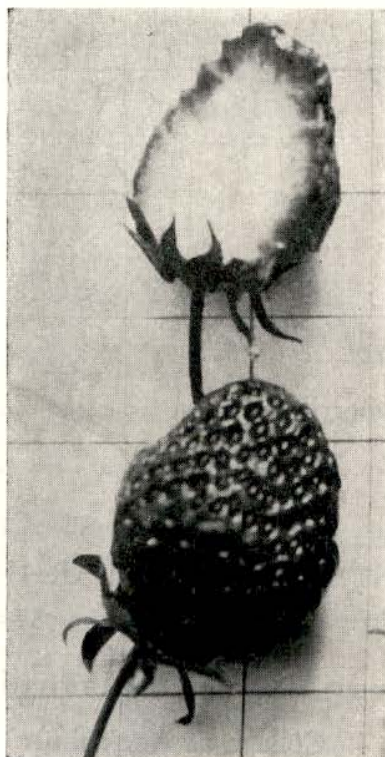


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STRAWBERRIES

In Nebraska



Circular 11

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The Experiment Station of the University of Nebraska
College of Agriculture

W. W. Burr, Director

Lincoln, Nebraska

(5M)

Strawberries In Nebraska

C. C. WIGGANS

Department of Horticulture

THE STRAWBERRY is more widely grown than any other fruit in Nebraska and is the most valuable of the small fruits. Its total value is greater than that of any of the other fruit crops grown with the exception of apples, cherries, and grapes. It thrives well in all sections where moisture is not too limited and is found almost always in home gardens. It is also produced commercially to some extent, especially near the larger cities in the eastern end of the state. However, production in the most favorable years is far below market demands, even during the local harvesting season. Therefore, extended commercial plantings can be strongly recommended, particularly where irrigation is available.

Strawberries are very easily grown and little difficulty should be experienced in producing them for home use. Harvesting and marketing them commercially, however, require more care and ability. Since berries are produced the second season after the plants are set, they may be profitably used by a tenant with a short lease as well as by the land owner who tills his own farm. They may be planted at a small initial cost and will bring quick returns and a large yield.

The plant can be grown over a wide range of soil and climatic conditions. Widespread use of the fruit in both the fresh and the preserved states makes for extended plantings. It is the earliest fruit to ripen, and if for no other reason than this it should be included in every home fruit garden.

Strawberries for home use are generally considered a part of the vegetable garden planting. Because of their temporary nature—one planting rarely being continued for more than three or four years—they are well suited for a place in the garden rotation. The home orchard is also often used as a place for strawberries. If the trees are young this plan works out very well, since the cultivation essential for the berries is very beneficial for the trees. In older tree plantings, however, the strawberry is likely to be somewhat unfruitful because of too much shade.

A small planting is usually sufficient to supply the needs of an average family. A large, neglected bed may not yield as much as a smaller but well-cared-for one. At Lincoln, strawberry variety tests showed that the annual yield over a period of years of the ten highest-yielding varieties was on the average 252.6 crates per acre. Some varieties were much more productive even than this.

SOILS

STRAWBERRIES do best on a well-drained, fairly light soil. Ordinary garden loam or land well suited for corn or other farm crops will generally be suitable for berry plantings. The soil should be well supplied with humus to aid in holding moisture and should be fairly fertile, although excessive fertility is to be avoided or too much vine growth will result. Sandy or gravelly soils are

slightly "earlier" than loamy soils. If potatoes or some other hoed crop immediately precedes the berry planting less trouble will be encountered in controlling weeds. Sod land, for the first year at least, must be avoided because of the presence of white grubs.

Deep fall plowing puts the ground in excellent shape for strawberries. It is easily prepared for spring planting and if it has been left in the rough all winter will have a better moisture supply. Insects are often destroyed by these means.

SITE

THE QUESTION of a suitable site for the strawberry bed is important because of the frequency with which the first blossoms, especially on early-blooming varieties, are killed by late spring frosts. Because of their nearness to the ground, strawberries are sometimes injured when other fruit blossoms escape injury. Consequently a slope is preferable not only because of its better surface drainage but also because of the slight protection that it affords from frost damage. Ground too steep is to be avoided, however, because of the erosion problem.

A south or southeastern exposure will cause the berries to ripen somewhat earlier but may be the cause of greater frost injury. A northern slope tends to hold moisture better and delays ripening. For the commercial grower in Nebraska, the latter effect is not a disadvantage since the later berries generally bring a better price than the earlier ones. However, the harvest period must not be delayed too long or there is danger that dry weather in late June will decrease the size of the crop.

Low windbreaks can be used advantageously by the strawberry grower. Not only do they lessen summer evaporation but also may help to hold the winter mulch in place. Competition for moisture, however, must be held to the minimum. Wide boards set on edge at right angles to the wind may serve as a temporary measure. Bundles of cornstalks leaning against proper support may also be used.

Shade, too, unless it involves root competition, is useful in producing high quality fruits. Thus a site just north of buildings or tall windbreaks may offer considerable advantage but will delay slightly the ripening date. A method of shading with muslin-covered frames has also been used successfully. Berries protected by such frames resting on solid enclosed sides and ends suffer little or none from bird damage.

PLANTING

Plants: Only one-year-old plants should be used. These can be distinguished from the older crowns because of their lighter colored roots. Plants whether taken from an old bed or ordered from a nurseryman, should be ready for early planting. If weather conditions at time of arrival do not permit immediate planting, a narrow trench should be opened up and the plants heeled-in. The bundles should be opened, the roots spread out in fan shape, and the soil packed firmly against the roots. They may be held in this way for several days. If plants are taken from an adjoining bed they usually are not dug until needed.

Pruning: All plants should be pruned at time of setting to balance the top

and root systems. The outer leaves are removed, allowing perhaps only the two center ones to remain, and long straggling roots are shortened back. Pruning is of less importance with the early-set plants, for at that time they have developed very little leaf surface. Late setting, if the plants are not pruned, may result in a poor stand because of excessive evaporation from the extensive leaf area.

Time of planting: Strawberries should always be planted in the spring in Nebraska because of moisture conditions in the later months. Fall planting, where it can be followed, may result in a light crop the next season, if proper winter protection is afforded. On the other hand, spring-set plants should not be allowed to fruit until the following year. The first season should be devoted to the growth of the crown and the production of vigorous runners. Any fruit which is borne then is produced at the expense of the vegetative growth. Spring planting should be done as early as possible. If fall planting is to be followed, the work should be done in late August or early September.

Spacing of rows: Strawberry rows are usually $3\frac{1}{2}$ feet apart but 4 feet may be close enough with very vigorous sorts. Plants in the row are from 1 to 2 feet apart, with 18 to 20 inches as the average distance.

Method of planting: Three things should be kept in mind in setting strawberries. First, the crown should be at the proper height. Plants set too high dry out, while if the crown is covered with soil it will rot. Second, the roots should be spread out somewhat, instead of being pressed into one compact bunch, to give better contact with the soil. Third, the soil should be pressed firmly about the roots. A spade, hoe, or dibble may be used in this operation.

CULTURE

THE STRAWBERRY should receive intensive cultivation throughout its first season in the field. Hoeing soon after the plants are set establishes a dust mulch which should be maintained during the entire growing period. Frequent cultivations prevent weed growth and permit better rooting after the runners begin to form. The bed may need to be worked a dozen or more times during the season—the exact number depending upon the number of rains. A horse cultivator may be used on larger plantings but hoeing is also necessary. All blossom stems should be pinched off the first year. Cultivation the second year cannot begin until after the fruit has been harvested. This operation is usually spoken of as renewal. It is described on pages 7 and 8.

Systems of training: Under Nebraska conditions the "matted row" system of training is preferred. This system consists of allowing the runners to root promiscuously within a row 18 to 24 inches wide, the narrow rows in some seasons being better than the wider ones. Sometimes the new plants are spaced somewhat during the earlier hoeings. The cultivator keeps a clear path between the rows. Rooting is hastened if the runner is weighted down with soil near the node. The earlier-rooted daughter plants are the ones which produce the most fruit the following year. Ordinarily, the first two runner plants are the only ones which can form good strong flower buds for the next year. Buds formed in late July or August are much more fruitful than those which form in late September or later. Consequently, any cultural practice such as raking

or harrowing which prevents the setting of additional runner plants, not only prevents weak fruit bud formation but lessens competition for moisture at a time when it is likely to be scarce.

The "hill system" is sometimes used to produce fancy berries. Individual fruits are much larger but the total yield will be less than with the other system. In this case the runners are kept cut off so that the plants form a large multiple crown which later produces many blossom stems. This system is effectively used with varieties which form only a few runners. Plants in this case may be spaced 12 to 18 inches apart in each direction.

Mulching: Strawberries should always be mulched to prevent heaving from alternate freezing and thawing and also to lessen the damage caused by dry winter winds. The mulch conserves moisture during the fruiting season and helps to keep down weeds. The fruit from a mulched bed is always cleaner than that from an unmulched planting.

Wheat straw is usually available and serves very well as mulching material, especially if it is free from grain. Straw with many weed or other seeds in it should not be used because of the difficulties encountered later. Oat straw tends to pack tightly and the same objection holds for leaves. Cornstalks are coarse but are preferable to straw in windy sections because of the tendency of the latter to blow away. Prairie hay may be used but tangles easily.

The mulch should be applied just before the first hard freeze. This not only prevents damage to the fruit buds, but protects the roots from becoming black. The rows should be well covered with a layer several inches thick. From 2 to 4 tons per acre will give a coating 2 to 4 inches thick.

In the spring the mulch must be removed. This consists of merely raking most of it from the row and piling it up in the middle. In case of an extra heavy mulch, some of it may need to be removed from the field. Delaying the removal as long as possible also delays the blooming period and hence helps protect the blooms from frost damage. This also delays somewhat the ripening period. In no case is all the straw removed from the row. If the leaves and fruit stems are forced to grow up through a moderate layer of straw the fruit is kept cleaner and is much less likely to rot due to contact with the soil. Replacing the straw on frosty nights may protect the crop from damage.

Irrigation: No fruit will pay higher dividends for the water applied than will the strawberry. Roots of the strawberry are quite short—usually extending not over 18 inches into the soil. Consequently short dry periods, particularly during the ripening season, are responsible for greatly reduced yields and much smaller berries. At the time of renewal and afterward when the new runners and fruit buds are forming, an adequate water supply is essential.

Water is applied, preferably with an overhead system, but heavy applications during the blooming period may result in some misshapen berries, due to washing away of the pollen. Ditch irrigation is much less effective because even distribution of the water is rarely possible. It requires special attention to the row layout and cultural practices. A 2 or 3-inch application will wet the soil to a depth of a foot or more and should be sufficient for at least one week. The ditch irrigation of alternate middles will facilitate picking operations.

FERTILIZERS

THE AVERAGE Nebraska soil usually will not require the addition of commercial fertilizers to make it produce satisfactory crops of strawberries. Soils deficient in nitrogen may be improved by turning under a leguminous crop or adding manure. It is best to do these things one year before the strawberries are set. Phosphorus or potash is usually unnecessary but an application of superphosphate—300 pounds per acre—may sometimes be beneficial. The use of a 10-20-0 fertilizer at a rate of 20 pounds per 1,000 square feet is often profitable.

HARVESTING

STRAWBERRIES should be picked early in the day if possible, but if they are to be shipped or kept for any length of time they should not be picked until the dew has dried. The calyx and a short piece of the stem should remain on each fruit for attractiveness and to prolong its keeping period.

The berry increases enormously in size and sweetness during the last day or two of its ripening period. A berry just colored is far from being ripe. For home use they should not be picked until thoroughly ripened. If they are to be shipped they must be picked somewhat earlier so that they will reach the market in prime condition. Even here, however, they must be well colored, while all overripe berries must be culled out.

Frequent picking gives a more uniform product and eliminates overripe fruits. The bed should be picked regularly at least once in every two days.

Surplus fruit can usually be disposed of to good advantage. In packing fruit for sale only first-class well-ripened berries should be put into the standard boxes used for this purpose.

RENEWAL

RENEWAL is the process of preparing the strawberry bed for a second or later crop. The first crop of fruit, borne the second season of the bed, is usually the best one because the plants are more vigorous and are not so crowded. Later crops dwindle in yield and also in size of berry unless seasonal conditions are very favorable. However, if proper care is given, a second and even a third crop can be made profitable. It is doubtful if it pays to renew more than twice in Nebraska because of the scant rainfall. If the very finest berries are to be produced a portion of the bed should be set every year or at least every second year.

A matted row develops in one season from individual plants spaced $3\frac{1}{2}$ by $1\frac{1}{2}$ feet. The main aim in renewal is to remove a part of the extra plants and give the remaining ones a better chance to produce runners and hence new plants for the next year's crop. However, the bearing plants are not so vigorous as the younger ones and, therefore, do not produce so many runners. This means that the row must not be thinned down too much.

The first step in renewal usually consists of mowing the bed. Foliage and mulching material are then removed by raking or burning. Burning off the



A well-matted row.

field is a questionable practice, since, unless conditions are just right, damage to the crowns may result. It can be done, however, on a dry windy day when the soil is moist. Destruction of mulch and foliage on or off the field is of great assistance in controlling diseases and insect pests.

The thinning out process may be accomplished either with a plow or with a hoe. The number of plants to be left depends upon soil, rainfall, and variety. If too many are removed a poor row and yield will result, while overcrowding comes from the other extreme. In general, it may be said that about one-half of the plants should be removed. In large fields one side of the row is plowed out, the ridges leveled down, and the field then harrowed crosswise to cultivate the plants left in the row.

Subsequent cultivation is similar to that of the previous year, and the mulch should be applied again at the approach of cold weather.

Later renewals are made in the same way. Each succeeding season, however, finds weaker growth of plants because of decreasing fertility and also less efficient cultivation. It is far better to set a new bed every two or three years than to hold a planting too long. Some of the most successful growers plant a portion of their field each year so as to have a new bed for fruiting coming on every season.

DISEASES AND INSECTS

FORTUNATELY few diseases or insects damage the strawberry sufficiently to warrant measures for their control. Leaf spot is the only disease of importance, while insect damage comes largely from leaf rollers and white grubs. The crown borer may also occasionally do some injury.

A condition sometimes mistaken for a disease has been making its appearance during the past few years, especially in certain sections of the western end of the state and in the Platte valley. The same condition has been observed on

other plants, including some of the trees. The leaves turn yellow and the plant takes on a general sickly appearance. Too much moisture may bring this about but the more usual cause is probably traceable to soil conditions which apparently result in a deficiency of available iron. In some instances relief has been obtained and the plants made green again through application of a weak solution of iron sulfate (one teaspoonful per gallon). The use of 5 pounds ferrous sulfate per 100 feet of row, especially when the soil has been heavily manured, is a good practice. However, such cases should be treated in an experimental way, since sufficient evidence is not available to allow definite recommendations.

Strawberry leaf spot is identified by the small round spots or holes found in the leaves soon after the blooming period. Many leaves drop off, lessening the vigor of the plant. It may be controlled by using Bordeaux mixture (4-6-50) when growth is just beginning and again just before blooming time. Some varieties are much more resistant than others.

Slime-mold should also be mentioned. This grows only upon decaying organic matter but sometimes smothers the adjacent strawberry plant. The trouble usually disappears after a few days of hot, dry weather. There are no control measures.

White grubs or larvae of the June bug are injurious usually only on sod land. Such injury is largely avoided by cultivating this ground a year or two before the berries are set. Fall plowing is also of value in controlling this pest. Broadcasting 5 pounds of lead arsenate per 1,000 square feet of surface before the plants are set has been recommended as an effective control method.

Strawberry leaf rollers are small greenish larvae which are easily controlled by poisons but the spraying must be done before the rolling of the leaves begins. Arsenate of lead applied two or three times at intervals of one week will prevent serious damage. It may be combined with the leaf spot spray mentioned above, the rate being 1 pound of powder to 50 gallons of water. White hellebore (1 pound to 3 gallons) may also be used. It is especially valuable if the fruit is of any size, for it soon loses its poisonous properties and thus is perfectly safe.

EVERBEARING STRAWBERRIES

THE SO-CALLED "everbearing"—or to be more exact, "fall bearing"—strawberries have attracted considerable attention during the past few years. The fruit crop, while not totaling as much as that of the standard varieties, comes mostly during the late summer or early fall months. However, as the bed becomes older, an increasingly larger share of the crop will come in June.

Everbearers are handled with a few exceptions very much as outlined for the June-bearing sorts. Some varieties, notably the Progressive, will bear a considerable crop—in fact, probably their best fall crop—on runners formed that season. Thus, with such sorts the fall crop immediately following planting is the most desirable. This at once suggests that a new bed should be set every year. Rarely will it pay to renew an everbearing bed. Some varieties are not good plant makers and some difficulty may be experienced in getting a good row. Such varieties are often grown in "hills."

In general, the everbearing sorts are useful only as a part of the home fruit garden. Commercially, the yield at any one time is too small for profit and the

ripening season is too long. However, in certain areas in western Nebraska where irrigation water is available, they are grown and sold profitably. Summer irrigation in other parts of the state is often necessary to keep the plants alive in dry seasons.

VARIETIES

OVER 1,800 varieties of strawberries have been listed by American nurserymen and a few more are added each year. It is possible to find one or more varieties suited to almost every possible soil condition and market demand. Certain varieties are restricted in their adaptation while others do well almost universally.

Out of the great number of varieties available the average grower should restrict himself to a very few. A very early variety furnishing a few fruits, usually of poor quality, a mid-season sort giving the best yield and used as the main crop, and a late variety to prolong the season, might be considered a good combination. An everbearing variety should be added if fall fruit is desired. Catalogue descriptions indicate the season and general quality of the varieties and their general adaptation for use for canning or locker storage.

Certain varieties produce little fruit if planted alone. These are known as pistillate varieties because they fail to produce the pollen necessary for fertilization. Under such circumstances a staminate variety should be planted as a pollinizer—every fourth or fifth row being of this sort. Also these two varieties must bloom at approximately the same time.

If only one variety is to be grown the Dunlap will probably give better satisfaction throughout the state than any other. Varieties do vary in their adaptation to both soil and climate and hence a variety suitable for one section of the state may not be altogether successful elsewhere.

New varieties are introduced constantly and several promising ones have come recently from the U. S. Department of Agriculture. Among these are the Blakemore, Fairfax and Dorsett.

Those varieties maturing in midseason are the most dependable sorts in Nebraska. The following list of varieties includes those which may be expected to succeed under Nebraska conditions. It is not an exhaustive list, however, and other varieties may be just as satisfactory or even more to the liking of individual tastes. All these sorts produce both staminate and pistillate blooms and may be planted alone.

June-bearing Varieties

Blakemore
Dorsett
Dunlap
Fairfax
Premier

Everbearing Varieties

Gem
Mastadon
Progressive
Wayzata