



# **GROWING TOMATOES**

## **In the Garden**

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1. Tomatoes grow well in almost any part of the state where the frost-free season is long and warm enough to permit fruits to become mature or mature-green, or where disease is not severe enough to harm the majority of plants.
2. A garden soil that has reasonably good drainage, tilth, and fertility will produce a crop of tomatoes.
3. Land manured the previous year is good for tomato plants. Rotted manure applied to the garden a few weeks before setting out plants provides valuable organic matter and plant food.
4. Tomato plants respond well to applications of phosphoric acid fertilizers which induce earlier blossoming and ripening of fruit.
5. Varieties of early maturity are important. The majority of fruits on the vines should mature before fall rains and frosts.
6. Strong plants with well developed root systems are essential to a good early and total yield of fruit. They should not be set out till after spring frosts.
7. "Booster" or "starter" solutions reduce shock of transplanting and induce a quicker pick-up of plants after being set out.
8. Flea beetles are dangerous to newly-set plants and must be controlled by a standard dust applied soon after transplanting.
9. Cultivation is useful for eliminating weeds and maintaining a good soil mulch.
10. In small gardens of limited space tomato plants may be set closer together, supported, and pruned to a few fruit-bearing stems.
11. Blossom-end-rot, induced by insufficient moisture during dry periods, may be prevented by timely waterings.
12. Mature-green fruit, showing a slightly yellow color on the inside, will color to a full ripe-red if stored in a moderately warm place.



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**T**HE home garden tomato is valuable in supplying the family with healthful food over a period of several months. Besides being canned and made into juice, tomatoes can also be stored for several weeks and used in a fresh state well into the early winter months.

The valuable vitamins of the tomato, A, B<sub>1</sub>, and C are reduced but little in processing, if such processing is properly handled.

**Climatic conditions.** The tomato is a warm-season crop, tender to frost, and requires about 120 days from seeding to first harvest. A long frost-free growing season, therefore, with moderate temperatures and ample soil moisture, furnish the most favorable conditions for tomato growing.

**Soil.** Tomato plants will grow satisfactorily on almost any type of well drained soil that has reasonably good content of organic matter and fertility. The earliest tomatoes are grown on light warm soils that require irrigation during the dry weather. Heavier soils of good tilth produce tomatoes that mature somewhat later but that may be satisfactorily ripened without supplemental irrigation.

Manure and cover crops such as vetch are important in providing organic matter for the soil, but they should be turned under early enough in the spring to be well rotted when the plants are set out.

**Fertilizers.** Earliness of fruit production and good yields of fruit are important objectives in fertilizing soil for tomatoes.

A crop of tomatoes uses a comparatively small per cent of the total consumption of nitrogen in the crop during the first months of plant setting, about 27 per cent the second month and 70 per cent the third month. If too much nitrogen is given during the early part of the plant's growth, therefore, there may be a deficiency of nitrogen to meet the needs of the plant and fruit when it is in full production. If the plant has excessive nitrogen at the beginning of the season's growth, it will be unbalanced and the fruits will not set freely.

The amount of phosphorus contained in tomato plants and fruit is not high but this plant food element increases fruit production by stimulating root development and hastening flower production and early maturity of the fruit.

Potash, found principally in the leaves and fruit, is used in large quantities by a crop of tomatoes. As in the case of nitrogen, a large amount of the potash consumed by the crop is used in the second and third months after transplanting, when the plant is about full grown and bearing a quantity of fruit.

Barnyard manure is valuable because it provides sources of nitrogen and potash but it is low in phosphorus, which is of particu-

lar value in growing tomatoes. To be most effective barnyard manure should be supplemented with a quickly available phosphate fertilizer such as superphosphate. Heavy applications of unrotted manure are not desirable as they make plants too succulent and leafy, with the result that many of the early blossoms fail to set fruit and the fruits that set later are late in ripening. A forkful of rotted manure can be well mixed with the soil where the plants are to be set, preferably a few weeks before setting out plants.

If commercial fertilizers are used in growing tomatoes, they should be high in phosphorus, such as 11-48-0, 4-12-4 or 4-24-4.

Applications of commercial fertilizer on the soil surface are not desirable, particularly of superphosphate which rapidly becomes fixed in the surface soil after which it is of little use to the plants. A good method of fertilizing tomato plants is to apply a booster solution to the plants before taking them to the field, and applying to the soil at the place where they are to be set, 2 to 4 ounces of superphosphate, in a band application. Such a band application should be about 4 inches below the surface of the soil and about 2½ to 3 inches to the side of the plant. No fertilizer should come in direct contact with the roots of the plant.

If a complete fertilizer such as the Victory Garden fertilizer 3-8-7 is used, it should be applied in amount and method of placement as suggested for the superphosphate.

**Varieties.** A good tomato variety should be comparatively early in season of ripening, round, smooth, firm, of a good red color and productive. The most widely grown varieties include Bonny Best, Stokesdale, Pritchard, Marglobe, John Baer, Wasatch Beauty, Pepper, and Rutgers, the latter being useful only where the season permits later varieties to ripen. Mingold is a good yellow variety. Oxheart is a particularly sweet-flavored variety but somewhat late in season of maturity.

**Plants.** Tomato growers with suitable equipment such as a greenhouse, electric, manure, or flue hotbeds, grow their own plants, seeding from the first to the middle of March. Otherwise, gardeners buy their plants grown for transplanting in May. It takes about 7 to 8 weeks to grow a plant from seeding to time of setting in the field. Tomato growers should aim to produce or buy plants that will promote earliness and a good yield of the crop. Plants in "flats" are usually grown 1½ to 3 inches apart. Plants in individual containers such as veneer bands, 2 x 2 x 3 inches or 3 x 3 x 3 inches, are useful in preventing root disturbance and in encouraging quicker establishment of the plant when transplanting to the garden.

It is inadvisable to start plants so early in the spring that they become spindling, root-bound, and hardened too much before being set out. Plants should not be vigorously toughened before being set in the garden. Reduction of water and plenty of air given to plants in the frames will sufficiently harden them without any serious check in their growth.

**Setting out plants.** Tomato plants are set out after danger of spring frosts is past. Transplanting is usually done from the first to the third week in May. The plants should be well watered down several hours before the time of transplanting. For this watering a booster solution may be used instead of plain water. Apply booster solution to the soil about the plants; *do not sprinkle on foliage.*

Where the plants are not supported, distances of setting them vary from 5 to 7 feet between rows and about the same distance between plants. Some varieties having determinate growth, such as Wasatch Beauty, do not require as much space between the plants in the row or between rows. In some home gardens where space is somewhat limited, plants are set at 24 to 30 inches apart in the row and supported. Commercial growers rarely train up their plants. It is customary to set plants a few inches deeper in the garden than they stood in the flats or bands.

The soil should be well prepared where the plants are set, and, if necessary, water should be applied, preferably in the form of a booster solution.

**Starter or booster solutions.** These solutions consist of fertilizers dissolved in water and applied to the plants before they are taken into the field to be set out, or applied to the soil when the plants are being transplanted in the field. They stimulate root development and enable the plant to become more quickly established in the soil, resulting in earlier maturity and larger yields of fruit. Various formulas for starter solutions have been used. Ammonium-phosphate 11-48-0, at the rate of 5 pounds to 50 gallons of water, has given excellent results. Another good mixture consists of 1 pound of nitrate of soda,  $3\frac{1}{2}$  pounds of superphosphate and  $\frac{1}{2}$  pound of sulphate or muriate of potash, making a total of 5 pounds, mixed with 50 gallons of water. The Victory-Garden fertilizer 3-8-7 can be used at the rate of  $1\frac{1}{2}$  to 2 ounces per gallon of water. One ounce of such a fertilizer is equal to a well filled tablespoonful.

Starter solutions are used primarily to wet down tomato and other transplants several hours before they are set in the field. In applying the solution to the young plants growing in a flat or cold-

frame, it should be on the soil about the plant and not sprinkled on the plants themselves. The thorough wetting of the soil will give the plants moist soil to be taken to the garden, and the plants will therefore cut out more readily and with less root disturbance. It will also provide available plant food in the ball of soil that is cut out in the process of separating plants from the flats or frames. Plants grown in individual containers are particularly benefited by a booster solution as the entire mass of soil about the plant will absorb the solution and take it into the garden.

Booster solutions are also applied by pouring about  $\frac{1}{2}$  to 1 pint of solution about the roots of plants as they are being set out in the garden and field. This solution will help in getting the plants more quickly established in their new location. Particularly is this true if there is an ample amount of phosphorus in the solution, for this plant food stimulates development of the roots.

**Plant protectors.** Some forms of plant protective materials may be used in case of late spring frosts. Some growers use a box with a pane of glass over each plant that can be used year after year with little depreciation. There are also some commercial protectors made of cheesecloth or waxed paper. In many cases it is desirable to place on the windward side of the plant a shingle or two, which will shield it from cold or severe winds following the transplanting.

**Pollination and fruit setting.** The dropping of tomato blossoms is not infrequent and may seriously reduce the number of early fruits. A heavy blossom drop is induced especially on plants growing in soil that has been fertilized too heavily with manure or nitrogenous fertilizer so that the plants are large and vegetative. High temperatures and low humidity also induce considerable blossom drop.

To avoid this condition the soil should be fertilized carefully, avoiding the use of heavy manuring. 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 the tomato flower except the bumblebee, which can do a lot of valuable work in fertilization of blossoms. It is oftentimes desirable to plant near tomato plants a row of tall, white, or red-flowering beans that will encourage bumblebees to come to them and later visit the tomatoes nearby.

**Cultivation.** The control of weeds is the main objective in a 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 in destroying roots of the plants as well as bringing moist

soil to the surface. All soil moisture should be conserved during the dry summer to prevent blossom end rot.

**Irrigation.** Supplementary watering is valuable in keeping plants growing steadily and particularly in preventing blossom end rot. Especially is this true in the lighter types of soils. One possible danger of 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 supply much 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 may be left open in order that water may be applied to the plants after they have taken possession of the space between the rows. Tomato plants irrigated by the sprinkling method are usually not injured in any way 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 partly pruned and produce fruit on supports, is largely a matter of whether the crop is handled commercially or the plants are grown for home use. The total yield of fruit from pruned and trained plants is invariably decreased as compared with unpruned plants. Plants that are pruned have a smaller amount of roots and can obtain less water during the dry season; therefore the fruit on them is more susceptible to blossom end rot. The foliage of plants untrained and unpruned, on the other hand, covers the soil and helps to prevent moisture evaporation and assists considerably in preventing fruits from being plainly exposed to high temperatures that induce sunscald or blotchy ripening. 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 trellis, stake, or other support without much pruning.

The home gardener should not consider the laterals as being "suckers" but rather fruit-bearing stems that may be as productive as the main stem of the plant.

None of the permanent leaves of the plant should be removed for they are valuable in shading fruit in addition to manufacturing food for the plant.

**Insects and diseases.** Flea beetles eat small holes in the leaves soon after the plant has been set in the garden. They can be readily controlled by using calcium arsenate dust or cryolite. For detailed

information on insect control consult Extension Bulletin 551, Vegetable Insect Pest Control.

Cutworms are sometimes prevalent in tomato fields soon after transplanting, but they can be readily controlled by the standard poison bran bait.

To control the tomato fruitworm, spray or dust before fruit is half grown with calcium arsenate or cryolite. Pyrethrum, if available, should be used in later applications.

**Damping-off.** This disease is especially destructive to young plants growing under glass in the spring. In starting young plants it is desirable to sow the seed in pasteurized soil, treated electrically or by some other means such as by the application of formaldehyde or hot water. In some cases damping-off or stem rot 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. It should be sprayed onto the plants and the surface soil so that the material will run down the stems of the young plants onto the soil. For further details on damping-off control see Extension Circular 342, Growing Early Vegetable Plants under glass.

Plants showing blackening of the stems near the ground line should be destroyed.

**Late blight.** This disease is closely related to if not identical with the late blight disease of potatoes. Circular of Information No. 291, Oregon Experiment Station, fully describes late blight and possible means of control.

**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 that 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, blossom end rot is induced. Avoiding the growing of too vigorous a plant, using irrigation to maintain a uniform supply of moisture in the soil and eliminating frequent, deep cultivation will assist in preventing fruit from having this trouble.

**Curly top.** This is also known as Western Yellow tomato blight. It is a serious disease of the tomato and causes heaviest losses in the semiarid regions of the state. The trouble is known to be caused by a virus carried by the beet leaf hopper. When the plant is attacked it stops growing, the leaflets roll upward, become leathery

and turn yellow. The veins are purplish, the fruits turn red prematurely and the whole plant gradually dies. At the present time no fully satisfactory control measures are available. Plants grown in a moderate amount of shade, however, are usually less affected than those grown in full sunshine. For further information consult Oregon Experiment Station Circular of Information No. 278.

**Tip blight.** This is a virus disease found particularly in certain counties of the state where tomatoes are grown. It is fully discussed in the special circular on the subject, Oregon Experiment Station Circular 128.

**Sunscald.** The sides or cheeks of fruit lying unprotected from hot sun may frequently be burned during days of unusually high temperatures. Plants having sufficient foliage so that much of the fruit is protected from the sun will rarely suffer fruit injury by sunscald.

**Blotchy ripening.** Improper coloration of the fruit often occurs when temperatures in the summer reach a high degree. When ripening in moderate temperatures, the fruits have a fine red pigment. Where the fruit is protected by foliage it may be several degrees cooler than that which is exposed to intense light and temperature, hence the protected fruit usually has an unblemished color.

**Fruit cracks and blemishes.** Following a spell of dry weather fruit may have both vertical and concentric cracks after the first rains. Environmental factors such as rainfall are more likely to cause cracks than any other factors.

**Harvesting and storage.** Tomatoes pass through various stages of coloration before becoming red-ripe. Immature-green fruit, when halved, cuts like a green apple with no sign of gelatinous cell tissue or interior yellowness. Such tomatoes will not color red if picked and put away. Mature-green fruit, however, shows a gelatinous or sticky cell tissue and a slight to definite yellow interior. Such fruit will develop a red color when picked and put in a moderately warm place.

Fruit should not be fully ripened on the vines if they are to be transported any great distance, but should be picked in the pink or half red stage.