

The Agricultural Experiment Station
OF THE
Colorado Agricultural College

Strawberry Growing
in
COLORADO

BY

B. O. LONGYEAR

The Agricultural Experiment Station

FORT COLLINS, COLORADO

THE STATE BOARD OF AGRICULTURE

	TERMS EXPIRE
HON. B. F. ROCKAFELLOW, President - - - Canon City,	1911
HON. E. H. GRUBB, - - - - - Carbondale,	1911
HON. R. W. CORWIN, - - - - - Pueblo,	1913
HON. A. A. EDWARDS, - - - - - Fort Collins,	1913
HON. F. E. BROOKS, - - - - - Colorado Springs,	1915
HON. J. L. BRUSH, - - - - - Greeley,	1915
HON. J. C. BELL, - - - - - Montrose,	1917
HON. E. M. AMMONS, - - - - - Littleton,	1917

GOVERNOR JOHN F. SHAFROTH -
PRESIDENT BARTON O. AYLESWORTH } *Ex-Officio.*

A. M. HAWLEY, SECRETARY CHARLES H. SHELDON, TREASURER

EXECUTIVE COMMITTEE IN CHARGE

B. F. ROCKAFELLOW

A. A. EDWARDS

STATION STAFF

L. G. CARPENTER, M. S., <i>Director</i> , - - -	IRRIGATION ENGINEER
C. P. GILLETTE, M. S., - - - - -	ENTOMOLOGIST
W. P. HEADDEN, A. M., PH. D., - - - - -	CHEMIST
WENDELL PADDOCK, M. S., - - - - -	HORTICULTURIST
G. H. GLOVER, M. S., D. V. M., - - - - -	VETERINARIAN
CARL W. GAY, B. S., D. V. S., - - - - -	HORSE BREEDING
W. G. SACKETT, B. S., - - - - -	BACTERIOLOGIST
R. E. TRIMBLE, B. S., - - - - -	ASSISTANT IRRIGATION ENGINEER
F. C. ALFORD, M. S., - - - - -	ASSISTANT CHEMIST
EARL DOUGLASS, M. S., - - - - -	ASSISTANT CHEMIST
S. ARTHUR JOHNSON, M. S., - - - - -	ASSISTANT ENTOMOLOGIST
B. O. LONGYEAR, B. S., - - - - -	ASSISTANT HORTICULTURIST
F. KNORR, B. S., - - - - -	ASSISTANT AGRONOMIST
P. K. BLINN, B. S., FIELD AGENT, ARKANSAS VALLEY, ROCKY MOUNTAINS	
E. R. BENNETT, B. S., - - - - -	POTATO INVESTIGATIONS
MIRIAM A. PALMER, - - - - -	ARTIST
L. C. BRAGG, - - - - -	ASSISTANT IN ENTOMOLOGY

STATE FRUIT INVESTIGATIONS

O. B. WHIPPLE, B. S., GRAND JUNCTION, -	FIELD HORTICULTURIST
GEORGE P. WELDON, B. S., DELTA, -	FIELD ENTOMOLOGIST

OFFICERS

PRESIDENT BARTON O. AYLESWORTH, A. M., LL. D.

L. G. CARPENTER, M. S., - - - - -	DIRECTOR
A. M. HAWLEY, - - - - -	SECRETARY
MARGARET MURRAY, - - - - -	CLERK

Strawberry Growing In Colorado.

BY

BY B. O. LONGYEAR.

One of the earliest horticultural crops to be cultivated in Colorado was the strawberry. It is probable that plants were first brought into this state from Des Moines, Iowa, by Mr. J. B. Wolf in 1863 and planted on river bottom land west of Denver. Altho this plot was destroyed by flood the following spring Mr. L. K. Perrin, of Denver, who had secured some of these plants, sold in 1865 the first Colorado grown strawberries for \$3.50 a quart. This early demonstration of strawberry raising in Colorado has been followed in later years by the development of the business in certain parts of the state into an important commercial industry.

This bulletin presents the methods practiced by many of the most successful strawberry growers in localities where the industry is carried on on a commercial scale.

Soils. While the strawberry can be successfully grown on soils of widely varying character it does best on a sandy or fine gravelly loam. Such soils are more easily worked than those of a heavy, clayey nature and they produce earlier crops of better quality than the latter. Heavy soils, with good natural under-drainage, can be made to yield heavy crops especially when lightened with manure thoroughly incorporated with the soil or by plowing under late growth of alfalfa. Where the soil is not well drained naturally, tile drainage may often be used to remove surface water from the land. For altho the strawberry is a plant that requires a plentiful supply of moisture at the roots it is rapidly injured by a wet soggy condition of the soil.

Location. The land selected for strawberry growing should be level enough so that an even watering of the soil may be secured without danger of washing. Where the land is at all uneven, high places must be lowered and depressions filled, otherwise the soil will be too wet in some places while others go dry. If none but sloping land is available the rows may be run in such manner as to avoid a strong fall by following the contour of the slope.

Preparation of Land. The best growers lay much stress on careful preparation of the land. Fall plowing followed by a second plowing in spring is often practiced. This is especially desirable if the soil is inclined to become lumpy. Sandy loams are capable of good preparation if deeply plowed in late winter or early spring, followed by thorough harrowing. A leveler made of plank is employed to reduce lumps and give an even surface.

In case strawberries are to follow alfalfa sod, fall plowing and

harrowing are practiced and at this time the alfalfa roots are removed as the harrow loosens them. A second plowing in spring followed by the harrow and leveler until the soil is free from lumps completes the preparation of the land.

Fertilizers. Well rotted barnyard manure is the fertilizer commonly used for strawberries in this state. This is plowed under at the rate of 10-20 loads per acre. Fresh manure is somewhat objectionable on account of the weed seeds which it is liable to contain and also because it cannot be readily incorporated with the soil. Where composted manure is not available fresh manure is often used at the same rate.

Hen manure is considered the most valuable domestic fertilizer and where available it is usually applied in the fall or early spring as a top dressing to the rows. Being one of the strongest of manures it must be spread thinly to avoid injury to the plants.

Of the commercial fertilizers, bone meal is believed to be the most satisfactory as its effects continue for two or three years. Nitrate of soda is sometimes used during the blooming period with good results. On account of the readily soluble character of this fertilizer, two light applications, about two weeks apart, are better than a single heavy one. This fertilizer may be applied at the rate of 100 to 200 lbs. per acre.

PLANTING

Time. Spring planting is followed in this state almost without exception. Late summer and fall in this climate are usually characterized by hot days and cold nights and such conditions are unfavorable to starting young plants into vigorous growth. In case of small garden plots it is possible however to set plants in late summer and secure a light crop the following spring, especially in cases where plants can be obtained near by and moved with a small mass of soil around the roots. Potted plants can be obtained from the principal seedsmen for fall setting with the assurance of a fair crop the next spring.

The character of the season will usually determine largely the best time to set plants. In most cases this can be done in April which is the favorite month. Some growers say as early as possible so as to secure a strong growth during the first season.

Plants. Plants for a new plat are obtained either from some old bed near at hand or from the nurserymen. In the former case they are usually dug with a spading fork, often on the day before planting. The plants are placed in wet sacks as fast as dug and kept from drying out by an occasional sprinkling with water.

Plants received from the nursery may sometimes be kept for two or three days if the land is not ready for them and if they are received in good condition. They should be stored in a cool moist place, such as a light cellar, and occasionally sprinkled. Some growers prefer to buy plants from Eastern nurseries where they can be obtained earlier in the season than those from the home fields, and in this way get them well established before hot weather comes on.

The plants selected for planting are those having yellow roots, those with black roots being discarded as old or diseased. Careful growers also prefer plants that are nearest the old ones as the strongest plants are usually the first ones that set on the runners while those at the tips are weak.

Setting the Plants. Previous to planting narrow furrows are run with a shovel tooth cultivator, or similar implement, and the plants are set along one edge of the furrow. Two men work together; one opens the soil with a spade, the roots of a plant are placed in the hole behind the spade and spread apart with the fingers of the hand which holds the plant, the spade is then withdrawn and the soil is pressed firmly against the roots with the foot. The plants when set should have the crowns level with the surface of the soil. A stream of water is allowed to follow in the furrow close behind the planters and in this way the soil is settled and the plants watered at the same time. The distance between rows and plants in the row is varied somewhat according to conditions of land and the variety of strawberry planted.

System of Planting. Two systems, the hedge row or hill system and the matted row, are followed. In the former the rows are set $2\frac{1}{2}$ ---3 feet apart with the plants twelve to fifteen inches apart in the row. All runners are kept off and strong individual plants are formed. This system is but little practiced here as it is adapted only to small areas on account of the greater amount of labor involved. The matted row is practically the universal system practiced in commercial strawberry growing in this state. It is claimed by some that it is the best system adapted to our climate as the fruit is better shaded from the hot sun while ripening. The usual distance between rows is 3 to 4 feet, the more nearly level the land the farther apart. For many varieties the plants are set 12---18 inches apart in the row, while such as the Senator Dunlap and other strong spreading sorts are set 18---24 inches apart.

Cultivation and Irrigation. The first irrigation is given at planting time and thereafter as often as needed to keep the young plants in a vigorous growing condition. Cultivation is given as soon after irrigation as the land will admit without danger of puddling the soil. Irrigation is not usually necessary oftener than every ten days to two weeks and the best growers aim to keep the plat absolutely free from weeds, especially during the first year. This necessitates hand hoeing together with the work of the cultivator. Of the latter implement one having twelve to fourteen spike or narrow shovel teeth and capable of being narrowed down readily is preferred by most growers. As the season advances the cultivator is gradually narrowed thus allowing the runners to root along the sides of the rows. In most cases the matted rows will be fifteen to eighteen inches wide at the end of the season with a correspondingly narrow clear space between them. Cultivation and irrigation are as a rule discontinued by September first to fifteenth depending somewhat on how late weeds continue to appear.

Winter irrigation is impossible in many districts because water is unobtainable at that season. In districts where water is available

however, two or three winter irrigations are considered very desirable and some growers prefer this to winter mulching.

Mulching. Considerable difference of opinion exists regarding the benefits of winter mulching. The majority of growers consider it desirable especially where winter irrigation is not possible. For this purpose straw, manure, marsh hay, or similar material is made use of. Many growers prefer a light mulch of fine rotted manure placed on the row as it does not require removal in spring. In many localities it is difficult to make any mulch stay on the plants on account of strong winter winds. Brush, poles, or similar material, when it can be had, is sometimes used to hold the mulch in place.

Cultivation is resumed the second year by some growers as soon as growth begins, after first removing the mulch, if any has been used, and is continued until the fruit sets. Others prefer to leave the mulch between the rows and pull the weeds by hand as they appear above the beds without giving further cultivation until after fruiting. In most cases, however, the mulch is removed as it would interfere with irrigation and shallow furrows are run between the rows for this purpose.

During the fruiting season irrigation is given frequently enough to keep the plants well supplied with moisture. Drying of the soil at this time not only reduces the size of the fruit but shortens the period of bearing as well. It is found that the rows should not be over eighteen rods long between laterals. Greater length than this necessitates keeping the water too long a time in the upper end of the rows in order that it may reach the farther end. The desirability of having the land as even as possible is apparent at this period for the plants in depressions are then flooded after which the fruit scalds under the hot sunshine. Irrigations during the picking season are given as soon as possible after the pickers have been over the field in order to allow as much time as possible for the soil to dry off before another picking is ready.

PICKING AND PACKING.

The berries intended for the markets are picked when somewhat under-ripe especially when intended for long shipment. The exact degree of ripeness can be gained only by experience and may vary somewhat with different varieties. A short piece of stem left attached to each berry adds greatly to the keeping quality of the fruit. The most successful growers aim to secure good pickers for the entire season. Each picker carries a tray holding six boxes into which the berries are picked directly. When the fruit is to be graded it is desirable to have this done when picking and thus avoid a second handling.

Facing the boxes consists of turning the stems of the upper layer of berries downward in each box. This adds to the attractive appearance of the fruit and is preferred by many dealers. Several methods of tallying the pickers are employed. The simplest is that in which a book or slate is used to record, opposite the name of each picker, the number of boxes picked. Some use tickets stamped or printed with the growers name and numbered 1, 2, 6, 12, 24 qt., each different number being on

cardboard of a different color. These tickets are given to the pickers according to the number of quarts picked and are later redeemed by the grower.

The universal package in use in this state is the Leslie box and crate, each crate holding twenty-four quart boxes. These are usually purchased flat by the grower and made up during the winter or when time permits. Some kind of shelter is necessary under which the packing can be done. This is usually located at one side or end of the field and commonly consists of a rough board shed, a tent or other portable structure.

MARKETING

A great deal of the profits in strawberry growing depends on the market. In several ways a good local market is most desired. The fruit can be handled ripier. The grower comes to know his market and a reputation can be established whereby the same customers can be held year by year.

In a large city where a public market is maintained sales may be made often direct to the consumer and peddling by the grower is wholly unnecessary. Even in the smaller towns this may be largely avoided if desired by dealing with the local marketmen.

Many of the best strawberry growing regions, however, are so situated that distant markets must be depended upon. In some cases the careful grower establishes a reputation for first class fruit in one or more distant cities and makes all shipments direct to the dealer. Where this or some other plan is not followed the commission man is usually employed with whom the profits are shared in the form of a percentage.

The establishment of fruit growers associations in nearly all places that have become centers of production has greatly lightened the fruit growing business of the care and responsibility of marketing. This is particularly true where there is no large local demand and where distant markets must be depended upon. In this way the fruit grower can give his whole attention to the business of production and leave the marketing, a business in itself, in the hands of a qualified manager. In the selection of this manager the grower, if a stockholder has a voice.*

The association is able to save the growers a considerable amount by furnishing them with supplies at wholesale and in such quantities as desired. Another important feature of these organizations is the greater uniformity in packages and grading which have thereby been brought about.

These are a few of the features which together with the influence of the fruit growers associations, in bettering the general marketing conditions in favor of the grower, makes this one of the most desirable ways of disposing of the fruit crop.

*See Bulletin No. 122, Colorado Experiment Station, Fruit Growers Associations.

RENEWAL OF OLD BEDS

Many of the leading growers of the strawberry in the Eastern states recommend taking but a single crop from a plantation. This means getting only one crop from the land during two years. Thus after the picking season is over the plants are plowed under and the land is prepared and planted to some late forage or other crop. This method also requires setting a new plantation each spring and keeping a double area of land in strawberries for at least a part of the time.

In this state, however, two, three and sometimes more crops are taken from a plantation in successive years. Some growers state that the second year's crop is often greater than that of the first year after setting the plants, while the third is apt to be inferior to the first two. The number of crops that can be harvested with profit appears to depend to a considerable extent upon the method of renewal, the care and freedom from weeds, and the use of fertilizing materials. In some cases six and seven crops of berries have been taken from the same plantation before putting the land into other crops but this is not regarded as profitable.

Two methods of renewal, with some variations, were noted. In one method the old rows are narrowed down to about one foot by light plowing or deep cultivating between the rows. During the remainder of the season cultivation and irrigation are given the same as in new plantations, the runners being allowed to root along the sides of the rows until the spaces are only about one foot wide.

Additional thinning of the plants in the rows is frequently secured by "blocking" the old rows. This is done by hand with a hoe or by means of a cultivator run crosswise of the rows.

In the second method of renewal the rows are plowed along one side about one third only of the width of each row being left. The corresponding side of each row is plowed under and the next year the reverse side is thus treated. In this way all of the oldest and weakest plants are removed, and the next year the rows do not stand on the same land as the year before.

This method possesses two distinct advantages over the former. First, it allows of the breaking up and cultivation of the soil in the center of the old row which has become packed and hard. Second, the plants left to send out runners are younger and possess more vitality than those in the center of the old row and are therefore capable of producing better plants. This method seems better adapted to longer duration of the plantation than the former and is the one practiced by many of the most successful growers.

ROTATION

As soon as possible after the last crop of berries has been harvested the plantation is usually plowed under and the land is prepared and planted to some late forage or garden crop. Sweet corn, turnips or late cabbages are most frequently used for this purpose and in long seasons, roasting ears are sometimes obtained from the corn. If the soil is deficient in fertility, manure is often applied to the land before

plowing, in addition to the vegetable matter furnished by the old strawberry plants.

High priced land is usually planted the next year to some garden or truck crop such as tomatoes, cantaloupes, sweet corn, or potatoes. Raspberries are sometimes set on the land the second year to remain as long as they are productive.

Strawberries are often planted again after the third year of growing truck crops. Altho good strawberry land is by most growers considered too valuable for seeding to alfalfa or clover still some of the most successful ones believe it a very desirable thing to do. Where a good stand of red clover can be obtained it is particularly well adapted for this purpose as it is more easily subdued than alfalfa. In case the latter is plowed under it is usually necessary to remove the larger roots from the soil during the process of harrowing.

GROWING A SECOND CROP IN ONE SEASON

During the last few years a number of strawberry growers have succeeded in harvesting a second crop late in the Autumn usually during October. Strawberries at this season bring unusually high prices, some grown near Denver having been sold for \$7.50 a crate.

One of the growers in this region follows the plan of mowing the foliage and allowing the patch to dry out as soon as the first crop is off. The old plants in the center of the rows are then plowed out after which the plat is disk harrowed in both directions. This is followed by a thorough soaking of the ground which starts the remaining plants into vigorous growth.

In this way the growth is first checked and then renewed with the result that the plants may blossom and fruit a second time frequently ripening the berries after the first fall of snow.

VARIETIES

Many of the numerous known varieties of the strawberry have been tried in different parts of Colorado. Only a few of these, however, have been found adapted to our conditions and it is often the case that one or two varieties are grown almost exclusively in a certain region. The ideal commercial berry for Colorado is yet to be found and a few growers are continually trying new varieties with the hope of finding one that shall be an improvement over those now grown. The qualities which recommend a variety for home use are not necessarily the same as those which make a desirable commercial variety. A good commercial variety should be hardy, very productive, of good color and firm enough to bear shipping well. It should possess good size and form and should not quickly run small after the first two or three pickings. A variety in which the fruit-bearing stems are strong and erect is found to possess a distinct advantage over one in which the berries are borne close to the ground where they are apt to suffer from sunscald following irrigation.

The mere fact that a variety does well on one farm is no guarantee that it will do equally well in all portions of that region nor even

that it will succeed on the adjoining farm. In most cases a variety which succeeds best in a certain locality may do so largely because of similarity in the soils and the location of the land together with any features which may influence climate.

The following list includes only such varieties as have been found best adapted to the prevailing conditions and practices in our principal strawberry growing regions.

Beder Wood.—(Perfect.) This is the leading variety grown in the Canon City region. Altho one of the earliest, it endures late frosts well. It is very productive, the cropping season is lasting and the size holds up well. The berries, which are medium to large, are borne on strong stems well above the ground. The color is scarlet, the quality excellent. Its principal fault is lack of firmness which unfits it for very long shipments. Probab'y our best commercial variety as yet for certain sections.

Glen Mary.—(Perfect.) One of the promising market varieties which is being tried in several localities. It is a vigorous growing, medium to late variety with large flattened-conical berries of dull red color and considerable firmness. It is productive but ripens unevenly, with a white tip.

Captain Jack.—(Perfect.) This variety is grown in several localities and is one of the leading sorts in the Denver region. It is a vigorous plant of stocky growth. The fruit is held above the foliage on up-right stalks. Berries light crimson, regular form, fair quality and a good shipper. This is a good medium early variety but the berries soon become small after the first pickings. It has not been found as productive as the Beder Wood. Many growers find this variety requires a strong soil and it is recommended for damp, heavy land.

Gandy.—(Perfect.) A large, vigorous plant with few runners, well adapted to hill culture. The berries are large, irregular, bright scarlet, slow to ripen at the tips, quality and firmness good. This variety is quite commonlv but not extensively grown as a late variety. It is considered as of moderate value.

Jucunda.—(Perfect.) This is the favorite variety in the Denver and Golden region and together with Captain Jack forms the principal market berry. There it is found productive, medium late and on bottom land the crop holds on well. It is a large variety, crimson color, good quality and firm flesh. This variety was not reported favorably in tests made at the State Experiment Station here several years ago.

Warfield.—(Pistillate.) This one of the older varieties which has been grown successfully in a commercial way in this state. It is vigorous, productive, and the fruit possesses excellent market qualities, being large, firm and highly colored. It must be planted with some perfect flowered variety for which purpose Beder Wood is recommended. It is also highly recommended for home use.

Marshall.—(Perfect.) A large fruited variety which has proven satisfactory to some growers. It requires extra care to get the best results which may be one reason why it is not more generally grown.

Aroma.—(Perfect.) This variety is reported by a few growers as one of the best market sorts on account of its good keeping qualities. It is not found to be quite hardy, however, and has not come into extensive culture.

Senator Dunlap.—(Perfect.) One of the good early varieties in some sections. It is especially prolific in the formation of runners hence this variety shou'd be set farther apart than most varieties.

The berries are medium to small, conical, necked, and deep crimson. The quality is good but the fruit lacks firmness and turns dark on the market. The berries run small in latter part of season largely on account of the numerous runners sent out.

Ridgeway.—(Perfect.) A vigorous, mid-season variety of good productiveness. Fruit large, round-conical, bright crimson, quality good. By some of the prominent growers in the Boulder region this is considered their

best variety, its greatest fault being that the fruit is tender and does not bear shipping well.

Clarke's Seedling. This is one of the varieties which has won a reputation in Oregon from where it is shipped into this state. It is an attractive looking berry of great firmness and keeping qualities. Mr. C. L. Parsons, of Boulder, who has tested this variety reports it as being a poor producer in other localities.

on his place. It is worthy of further tests under different conditions and

Chesapeake.—(Perfect.) Plant vigorous and stocky, berries large, regular, rounded-conical form; color deep crimson, seeds yellow and prominent. This is a new variety producing fruit of excellent quality and firmness and of very attractive appearance. It is being tried by Mr. Joseph Hoyt, of Canon City. It is reported from New Hampshire as being a light producer. In other respects it possesses splendid commercial qualities and is especially promising for home use.

Wm. Belt.—(Perfect.) One of the large fruited vigorous varieties which has done well as a market berry on the heavier, moist soils near Longmont. This variety is also favorably reported from Michigan for its productiveness and vigor.

Splendid.—(Perfect.) This is a vigorous growing variety which forms full matted rows of stocky plants. The berries are large, light scarlet and ripen slowly at the tip. It is reported favorably as a producer for market near Denver.

Cost of Growing, Yields and Profit. The fact that but few of even the best growers keep any records of the expense of growing an acre of strawberries makes it difficult to give any exact statements in this connection. Mr. C. L. Parsons, of Boulder, kept records one year during which the total expense (not including rental or interest on cost of the land) was \$105.00 for one acre of strawberries. Mr. J. P. Farmer, of Canon City, estimates that the equivalent of one man's time during summer with horse could care for five acres of berries except harvesting. He also estimates that it will cost \$125 to \$150 to grow an acre in the best manner, but believes that this is more than is usually put into the crop. In all probability \$100 per acre is near the average expense of growing a crop of strawberries as practiced on a commercial scale in Colorado.

The profits in this industry are likewise a matter of great variability as they depend not alone on the cost of producing and harvesting the crop but also on the markets. It costs no more to grow a large yield than a small one. In the former case, to be sure, the cost of harvesting will be increased, and if a large yield is general the price is apt to be correspondingly low. Some general estimates of yields in the Canon City region range from 300 to as high as 800 crates per acre, the latter case being from small tracts. Bederwood in this region produces from 300 to 500 crates per acre in a good season.

From estimates given by growers in other regions and from other varieties it is evident that a crop of 300 crates per acre should be considered a good yield in a normal season.

The cost of harvesting and packing varies less widely than most of the other operations, and is estimated at from 60 to 65 cents per crate in places where pickers are paid 2 cents a quart. An average of the estimates secured on the cost of producing a crate of berries ready for market is about \$1.15. The price received by the growers during the

last few years has averaged about \$2.00 per crate. Some growers roughly estimate that about one half or 50 per cent. of the gross returns is profit during normal seasons.

INSECTS AND DISEASES

The strawberry is comparatively free from the insect pests and fungous diseases that infest this plant in many other regions. A few growers report the work of the strawberry leaf roller as occurring to a small extent, but not in sufficient amount to make spraying with insecticides necessary. The Experiment Station Entomologist, Prof. C. P. Gillette, states that but very little damage is done by insects upon the strawberry in this state.

Of the fungous diseases of the strawberry the leaf spot is the most common. It seldom occurs however, on vigorous beds in favorable situations to such an extent as to cause appreciable injury. In low, moist situations and on certain varieties it has in some cases been serious enough to call for spraying. Bordeaux mixture is used for this purpose, one application just before blossoming and one or two after harvesting the crop being recommended for this purpose.

A more serious and obscure trouble has been noticed by some growers as affecting the roots of the plants. It has been found most serious on land where the water level in the soil was close to the surface and where the physical condition of the land is unfavorable for the plants. This trouble manifests itself in the blackening and dying of the roots of young plants before bearing, in some cases appearing at the beginning of the winter season. It also occurs on land that has been continually cropped with strawberries and other garden crops without rotation with some leguminous plant. Some study is now being undertaken here with the idea of determining if possible the cause and prevention of this trouble.

200 118BOS
05/00 SS 1394
174
CLB
CONFIDENTIAL