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TOMATO GROWING AND PREPARING FOR MARKET

BY

A. G. B. Bouquet,
Horticulturist (Vegetable Crops)

Federal Cooperative Extension Service
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TOMATO GROWING AND PREPARING FOR MARKET

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The tomato is probably the most popular of all vegetables. It is widely grown in the home garden, produced commercially for local markets, extensively grown as a truck crop for shipment to distant markets, is among the most important canning crops, and is also one of two vegetables widely grown under glass. When it is considered that the tomato was not generally cultivated in the United States until 1835, it can be readily appreciated what tremendous popularity this vegetable has attained in a comparatively short time. It now heads the list in value of perishable vegetables.

According to statistics of the United States Department of Agriculture, the acreage of tomatoes for open markets in 1940 was 203,670 acres with a total production of 23,705,000 bushels. This was about 5,000,000 more bushels than for the ten-year average of 1929 to 1938. In Oregon there were approximately 1400 acres of tomatoes planted to the crop for open markets in 1940 compared with 950 acres for the ten-year period previously mentioned.

In the shipment of carlots of tomatoes, 67 cars were shipped from Oregon in 1940, all from Milton-Freewater in Umatilla County.

The production of tomatoes in the United States for processing was stated to be 385,930 acres for 1940 with a total production of slightly over 2,000,000 tons. In Oregon, the production of tomatoes for processing resulted in 91,807 cases of canned tomatoes, together with an additional 41,952 cases of tomato juice. The greater part of the crop grown for processing in Oregon is produced in Jackson County.

Climatic Conditions. The tomato plant is tender to frost and is in general a warm season crop. It is also a full season crop, requiring upwards of 120 days from seeding to first harvest. It cannot be successfully grown, therefore, in parts of the state where the frost-free season is short. In some counties of the state, such as toward the coast, the temperatures may not be high enough to make possible the ripening of many fruits per plant, and the majority of the fruit may have to be ripened artificially.

In certain parts of the state where arid or semi-arid conditions exist, the leaf hopper, causing the "yellows" disease, sometimes known as western yellow tomato blight, may seriously interfere with the growing of tomatoes.

A long frost-free growing season with moderately high temperatures during the summer and ample soil moisture supplied by supplemental irrigation furnish the most favorable conditions for tomato growing.

The plants or fruit may be particularly susceptible to fluctuating weather conditions. Late spring frosts are dangerous to newly-set plants and early fall frosts reduce the length of the fall harvesting season. Late spring rains induce heavy foliage growth and hinder fruit setting, while early rains in the fall cause the fruit to crack and possibly to be unmarketable. Hot weather induces blossom drop and later on, when accompanied by prolonged drouth, is responsible for considerable blossom-end rot and sun scald.

In the interior counties, a difference of 50 to 150 miles may markedly influence the time of ripening and the tonnage per acre due to variations in total amount of heat during the growing season.

Soils. While the tomato plant will grow and produce satisfactorily on almost any type of well drained soil having reasonable fertility, nevertheless commercial growers of tomatoes usually plant on land of a somewhat light character, such as a sandy or silt loam, which is comparatively warm and induces a rapid growth of the plants, with a subsequent early blossoming and ripening of the fruit. These types of soil are also economical to work and are readily prepared for transplanting the plants as well as being suitable for irrigation. If soils are too light in character, however, and no irrigation is possible, moisture will be lost readily with the result that there may be considerable blossom-end rot of the fruit.

Fertilizers. The object of the tomato grower is to produce a vigorous plant of medium size with no extremes. Earliness of fruit production as well as total fruit yield are important objectives in fertilizing soil for tomatoes.

A great deal of experimental data regarding the fertilization of tomato land points to the value of organic matter as one of the fundamentals of fertilization. The several values of organic matter in the soil are too well known to be enumerated here, but it is important to emphasize the value of incorporating organic matter into the tomato soil.

Manure is valuable in that it not only provides important organic matter but also supplies plant food, particularly nitrogen, as the micro-organisms break down the organic matter, and the nitrogen from manure may be supplied to the plant during the time that it is most needed. In general, good yields have always been obtained from manure provided it was not applied in too large quantities.

Superfluous or heavy applications of manure, on the other hand, are undesirable as they may cause too succulent plants, followed by a poor setting of fruit later on and possibly a considerable amount of blossom-end rot. Late maturity of fruit ripening may also occur when the plants are too vegetative.

Organic matter can also be increased by turning under cover crops, particularly those that are most adapted to the section of the state and the type of soil where the tomato plants are being grown. If possible, the cover crop should be turned under early enough so that it may be thoroughly rotted by the time the tomato plants are set. It is also important that the grower realize the necessity of additional applications of nitrogen fertilizer following the turning-under of a cover crop, although this may not be necessary if the cover crop has been turned under a sufficient length of time so that it is thoroughly rotted before plant setting time.

With either manure or a cover crop as a foundation, supplemental applications of commercial fertilizers are helpful in favoring earliness and total yields. The use of commercial fertilizer in growing tomatoes is generally considered to be an efficient and paying investment.

Nitrogen. A crop of tomatoes requires or absorbs about three per cent of the total consumption of nitrogen during the first month that it is in the soil, 27 per cent the second month and about 70 per cent the third month. If too much nitrogen is given during the early part of the plant's growth it may become too succulent and there may be a deficiency of nitrogen to meet the needs of the plant and the fruit when it is in full production. Nitrogen is utilized by the tomato plant to the extent of about 100 pounds per acre. The nitrogen is first stored in the leaves and as the fruit is formed, it is transferred to the fruit where it is stored as an organic compound. If the tomato plant has an excess of nitrogen at the beginning of the season's growth it will oftentimes be unbalanced and the plants will not set fruit freely.

Phosphorus. The amount of phosphorus contained in plants and fruit of a tomato crop is not high, being estimated to be about 30 pounds per acre, but it is necessary to apply considerably larger quantities of phosphorus than the plants need, because phosphorus is readily fixed in the soil and becomes unavailable. Phosphorus is important in root development and in the strength and size of the stem of the plant. It also hastens the maturity of the fruit, and is therefore an important ingredient of a complete fertilizer. Phosphorus does not move rapidly in the soil from where it is placed, therefore it should be placed in the soil under or around the plant before or when it is set in the soil.

Potash is used in large quantities by a crop of tomatoes, to the extent of some 150 to 200 pounds per acre. There is considerable potash used in the formation of the leaves and there is much potash transferred from the leaves to the fruit. As in the case of nitrogen, 68 per cent of the potash absorbed by the crop is used in the third month after planting, which is the month that the bulk of the fruit is being borne.

In important tomato growing sections, the fertilizer analysis used is one usually having a ratio of 1-4-2 such as a fertilizer containing 4 per cent nitrogen, 16 per cent phosphoric acid, and 8 per cent potash. If 250 pounds of this complete fertilizer are used per acre, there will be about 2 ounces or so applied per plant. This amount could be modified according to the previous fertilization of the soil.

The manner of applying fertilizer is a very important consideration. Based on experiments which have been conducted along this line, the relative value of applying fertilizer by different methods would seem to indicate that the most efficient placement was a local one reasonably near the plants or in a circle around each plant. In consideration of the yields where fertilizer was applied to the plants locally, broadcasted, or side-dressed, the ratio was as 100 is to 30 and 36. Commenting on the method of application of fertilizer, Dr. J. B. Hester, New Jersey soil technologist, says: "Perhaps in no other crop is the method of application of fertilizer so important as it is in the tomato crop because of the likelihood of injury to the transplants and because of the influence on fruit set, maturity and defoliation; thus the method of putting the plant food into the soil is highly important." Some of the methods that warrant special consideration may be summarized as follows:

(1) Low nitrogen and high phosphate in the row, with the nitrogen and potash as side-dressing. In Dr. Hester's experiments ammoniated superphosphate 2-17-0 has been used, mixed in the row before planting to the extent of 500 to 1000 pounds per acre. Later on, the nitrogen-potash side dressing has been given in a 10-0-15 mixture.

(2) Another method has been used in the application of the low-nitrogen high-phosphorus mixture such as a 4-12-4 or 4-16-4, applying a portion of this before planting and making a side dressing of the fertilizer later.

(3) Another method has been used in applying a balanced nitrogen-phosphorus-potash mixture such as a 5-10-10 or a 4-8-8, using a small amount in the row before planting and the remainder as a side-dressing.

Where it is possible, it would be advisable to mix the early-applied fertilizer with the soil at the point where the tomato plant is eventually going to be set. If this is done two weeks or so before the transplanting of the plants to the field, the fertilizer will have become well mixed with the soil and dissolved in the root zone area, with the result that following the setting of the plants, they should be readily stimulated to a rapid growth and early fruiting. Under most circumstances, no fertilizer should be any closer to the plant than two inches. The side-dressings should be applied to the plants before they have started to extend over the ground, as it is important to get the fertilizer reasonably near the plants.

Acidity. Wherever possible, the tomato soil should be kept within the range of pH 6.0 to 7.0.

Of the minor fertilizer elements, magnesium is the mineral element associated with the green coloring matter of the plant. It has been found helpful in preventing the foliage of the plant breaking down too early. Approximately 20 pounds of magnesium oxide are sufficient to grow a crop of 10 tons of tomatoes.

Plants having boron deficiency show upcurled leaf margins and considerable brittleness of the leaf stems and the leaves.

"Starter" or "Booster" Solutions. These solutions consist of fertilizer dissolved in water applied to the plants before they are taken to the field to be set out or applied to the soil where the plants are being transplanted in the field. The important effect of such solutions is such as to stimulate root development and enable the plant to become quickly established in the soil. This results in earlier maturity and larger yields of early fruit. Various formulas for "starter" solutions have been used. Ammoniated-phosphorus, 11-48-0, alone, at the rate of 5 pounds to 50 gallons of water has given excellent results. However, there is some insoluble residue of this material and consequently if it is to be put in the barrel of a transplanting machine, the insoluble material should be screened out. Another mixture that could easily be made up is 1 1/4 pounds of nitrate of soda, 2 1/2 pounds of 11-48 ammoniated phosphorus and 1 1/4 pounds of muriate of potash. This would make 5 pounds total for 50 gallons of water.

If the starter solution is to be given plants growing together in the coldframe, enough of the solution should be given so as to thoroughly wet down the plants.

Varieties. A suitable tomato for market and home use is one that is comparatively early, approximately globe-shaped, smooth and firm with a uniformly red color, and prolific in yield. Varieties grown for home use and local marketing include Bonny Best, John Baer, Chalk's Jewel, Marglobe, Nystate, Pritchard, Stokesdale and many others. Mingold is an early yellow tomato of fine flavor and quality. Varieties for canning purposes which are usually heavier, more solid, and later in season include Indiana, Baltimore, Rutgers, Matchless and Stone.

There are many hundreds of varieties of tomatoes, but comparatively few distinct groups. Growers in commercial districts should make annual trials of a few plants of some promising new varieties.

Plant Growing. In certain parts of the State where tip-blight occurs, it is desirable to use strains of varieties that show a high degree of resistance. The tomato grower should aim to produce plants which will promote the earliness and total yield of the crop. The stronger and more vigorous the plants are at transplanting time, the greater is the chance for a successful crop. If the grower does not have the proper equipment for producing plants, they should be purchased from some reliable plant grower. It is false economy to try to grow good plants with poor equipment, and poor plants are invariably a considerable handicap to good early and total yields.

Small greenhouses are useful for plant growing as well as beds which are heated by electricity, hot air, or other means such as hot water or manure. The reader is referred to various publications concerning plant growing mentioned on the last page of this circular.

The plants are usually started some time in February or March depending on the type of equipment used, whether any topping is to be done and the possible time of transplanting the plants into the field. Greenhouse and electric hotbed-grown plants will grow faster than those which are grown in some other beds and the time of seeding must be gauged by this. It is inadvisable for plants to be

started so early that they stand a long time in the frames and become too greatly root-bound and hardened as well as too large for the proper size of the plant to be set out in the field.

Tall, spindling plants, grown too close together in a flat or frame, are undesirable. They do not have room enough to develop good root systems and when transplanted to the field are considerably checked. There is no advantage in having plants with the crown buds blossoming at the time of transplanting for it is quite probable that these flowers will drop without setting fruit. The plant, moreover, should not set fruit until it is established and begins to grow steadily.

In starting young plants, it is often desirable to sow the seed in sterilized soil in order that there be no trouble with damping off. Such soil can be treated electrically or by other means such as by the application of formaldehyde. These methods are discussed in Extension Circular No. 342 on growing early vegetable plants.

Sometimes it is advisable to dust the seed before planting, in case the soil has not been treated. In such an event the seed can be treated with red copper oxide dust.

Experiments in topping or removing the terminal bud from some tomato plants when the fourth leaf was an inch long have increased by over 30 per cent the early yields of marketable fruit. This topping has encouraged the formation of several laterals which have become fruit-bearing stems. Various modifications of the topping of plants for formation of laterals are used by growers. One method consists in starting the plants in late January or early February and pruning or topping the plants the first week in April when the plants are about six inches high. Other growers pinch out the terminal bud earlier so as to allow a longer time for the laterals to develop.

There is no necessity for severe hardening of tomato plants, otherwise, the balance of the plant may be upset and become too woody. Plants cannot be sufficiently hardened to prevent them from being injured by a frost if such should occur. Reduction in watering plants will harden them equally as well as reducing them to cold temperatures in the frames. It is a false notion that plants must be brought to a yellow color and vigorously toughened. However, it is unwise to set out an absolutely tender and succulent plant without it being somewhat hardened by the reduction of water and cooler temperatures in the frame. Recent experimental data, however, have confirmed the previous indications that hardened plants produce less early and total yields of tomatoes than unhardened plants.

Transplanting Plants. The climate of various localities will determine the date of this work. Plants may be set out during the middle of April in some sections where no late frosts are liable to occur or where the plants can be covered in the field. In other districts, the plants are set out the first or second week in May. General weather conditions must be an indication to the grower as to the desirable time of transplanting plants. The distances of transplanting plants may vary with the variety and the extent of its foliage, the average instances being 5 feet between the plants and 5 to 6 feet between the rows.

This is, of course, presuming that the plants are to run naturally on the ground and not be trained up. In Oregon, the commercial growers rarely train their plants up from the ground, but in some home gardens this may be done where there is insufficient space to allow the plants to run on the ground.

Plants should not be checked severely in being transplanted to the field. Booster solutions such as already mentioned, are valuable in this regard. Individual plant containers, such as veneer bands, are useful in growing tomato plants. Second-hand berry hallocks can often be obtained free or for a very small sum from canneries. A plant so grown is not disturbed when transplanted and will quickly become established in the field for early blossoming and production of early fruit. On the other hand, spindling plants crowded in a frame or flat, do not respond quickly to transplanting and are generally slow in recovering because of a disturbed root system, thus delaying the blossoming time and the ripening of early fruit.

Various forms of plant protective materials may be used. These may be particularly useful in areas of the state where the growing season is short and the plants can be saved from injury by late spring frosts. Some growers use a box with a pane of glass over each plant, and this can be used year after year with little depreciation. There are also some commercial protectors made of various materials such as cheesecloth, glassine or waxed paper, cello-glass, etc. Experiments conducted with these various materials indicate that the efficiency of them is largely dependent on the type of weather prevailing during the spring. No experiments of this kind have been carried out at the Oregon Experiment Station, but on a small scale the covering with a box and a pane of glass is sometimes practiced commercially in the state. In many cases, it is desirable to put a shingle on the windward side of the plant, which will help shield it from cold or severe winds following the transplanting. The shingle can be removed when the plant is well established and the weather is warm.

Some home garden tomato growers endeavor to protect their plants with small glass jars which in most cases are altogether too small for the proper covering of a good sized plant.

Pollination and Fruit Setting. Despite the fact that the tomato flower is a "perfect" one, the blossoms are partially self-sterile, especially during the early part of the growing season when the plants are growing vigorously. The dropping of blossoms is not an infrequent occurrence and it may seriously reduce the number of early fruits that set. A heavy blossom drop is especially induced on plants growing in soil which is fertilized too heavily with manure or nitrogenous materials so that the plants are large and vegetative. High temperatures and low humidity also induce considerable blossom drop.

With reference to the above problem, therefore, the soil should be fertilized carefully, avoiding the use of heavy manuring, and the blossom clusters may be shaken to advantage during the middle of the day when the temperature is moderately warm, at which time there will be a tendency for the pollen to scatter in such a way as to influence a greater setting of fruit. No insects visit tomato

flowers except the bumblebee which is exceedingly fond of them and which can do a lot of valuable work in fertilization of the blossoms. It is oftentimes desirable to plant near tomato plants a row of tall white or red flowering beans which will encourage bumblebees to come to them and later visit the tomatoes nearby.

Cultivation. The control of weeds is the main object in cultivating the tomato area and if there is a dry mulch on the surface and no rains have occurred, the soil should be left undisturbed. Deep cultivation is injurious not only because it destroys the roots of the plants but it also has a tendency to bring some moist soil to the surface and instead of conserving moisture, has a tendency to reduce it. There are no particular benefits to be derived by cultivation of tomato soil except for the purpose of keeping down weeds and maintaining a proper soil texture.

Irrigation. The lighter types of soils in which tomatoes are grown should be irrigated, if possible, in order to maintain uniform moisture throughout the season. Irrigation is valuable in keeping plants growing steadily and particularly in preventing blossom-end rot.

One possible danger in irrigation is in causing too vigorous foliage growth in the early part of the season, thus retarding the setting of fruit and the ripening of the same. It is not desirable to apply much supplementary irrigation water until the plants have started to set fruit and the normal precipitation is slackening.

Most tomato plants are irrigated by the furrow or open-ditch method although in some instances overhead sprinkling is used. As the vines continue to spread over the ground the open ditches alongside of the rows for irrigation may be left open in order that water may be applied to the plants after they take possession of the space between the rows. Tomato plants irrigated by the sprinkling method are usually not injured in any way in so far as pollination and setting of the fruit is concerned.

Pruning and Training. Whether plants should be allowed to grow naturally on the ground and be unpruned, or be partially pruned and produce fruit on supports is largely a matter of whether the crop is handled commercially or the plants are grown in an area making it necessary to set the plants closer together and prune and train them. In general, it is the opinion of those who have investigated the subject, that the value of pruning and training of plants is considerably over-emphasized and exaggerated. If plants have a portion of their fruit-bearing laterals removed so is the yield reduced. In some cases there may be a desire to have pruned and trained plants in that they might produce fruits slightly earlier than those plants which are unpruned, but this does not always definitely follow. The total yield of fruit from pruned and trained plants is invariably decreased. Plants which are pruned have a lessened amount of roots and can obtain less water during a dry season and therefore the fruit on them is more susceptible to blossom-end rot. On the other hand, the foliage of plants untrained and unpruned covers the soil, helps to prevent moisture evaporation and assists considerably in preventing fruit from being plainly exposed to high temperatures that may induce sun scald or yellow or blotched discoloration. The

foliage is also useful in protecting the fruit from rain and severe cracking.

Plants can be trained up and put on some sort of a trellis, stake or other support without much pruning. Some gardeners prune out all laterals but two, leaving the main stem and two laterals.

Insects and Diseases. Flea beetles eat small holes in the leaves soon after the plants have been transplanted to the field and may be very destructive. They can be readily repelled by using Bordeaux mixture in dust form or by using some standard dust such as calcium arsenate or rotenone. The grower should have a copy of Extension Bulletin 551 which will act as a guide in the control of insect pests affecting tomatoes.

Cutworms are sometimes prevalent in tomato fields soon after transplanting, but they can be readily controlled by a standard bait as discussed in the aforementioned bulletin.

Fruit worms. Suggestions are given in Bulletin 551 regarding the possible control of this pest.

Damping-off. This disease is especially destructive to young plants growing under glass in the spring. Suggestions have already been made concerning the control of damping-off either by seed or soil treatment. When only a small amount of soil is to be used for starting a limited number of young plants, it can be sterilized by treating it with a thorough saturation of boiling water. In some cases damping-off may occur in flats or beds after transplanting has been done, or it may occur before the plants are first transplanted, in which case a spray of red copper oxide, 1 ounce to 3 gallons of water, may be used to stop spreading of the disease to the remaining plants. At this strength the chemical does not seem to be at all caustic to the seedlings, and it should be sprayed onto the plants and the surface soil so that the material runs down the stems of the young plant onto the soil.

Any beds or greenhouses in which tomato plants are being grown should be given proper care in ventilation and watering so as to have a healthy atmosphere about the plants, taking particular care to avoid over-watering which would induce the damping-off disease.

Dry rot. This is sometimes known as blossom-end rot or point rot. It is usually severe in extremely dry seasons or on fruits produced by plants that have excessive vine growth or which are growing in soils lacking moisture during the ripening season. Heavy spring rains sometimes produce unusually succulent plants and later on when the rains quit and temperatures become high, much blossom-end rot may be induced. Avoiding the growing of too vigorous a plant, using irrigation water to maintain a uniform supply of moisture in the soil and eliminating frequent unnecessary cultivations will assist in preventing much loss from this trouble.

Western yellow tomato blight. This is sometimes known as tomato "yellows" or "curly-top," discussed in Oregon Experiment Station Circular No. 180 on

this subject. It is a serious disease of the tomato, particularly in the arid and semi-arid regions of the state. The trouble is known to be caused by the carrying of a virus by the beet leaf hopper. At the present time, no satisfactory control measures seem to be available. Plants grown in a moderate amount of shade seem to be somewhat less affected than those grown in full sunlight.

Tipblight. This is a virus disease found particularly in certain counties of the state where tomatoes are grown commercially. The disease is fully discussed in the circular stated on the last page of this publication.

Sun Scald. The sides or cheeks of some fruits lying unprotected from hot sun may oftentimes be burned during days of unusually high temperatures. Fruits having a deep green color will have a greater absorption of heat than those of a lighter green or red color. The radiation of soil heat may also be a factor in increasing the amount of sun scald.

One of the best ways to avoid sun scald is to grow a plant having sufficient foliage so that much of the fruit is protected from the sun.

Fruit cracks and blemishes. Following a spell of dry weather, fruit may have both vertical and concentric cracks after the first rains. The cells of the fruit and the plant have contracted during the dry weather and expand greatly when there is ample moisture. It has been shown by experiments that environmental factors such as rainfall are more potent factors in causing certain types of cracks than varieties. Among the varieties showing deep radial cracks are Marglobe, Bonny Best, John Baer, Nystate, Chalk's Early Jewel and others. Most of the early varieties such as Earliana are more susceptible to concentric cracking than the late varieties.

Blotchy ripening. Blotches or improper coloration of the fruit are often experienced when temperatures in the summer reach a high point. Under these conditions, the chemical products in the fruit which induce a good red color are destroyed or screened, with the result that green or yellow blotches often appear. When ripening in moderate temperatures, the fruits have a fine red pigment. Where the foliage protects the fruit, it may be several degrees cooler than that which is exposed to intense light and temperature, hence the protected fruit invariably has an unblemished color.

Harvesting. Tomatoes are picked in various stages of ripeness, depending upon the distance of the market to which the product is to be sold. If the fruit is to be packed for shipping, it should be mature but with little pink or red color. There are two types of green tomatoes: (1) mature-green, which have a slightly gelatinous or sticky interior when sectioned, indicating that the fruit is mature and will color later on; (2) immature-green fruit that cuts solid and has no gelatinous cell tissue and which will not develop a red pigment under any temperature conditions. The age and size of the fruit and the interior texture and color are fairly accurate indicators of maturity.

In shipping the mature-green fruit, sometimes known as "green wraps," paper is used presumably for protection of the fruit in the container such as the lug box. However, this paper interferes with the ripening processes, preventing proper gaseous exchange. The flavor of unwrapped fruit is more satisfactory than that of the wrapped tomato. Tomatoes picked on the turn in color compare favorably with the flavor of vine-ripened fruits, but the flavor of wrapped fruit may be unsatisfactory.

Attention is called to the possible use of ethylene gas in hastening the ripening of fruit. Ripe apples placed in tomato ripening rooms are effective in this regard because of the evolution of ethylene by apples. (See Circular of Information stated on last page.)

The earliest tomatoes in Oregon are usually ready to be harvested in the forepart of July. Market reports indicate that about the first week in July, tomatoes are being offered in sufficient quantities for marketing from some of the earlier shipping districts of the state. The season extends up to the time when rains and frost make it impossible to pick any more No. 1 grade fruit.

Grades, Containers and Packing. Uniform grades are necessary in marketing tomatoes in order to eliminate undesirable fruits and to have a package containing fruit that is uniform in maturity, size, shape and color, as well as being free from blemish. The Oregon State Department of Agriculture's "Standard Grades for Tomatoes" serve as a basis for selling tomatoes in the early market as well as to the factories.

There are two types of containers used in the state, the 18 to 20 pound box holding two layers of fruit, and the lug box having approximately 30 pounds of fruit and cabable of holding 60, 75 or 90 tomatoes, according to the size of the fruit.

Practically all of the tomatoes grown for canning are now sold on the basis of grade rather than a price for the tonnage as a whole. Based on the report of inspection in areas where considerable cannery tomatoes are grown, 75 to 80 per cent of the fruits delivered are of No. 1 grade; from 20 to 22 per cent, second grade; and 3 to 4 per cent culls.

Yields. The production of tomato plants in tonnage of fruit will depend very largely on the locality where the crop is grown, the general weather conditions prevailing and the variety produced. Canning varieties will naturally yield more heavily than those which are grown for the open market. In sections where tomatoes are produced for an early market, some growers figure on one box or 18 to 20 pounds to a plant. In districts where the crop is grown for canning purposes the yield may vary from 6 to 15 tons per acre, depending on weather conditions, heat units, freedom from rain and frost, etc. As a matter of fact, the yield of marketable fruit will vary greatly as determined by weather conditions prevailing during the season as a whole.

Seasons and Values. Early in July tomatoes in the earlier-producing sections of Oregon sell for $1.25 up to $2.00 per box for the best fruit. Toward

the latter part of the month, prices have declined to $1.25 to $1.50, and by the last of the month have dropped to $1.00 per box. Early in August, prices will have declined to 50¢ or 60¢ with 75¢ for the better grade of fruit. These prices are uniformly maintained until the time when tomatoes are plentiful, when prices materially drop to 40¢ or less per box. Toward the latter part of September, there may be a general rise in price up to the previous market of 60¢ to 65¢. However, values vary considerably each year and during each week of the season, depending on weather conditions and volume of supplies.

Publications Relating to Tomato Production and Marketing

O.S.C. Extension Circular 342.	Growing Early Vegetable Plants Under Glass.
O.S.C. " " 343.	Flue-heated Hotbed in Growing Early Plants.
O.S.C. " Bulletin 551.	Vegetable-garden Insect Pest Control.
O.S.C. Station Circular 128.	The Tip-blight Disease of Tomato.
O.S.C. " " 132.	Blossom-End Rot of the Tomato.
O.S.C. " " 180.	Curly-top Disease of Vegetables.
O.S.C. " " 249.	The Use of Ethylene Gas in Ripening Tomatoes.
O.S.C. Station Bulletin 307.	Electric Hotbeds and Propagating Beds.
U.S.D.A. Farmers' Bulletin 1291.	Preparation of Fresh Tomatoes for Market.
U.S.D.A. Circular 566.	Ripening and Repacking of Mature-Green Tomatoes.
U.S.D.A. Tech. Bulletin 268.	Effect of Various Temperatures on the Storage and Ripening of Tomatoes.

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