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GREENHOUSE VEGETABLES
TOMATOES

by

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The tomato constitutes the leading crop grown under glass wherever vegetables are grown in greenhouses. This publication replaces Circular 249 - the previous publication on greenhouse tomatoes, and discusses the most important factors and problems involved in growing greenhouse tomatoes.

Greenhouses Suitable for Tomato Growing. Even-span greenhouses are widely used for tomato growing, varying in width up to 50 feet. In view of the fact that tomato plants grow to a height of six to eight feet, it is desirable to have a greenhouse that has eaves of at least six or more feet.

In most greenhouses tomatoes are grown on ground beds which have plenty of soil depth and which permit easier training, trimming, and general maintenance than when the plants are grown on benches. Sometimes the latter are used because tomatoes fit in a rotation of crops in which flowers form a part.

Seasons of Production. There are in general two seasons of growing greenhouse tomatoes: (1) December to July, inc., (2) June or July to January or February. The harvesting of the spring and early summer crop usually begins in April or May, extending into late July. The fall crop begins to be harvested in October and may extend to February the first or until such time as space is needed for plants of another crop.

Conditions for Plant Growth and Fruiting. Of the two seasons just mentioned, the spring and summer is much more desirable from the standpoint of light, temperature and favorable growing conditions. Just as in the spring and summer the days are growing longer and warmer, so in the fall and early winter the light and temperature are decreasing daily until the latter part of December.

Temperature conditions have a marked effect on various functions of the plant and fruit. Moderate temperatures are most beneficial for the manufacture of food by the leaves for pollen germination, as well as for fruit coloring and ripening. Further details in regard to the influence of temperatures on these functions of the plant are included in the paragraphs on pollination, fruit setting and fruit coloration.

Long days are useful for food manufacture and high plant efficiency, whereas the short days of late fall and winter slow down very markedly the functions of the plant.

Light intensity influences not only the functions of the leaves but also the vigor of the plant in general and the setting of fruit. The variation of light is the chief cause of differences in plant efficiency. This is shown by the following table of the relation of light to leaf area and number of fruits produced.

Relation of Light Intensity to Leaf Area and Fruit Produced

Light Intensity Foot Candles	Leaf Area Sq. Meters	No. Fruits	Fruits per Plant
1139.9	7288	271	22.5
583.1	3894	205	17.0
261.0	2229	142	11.8

Investigations regarding the efficiency of additional illumination for tomato plants under glass indicate that fruit setting can be definitely increased by added illumination even during the most unfavorable light conditions. In general, the light which has been given to extend the normal daylight has occurred from 12 noon to 12 p.m. Where the plants were given the extra illumination the number of fruits set per cluster was markedly higher than in those which were unilluminated, but whether the cost of the illumination and its equipment would be equal to or greater than the value of the increased yield of fruit would depend on the cost of the lighting and the value of the crop.

Soil Improvement and Fertilization. It is important that the soil for greenhouse tomatoes be well supplied with humus or organic matter. Such helps to increase the number of beneficial soil micor-organisms, increases the moisture holding capacity of the soil, improves soil aeration, aids in making more readily available plant food, induces a larger root system of the plant and makes the soil easier to work.

To supply a plentiful amount of organic matter, rotted manure or a mulch crop can be turned under the soil. A ton of barnyard manure contains approximately 25%, or 500 pounds, of dry organic matter, the remainder being water, as well as approximately 10 pounds of nitrogen, 3 pounds of phosphoric acid, (P_2O_5), and 8 pounds of potash, (K_2O). A ton of unleached alfalfa hay usually contains about 12 to 15 per cent water and the remainder dry matter, as well as 50 pounds of nitrogen, 10 pounds of phosphoric acid, (P_2O_5), and 42 pounds of potash, (K_2O).

A 30 ton crop of tomatoes will remove approximately 122 pounds of nitrogen, 42 pounds of phosphoric acid (P_2O_5), and 200 pounds of potash (K_2O) from the soil. To supply this amount, 600 pounds of sulfate of ammonia or equivalent, 250 pounds of superphosphate, and 400 pounds of sulfate of potash would be required.

In addition to these plant foods removed, there would also be taken from the soil for each ton of vines, 14 pounds of nitrogen, 4 pounds of phosphoric acid, and 18 pounds of potash.

Nitrogen is an important element in influencing vigorous leaf and general plant growth as well as the size and number of fruits. Phosphorus encourages earliness of blossoming and, therefore, earlier ripening of fruit, and stimulates a greater root growth, while it is evident from the analyses above that there is quite a high quantity of potash contained in both leaves and fruits.

There is a definite correlation between the growth of the plant and the amount of fruit it produces. Plants have marked differences in stem diameter, which in itself is a good indication of fruitfulness. Slender stems are usually associated with unproductive plants, while more vigorous stems are typical of productive plants. In an observation of 100 plants in the Oregon Experiment Station greenhouses, 10 plants in the higher levels of fruit production had stems averaging three-quarters of an inch in diameter and produced an average of 44 fruits. Ten plants in the lower level of fruit production had stems of five-eighths of an inch in diameter and averaged 29 fruits.

Vigorous but moderately succulent plants are most fruitful, whereas over-vegetative plants often fail to set fruit for various reasons discussed under pollination and fruit setting.

Besides the use of simple fertilizers such as nitrate of soda, sulfate of ammonia, calcium nitrate, superphosphate, and sulfate of potash, and the combination of these into a definite analysis, such as a 5-10-10, fertilizers containing two elements, nitrogen and phosphorus, are often useful, such as ammoniated phosphorus 16-20-0 or 11-48-0, or nitrogen and potash --- nitrate of potash 13-0-46. Cyanamid may also be useful in supplying nitrogen and act as a possible controlling measure for symphylids.

If a thousand pounds per acre of a 5-10-10 fertilizer were applied, it would require 250 pounds of sulfate of ammonia, 550 pounds of superphosphate, and 200 pounds of sulfate of potash.

When fruit begins to develop on the plants, there is a drag on the vegetative growth, with the result that in some cases the upper clusters of blossoms may fail to set fruit, or if some fruit is formed it may be small. It seems desirable, therefore, to make fairly frequent applications of fertilizer, either weekly or semi-monthly. In some prominent tomato growing areas a mixture of ammoniated phosphorus 200 pounds and sulfate of potash 100 pounds is made every week or ten days. In some cases potassium nitrate, 200 pounds per acre, is applied instead. Weekly applications of a nitrogen fertilizer to the extent of 250 to 300 pounds per acre have also been instrumental in maintaining good fruit setting.

Soil Treatment. Greenhouse tomato plants are sometimes affected by nematodes, root anthracnose, fusarium wilt, or symphylids. These are discussed individually in further detail in following paragraphs. Where steam is available, it is the most efficient material to keep these pests from injuring the plants.

Lines of four-inch tile are laid 18 inches apart with the tile 18 inches below the soil surface. Some tile are put at a depth of 30 inches for the particular purpose of controlling nematodes, which penetrate deeply into the soil.

The water-holding capacity of the soil is considerably altered by steam sterilization. The soil must be watered more often, using less at a time than ordinarily, in order to maintain optimum conditions for plant growth. This is necessary because many of the soil colloids which are partly responsible for the water holding capacity of the soil are destroyed by steaming.

Plants grown in steamed soils have larger and a greater number of roots which are more fibrous in character than those plants grown in an unsteamed soil. Steamed soil has a lower water-holding capacity than unsteamed soil but the steamed soil may be just as efficient in supplying the roots of plants with moisture. Because of its close relation to the moisture content of the soil - blossom end rot disease of tomato fruits may be made actually more prevalent on steamed soils than unsteamed.

Nitrifying bacteria are killed by ordinary steam sterilization but ammonifying bacteria are not destroyed by steaming. Perhaps this accounts for an increase in ammonia after heating and in an increased foliage growth thereafter. The nitrifying bacteria, however, are fairly readily renewed especially if there is an abundance of humus material applied to the soil.

Varieties. Most greenhouses are now producing fruits of European varieties or of a strain derived from the same. There has been a tendency toward a wider production of these varieties because of the productiveness of fruits per cluster, the readiness with which fruits are set, and also because of the unusual uniformity of the fruits in size, shape and color. Plants of these varieties can be heavily fed for a large production of fruit without making an excessive vine growth as in the case of American varieties. Such varieties as Best of All, Princess of Wales, Cracker-Jack, and Kondine Red are examples. In many cases growers will have developed their own strain of seed and maintained its good characters. In this regard it is important to emphasize the necessity of building up the seed supply by means of a rigid selection from and the isolation of healthy plants in order to save seed from plants that are not affected with mosaic or streak.

Considerable progress is being made in developing varieties resistant to leaf mold, but up to the present time most of those varieties do not have the desirable characters and commercial value of the present line of European varieties.

Plant Growing. From four and a half to five months are required to grow the plants from seed to the first harvest of fruit, so that the seed must be sown at such a time as to have the fruit ready at the desired season. Plants for the spring crop are commonly started during December or early January, and for the fall and winter crops during the latter part of June. Seed is sown in finely prepared soil preferably sterilized, in the greenhouse benches or in flats and the plants transplanted after three and a half or four weeks or as soon as the second true leaves appear.

To grow good strong tomato plants, they should have ample room for development. In this regard, individual containers are best, such as veneer bands or second-hand berry hallocks. The objective in plant growing is to grow a strong stocky plant with a good stout stem and leaf growth and to have it set in its permanent place with the least amount of root disturbance.

In growing the fall and winter crop, it is necessary to start the plants during the latter part of June in order that they may be ready to set in the greenhouse sometime during the middle or latter part of August. It is desirable to have the fruit set on the vines before the arrival of the short days of the year.

Dates of seed sowing, transplanting and setting plants in the greenhouses are dependent largely upon the rotation of crops and the general scheme of operation in an individual greenhouse.

Planting Distances. These vary in different greenhouses, but as a general rule, plants are set at an average distance of 16-20 inches apart in the row and 32 or 36 inches between the rows. However, there are variations of these distances. Beds in which plants are set at 16 x 24 inches have a plant every 2.7 square feet, or at 20 x 24 inches every 3.3 square feet. If plants are set 16 x 36, there is a plant every 4 square feet, or a plant every 5 square feet, or 4500 plants in a half-acre house, if plants are set at 20 x 36. Usually, plants that are given $3\frac{1}{2}$ to 4 square feet a piece are more productive than those plants which are crowded, particularly during the shorter days of the year. In some cases there may be a walk on either side of four rows in which the plants may be set 16 x 24. If plants are set 16" x 36", there would be approximately a thousand plants for an area 40 x 100 feet.

Trimming and Training. The single stem system of trimming and training is almost universally followed. As the plants grow the laterals arising between the leaves and the main stem are removed so that the energy of the plant is thrown into the main stem and the fruiting clusters. Trimming is usually continued until the plant reaches the top of its support or is ready to be topped.

A common method of supporting the plant consists in running twine from small stakes driven into the ground at the base of the plants up to an overhead attachment such as wires which are secured to the frame of the greenhouse. These wires may go crosswise or lengthwise of the greenhouse according to the construction of the same. The plant will need no tying to the twine but the string is gently twisted around the plant as growth proceeds. There are other means for supporting the plant such as the use of stakes but the twine method is very simple, easily set up, readily taken down and requires a minimum amount of labor for maintenance.

It is undesirable to remove green and healthy leaves of tomato plants. These leaves manufacture carbohydrates or sugars which are distributed to the plant in general. They also help to shade the fruit during periods of high light intensity and high temperature. Only yellow or old leaves should be removed, and when this is done they should be broken off close to the stem and not cut off so as to leave a stub which may become diseased.

Watering and Mulching. Tomato soil requires a consistent amount of water throughout the growing season but especially during the period when the fruit is enlarging and beginning to ripen. Particularly during warm and dry periods of weather when transpiration is excessive do the plants need a large amount of water to offset the heavy amounts of moisture that are transpired (see notes on blossom end rot and blotchy ripening.) During the warmer times of the year, $1\frac{1}{2}$-2 inches of water will be required each week and lesser amounts during the fall and early winter. The average water content of field-grown tomatoes is 94.5 per cent.

Excessive applications of water may cause poor soil ventilation which is unfavorable to the best growth of the plants. During the time that the plants are first beginning to blossom it is undesirable to push them along too rapidly with excessive applications of water, but there must be a uniform degree of soil moisture through this period.

Mulching is a general practice among tomato growers and there are evidently sufficient benefits derived from a mulch to make it desirable. In so far as watering is concerned, a mulch of cheap alfalfa or manure will serve to make a cushion for the water when applied, will induce more even distribution of the water, will cause a minimum of puddling and will conserve moisture. If manure is used, there will be some plant food from it made available in watering for the use of the plants. Later on when the mulch is turned under the soil, it provides valuable organic matter and restores the soil organisms which may have been reduced by sterilization. While it may be true that straw or strawy manures use up nitrogen from the soil during their decomposition as a mulch, yet there will be no nitrogen deficiency if a commercial fertilizer having nitrogen in it is supplied as discussed under soil improvement and fertilization.

Temperatures and Ventilation. Day temperatures for tomatoes should preferably range from about 70 to about 85 degrees, while the night temperatures should be about 10 to 20 degrees lower. High temperatures in the greenhouse are undesirable, particularly as they relate to pollination, fruit coloring and blossom end rot. In the late spring and summer it is ordinarily necessary to cover the house with a shading material having a ratio of three pounds of whitening, a half a pint of raw linseed oil and three gallons of water.

Night temperatures below 60 or 65 degrees are also undesirable because of inducing condensed moisture to accumulate on the undersides of the leaves of the plants, encouraging the development and spreading of the leaf mold disease. Forced circulation of air by means of vents and fans prevent the air from becoming stale or too moist, but the plants should not be exposed to cold drafts. In general the humidity of the tomato greenhouse should be comparatively low.

Pollination and Setting of Fruit. Among the contributing causes for good setting of fruit are moderate temperature and humidity in the greenhouse, a vigorous but well balanced plant, a fair degree of soil moisture and short styles or stems of pistils so that pollen may readily reach the stigma or end of the pistils.

As opposed to these causes it is found that poor fruit setting is usually induced by plants that are either under-nourished or have excessive nitrogen fertilization, low soil moisture, high temperature several days before full bloom, low humidity in the greenhouse, and long styles or stems of pistils previous to and during full bloom.

The relation of importance of temperature to good pollination and fertilization of the ovary is shown by the following facts. After the pollen has been on the stigma or end of the pistil for several hours at temperatures ranging from 70 to 85° F., numerous pollen tubes enter the canal of the style or stem of the pistil. Experiments have shown that the highest percentage of pollen germination is obtained at temperatures varying from 70 to 85° F., and likewise the rate of pollen tube growth is higher in the range of these temperatures. As opposed to a percentage germination of pollen of 66% at an 85° temperature, there is but 21.5% germination at a temperature of 50° and only 6.3% germination obtained at 100°F. This helps to partially explain the cause of poor fruit setting during periods of high temperatures.

The greater number of pollen grains that germinate, the larger will be the number of pollen tubes that pass to the embryo and fertilize the ovary (embryo fruit). In view of the fact that there must be a pollen tube for each seed that is to be fertilized, it can be realized how important it is to have a thorough coating of pollen on the end of the pistil.

Another cause of poor fruit setting is the elongation of the flower styles during warm weather. The same styles during cooler weather may not elongate and will, therefore, be more receptive to pollen falling from the pollen sacks. Also, over-vegetative plants fail to set fruit because the anthers (pollen sacks) may fail to separate but rather surround the style very tightly. Many of the stigmas of such flowers show little if any pollen.

The Number of Seeds in Relation to Fruit Development. As previously mentioned, the more pollen grains that fall on the stigma, the greater chance there is for a larger number of pollen tubes to fertilize the ovules or embryo seeds. The presence and number of seeds contribute in some manner toward the increase in size of the fruit, and there is considerable evidence that there is a progressive increase in the size of the fruit as the number of seeds increases; in other words, the more seed the fruit contains, the larger it is.

In some cases entire clusters may consist of ripe fruits which on account of their small size can be classified only as culls. Such fruits are not infrequently found even on plants which have a strong stem of the proper diameter and which are vegetatively vigorous so that the small size of the fruit cannot be accounted for necessarily by the lack of vigor of the plant itself but rather by the fact that few pollen grains reached the stigma.

Many of these undeveloped fruits contain few seeds. In an observation of fruits varying from $1\frac{1}{2}$ to $2\frac{1}{4}$ inches in diameter, it was found that in the fruits varying from $1\frac{1}{2}$ to $1\frac{3}{4}$ inches in diameter, the number of seeds in the fruits varied from 6 to 33. In fruits of larger diameter, the number of seeds varied from 38 to 207. The larger the fruits the more seeds they contain and vice versa.

Aside from the nutrition of the plant, therefore, greenhouse tomato growers can overcome the problem of small fruits by shaking the flowers, flower clusters or plants during cloudy days to encourage plenty of pollen to fall on the stigmas. During such days natural pollination is not so efficient, and it is desirable to shake the plants more often and more thoroughly than during days that are bright and warm.

Plant Diseases. Virus diseases are discussed in a separate publication, namely Circular of Information 84. Both the soil and seed are considered to be carriers of mosaic diseases. Spotted wilt, one of the new virus diseases, is not transmitted by cultural practices and the handling of plants by operators as in the case of common mosaic, but in view of its dissemination by insects, mainly thrips, it is advisable to remove plants affected with spotted wilt as soon as they appear in the greenhouse.

Fusarium Wilt. This is sometimes called the "yellows" disease. Plants affected by this disease have a yellowing of the lower leaves and there is a general drooping of the whole plant. A cross-section of the stem of the diseased plant will show a brownish or darkened area just beneath the green bark. The fungus enters the plant through the roots and grows upward through the vessels of the stem. The vascular system of the plant becomes plugged and the flow of cell sap is stopped. Steaming the soil is the only effective method of actually ridding it of the Fusarium wilt. More thorough steaming is required to control this wilt than any other disease. Fusarium is said to require soil temperatures near 180° F. for several hours to keep it in check.

Root Anthracnose (Colletotrichum sp.). This disease causes brownish cankers on the roots and the base of the stem. The root system thereby is greatly limited in growth and function, and as a consequence the plants are stunted, produce a small leaf growth and inferior fruit. Chemical fungicides appear to hold this disease fairly well in check but do not eliminate it. The fungus can only be exterminated by steaming the soil.

Root-Knot Nematode (Heterodera radicicola). This parasite causes the well known galls on tomato roots. The nemas often extend to a considerable depth in the greenhouse soil, sometimes down to 30 inches or more. In view of the readiness with which nematodes are spread in the greenhouse, it is particularly important to eliminate them entirely where found. They are easily spread by tools, on the shoes of workers, and in the transferring of soil and plants. A temperature of 135° F. kills all stages of nematodes instantly. 120° F. kills the pest in 10 minutes, and they will be inactivated at 110° F. in two hours. Apparently there is very little activity of nematodes occurring in soil at a temperature of 50 to 56° F.

Steam sterilization is the only reliable manner of eliminating nematodes. However, they can be held in check to a considerable extent by drenching the soil with boiling water and by the application of formaldehyde, 1 gallon to 50 gallons. In small areas a dilution of one part of formaldehyde to nine parts of water is recommended.

Some experimental work in electric soil sterilization is now being carried on, and evidences point to this being a feasible method of eliminating the nematodes in places where no steam is available and the area to be sterilized is not too large.

In using steam it is necessary that the heat penetrate to the remotest places for nematode control, particularly to the outside of the beds next to the walks, and the sides and bottoms of wooden benches. Among the chemical treatments used for nematodes are formaldehyde, carbon disulphide emulsion, chloropicrin, cyanamid, and others. Formaldehyde does not eliminate nematodes but may keep the pests in sufficient check to enable a fair crop to be grown. Chloropicrin, a tear gas, is dangerous to be used and absolutely requires a gas mask if applied. Carbon disulphide is highly inflammable and has harmful effects on those who apply it, often causing after a few hours severe headache and vomiting. Cyanamid may be useful in killing nematodes toward the soil surface but may be of comparatively little value in penetrating to the lower depths of soil. Cyanogas may greatly reduce the nematode population but is expensive to use. Thorough drying of the soil during the summer will greatly reduce the population, especially if the roots and galls are exposed to the hot summer sun.

Leaf Mold. This disease is discussed in Circular of Information No. 73. The most detrimental effect of the disease is in the loss of leaves which devitalizes the plants. Leaf mold is not so common in houses where there is a low relative humidity and the night temperatures are maintained up to 65 or more degrees. F. In general, fungicides are ineffective. Some growers have reduced the injury by this disease to a minimum degree by the vaporization of sulphur, but there is some danger in using this material because of the possibility of the burning of the sulphur and the consequent injury to the plants.

The most likely method of control in the future lies in the development of disease resistant varieties, a number of which are now being bred.

Fruit Troubles - Blossom End Rot. This rot is caused by a withdrawal of water and cell sap from the cells of the base of the fruit. When there is a heavy drain on the cell sap of the fruit caused by high transpiration of moisture from the leaves the cells break down and develop the typical blackening at the blossom end. Recent experiments in the application of water to the soil at different times and in varying amounts indicate that thorough infrequent watering may be superior to lighter, more frequent watering, which may tend to keep the soil poorly aired, due to the constantly wet upper surface. Particularly is it necessary that the watering be thoroughly done during periods of warm weather and high transpiration of moisture.

Soils which are well supplied with organic matter are likely to have a more uniform and greater supply of moisture for the plant during critical periods of high temperatures than otherwise.

Blotchy Ripening. This trouble occurs during the warm days of May, June, and July, and is seldom a problem in the crop maturing from October to January. There may be one small green blotch or several blotches on the fruit and no line separates these from the normal red portion, but they merge gradually. As ripening proceeds these blotches usually assume a waxy or glassy appearance. This disorder is practically restricted to mature fruits, as immature fruits show no signs of blotchiness.

Recent investigations indicate that blotchy ripening is due primarily to conditions resulting from the withdrawal of water from the fruit during periods of excessive transpiration occurring several days before ripening. It is closely associated with the breakdown of cells near and adjacent to the vascular bundles of the walls of the fruit. On bright, warm days there is a strong pull exerted by the leaves on the cells of the fruit. When dye was inserted into fruit, it appeared in the upper leaves one to one and a half hour after it entered the fruit. In rainy or cloudy days, 4 to 8 hours elapsed before it could be detected, even in the stem of the fruit, and had not yet reached the leaves. This indicates the relative rapidity of withdrawal of cell sap during days of varying temperature. This pull of the water to the upper leaves often reaches a point which cannot be balanced by the plant in taking up moisture from the roots.

Fruit Coloration. The season of the year is an important factor in the formation and destruction of tomato pigments. The fruits invariably develop the finest red color during the cooler seasons of the year. This is accounted for by the fact that the red pigment develops most favorably under the influence of moderate temperatures and light. Certain temperatures, notably those above 88 degrees F., inhibit the development of the red pigment, whereas intense light and higher temperatures induce the development of a yellowish color of the fruit. Plants that have a good foliage growth are useful in shading the fruit from high light intensity and excessive temperatures. Shading the greenhouse will also help in this respect.

It has been shown experimentally that even when temperatures reach 90°F. during part of the day they will probably develop a normal red pigment if the remainder of the 24 hours is below the pigment-inhibiting range.

Insect Enemies. Among these are the white fly and thrips. The former can be readily controlled by fumigating the house with Cyanogas, using a dosage of 1/8 ounce to 1,000 cubic feet of space. The fumigation must of course be done in darkness. It is probable that the dosage will have to be repeated at intervals in order to keep down subsequent broods of flies. In order to keep the plants from being too succulent immediately before the fumigation, it is advisable to water the beds after rather than previous to the application of the Cyanogas.

The control of thrips, which are carriers of spotted wilt, can be effected by using the same dosage of Cyanogas or by spraying with nicotine sulphate solution, 1 to 600.

Symphylids constitute in some greenhouses an important menace to tomato plants. The tile method of steaming appears to be the only thorough manner of control at the present time. Cyanamid applications may have some repelling or even killing effect toward the soil surface but symphylids pentrate to depths of soil often unreached by fumigants or even a surface steaming.

Symphylids destroy the fine root hairs and small rootlets, stunting the plants and sometimes killing them outright.

Harvesting, Grading and Packing. Greenhouse tomatoes should be picked in the degree of ripeness in accordance with the market to be supplied. The fruits are segregated into four grades, Extra Fancy, Fancy, Standard, and Sub-Standard. These grades constitute mainly differences in size and shape of fruits.

Tomatoes are packed in two types of containers; (1) a ten pound box having outside dimensions of $5\frac{1}{4}$ x $7\frac{1}{2}$ x 13 inches and (2) a four 5-pound basket carrier. Attractive labels on the outside of carriers serve to improve the appearance of the package and to identify the grower and his location.

Many factors contribute in determining the amount of fruit borne per plant. Well-grown disease-free plants produced under favorable light and temperature conditions yield from ten to twelve pounds per plant. Under less favorable conditions the yield may be as low as five pounds. With values of greenhouse stock, in general, tending downward, it is imperatuve that plants be induced to yield as heavily as possible.

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