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## G80-496 Tomatoes in the Home Garden

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## Tomatoes in the Home Garden

This NebGuide outlines tomato rearing practices, cultivars and possible pest, disease and weed control problems.

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Tomatoes come in a wide range of fruit colors, sizes, shapes and maturities. Ripe tomatoes may be red, yellow, orange, pink or even green. Shapes vary from globe or round to slightly flattened, pear-like or cherry-sized. Often consumers complain tomatoes purchased in grocery stores are lacking in flavor or have tough skin. In a home garden, you can grow the tomatoes you prefer, including a wide selection of fruit colors, flavors, textures and sizes. Although rumored, there is no direct link between fruit acidity and color. Preference for one fruit over another is due more to cultivar differences in flavor and texture. Each plant typically will produce 10 to 15 pounds of fruit.

Cultivars may have a determinate plant structure, growing only to a given height; while others show indeterminate or continuous growth until killed by frost. Generally, the earlier maturing cultivars are determinate. Certain tomato cultivars have been developed for special uses such as stuffing or longer storage. Greenhouse production requires specific cultivars adapted to the lower light and higher humidity levels characteristic of greenhouses. Cherry-type tomatoes are productive and have small fruit. Very dwarf cultivars adapted for growth in pots or other containers are also available. Most of these "patio" cultivars have cherry-sized fruit, although a few produce regular-sized fruit.

Tomatoes developed for commercial field production generally ripen over four to six weeks. Many of the earlier maturing cultivars have a determinate plant type combined with a concentrated fruit set. These will not produce tomatoes continuously but are grown for early production. Most home gardeners will want to plant

both determinate and indeterminate tomato cultivars for a long season of fresh tomatoes. Determinate tomatoes are ideal for canning or freezing.

Most newer cultivars are resistant to or tolerant of certain diseases. This is usually indicated by a letter following the name, such as "N" for nematodes, "F" for fusarium, "T" for tobacco mosaic virus and "V" for verticillium wilt. Although open-pollinated "heirloom" cultivars are now popular, many have little genetic resistance to common diseases. These older cultivars should be planted in ground that has not had any solanaceous crops (tomato, pepper, eggplant or potato) for at least three years and in a place with good air circulation to reduce the opportunity for fungal infection.

Tomatillos ("husk tomatoes") and ground cherries are sometimes confused with tomatoes. These plants belong to the genus *Physalis* rather than the tomato genus *Lycopersicum*.

An updated list of recommended tomato cultivars for Nebraska is published in the Extension Circular, *Selected Vegetable Cultivars for Nebraska*, available at your local Cooperative Extension office.

### **Planting Sites**

Tomato plants should be planted in full sun for optimum fruit development and high production. Fertile, well-drained soil is best. Wind protection provided by slatted wooden or plastic fencing, shrubs, trees or taller crops such as corn will enhance tomato growth and yield. Individual plants may be grown in large containers, but will need more attention as the soil tends to dry out quickly.

Avoid planting tomatoes near black walnut trees as the juglone produced by walnut roots can stunt and may eventually kill the tomato plants. Juglone and walnut wilt are discussed in more detail later in the *Problems* section of this publication. It also is advisable to rotate tomatoes so they are not planted in the same place other solanaceous crops (tomatoes, potatoes, eggplant and peppers) were grown the previous year.

### **Soil Preparation and Fertilization**

Soils can be tilled or spaded in the fall after harvest or in the spring before planting. Soil should not be worked while it is wet.

Tomato plants benefit from fertilization. A soil test may be necessary to determine the fertility level of your soil. Instructions on how to collect and submit soil for testing are available from your local Cooperative Extension office. When planting in soils with high nutrient values, some or all the fertilizer may be omitted at planting. If soil nutrients are low, apply 2 to 3 pounds of a complete fertilizer (ex: 5-10-10, 6-12-12 or 8-16-16) per 100 square feet of garden area when preparing the soil.

When the first fruit is about the size of a half-dollar, scatter one teaspoon of 5-10-5 fertilizer uniformly around the plant 8 to 10 inches from the stem. Mix the fertilizer into the top 1/2 inch of soil and water thoroughly. Repeat this once or twice a month through the rest of the season.

Do not over-fertilize. Excessive nitrogen fertilizer tends to force the plants to produce excess foliage at the expense of fruit production.

### **Growing Transplants**

Home gardeners may either purchase tomato transplants or grow their own. When growing your own plants, sow the tomato seeds four to six weeks before the plants are to be transplanted outdoors. The seeds may be planted into small pots and growing containers or in flats and later transplanted into individual growing containers.

Various commercially prepared mixtures for starting seeds are available. These are easy to use because they are generally free of insects and diseases and require no preparation. However, a mixture (by volume) of two parts garden loam soil; one part either sand, perlite or vermiculite; and one part ground sphagnum peat also can be used. Pasteurize both the container and soil mix before use to destroy harmful insects and diseases. Place the moistened soil mixture in a container, cover the container tightly with aluminum foil and heat the soil at 180°F for 30 minutes. A meat thermometer can be used to check the temperature of the soil in the center of the container. Use only oven-proof containers for this step. Whether you use a commercial mix or a homemade pasteurized soil mixture, be sure your transplant flats or small pots are clean. Disinfect previously used containers by soaking them for 20 minutes in a 5 percent solution of standard household chlorine bleach and water (most household bleach is 5.25 percent sodium hypochlorite). To make a 5 percent solution to disinfect containers, add 3/4 cup of household liquid chlorine bleach to a gallon container and then add water to make a full gallon. Allow the containers to air dry before adding the planting mix.

Cover the seeds with 1/2 inch of the planting mix. For good germination keep the soil moist and warm — between 70°F and 80°F. Cover the flats or pots with a sheet of plastic or piece of glass to help maintain the proper moisture and temperature. Remove the cover when seedlings break through the soil surface and water just enough to keep the soil slightly moist to the touch.

Transplant young seedlings into growing containers when the stems have straightened and the first true leaves have opened, usually 10 to 14 days after sowing. When transplanting young tomato seedlings, hold the plant by a leaf as pressure on the stem can cause permanent damage. Seeds can be germinated directly in pots without transplanting to other containers. Pots with more than one seedling should be thinned to a single plant by cutting the tops from the extra seedlings. Pulling excess seedlings out of the pot can injure the roots of the remaining seedling.

Expose young plants to full sunlight if possible. Supplemental light may be necessary if adequate sunlight is not available. The best temperatures for growing transplants are from 65 to 75°F during the day and 60 to 65°F at night. Both hotbeds and cold frames work well in maintaining these temperatures. Maintaining root temperatures within this range is more important than the air temperature of the foliage.

Transplants may become too tall and "leggy" due to insufficient light, high daytime air temperatures, excessive fertilization, lack of air movement or seeding more than eight weeks before field planting can begin. If adverse weather prevents a planned transplanting, the seedlings' growth rate can be slowed by reducing the amount of water applied so the transplants wilt slightly between applications. Brushing the tops of the plants 15-20 strokes once a day with your hand or a small stick or having a small fan blow gently across the seedlings for a few hours a day will also slow growth.

## **Purchasing Transplants**

Most home gardeners find it convenient to buy tomato plants. When purchasing, choose sturdy, dark green plants that have stems about the size of a pencil. Preferably, the plant should not be in bloom. Leaves should be fully expanded and free of diseases and insects.

Transplants are available in packs of six to eight, in flats or in individual containers. Although plants grown in individual containers may cost more, they are generally worth it. Those in individual cells or containers are transplanted with the least amount of shock as their roots are not disturbed when plants are set out in the garden. Containers should be large enough so root growth is not restricted.

### **Transplanting to the Garden**

Plants grown indoors should be "hardened off" before planting outdoors, which enables the plant to better withstand the shock of transplanting. The hardening process should begin 10 to 14 days before planting. Begin the hardening process by moving the plants in their containers to a shady, outdoor location.

Move the plants into sunlight for short periods each day, gradually increasing the length of exposure. Do not put tender seedlings outdoors on windy days or when temperatures are below 45°F. Try not to let the plants wilt during this hardening process. Tomato flowers exposed to temperatures below 50°F are likely to develop into fruit with the defect called "cat facing." If this occurs, remove the defective fruit to enhance additional flower formation and fruit set.

Transplant hardened seedlings into the garden when the risk of frost is low. The frost free date in Nebraska varies from year to year and location to location. Protect the plants with paper or plastic covers, newspapers or boxes if there is danger of frost. Research has shown plastic tubes filled with water, sold commercially as "Wall o' Water," are superior to paper "hot caps" or plastic milk containers in allowing sufficient light and adequate temperature moderation for tomato growth early in the season.

Set the plants slightly deeper in the soil outdoors than they were growing in the container. If the plants are tall, you can set them as deep as the second set of true leaves.

If plants are in peat pots, tear back the peat on one side of the pot. Press the soil firmly around the plant to form a slight depression to hold the water. The edges of the peat pot must remain covered with soil. If exposed, the peat pot serves as a wick for water evaporation and the plant will quickly dry and may die. Water the plants immediately and then double check to ensure all edges of the pot are covered with soil.

Distance between plants depends on two things: cultivar and growing method. Set unstaked plants 3 feet apart in rows 4 to 5 feet apart. If the plant will be staked, plant them 18 to 24 inches apart in rows 3 feet apart. Caged tomatoes are best spaced 24 to 36 inches apart in rows 4 feet apart.

## **Seeding Outdoor**

While tomato seeds can be planted directly outdoors in Nebraska, the length of the production season usually is reduced. Sow the seeds 1/2 inch deep in rows 4 to 5 feet apart. Keep soil moist until the seeds germinate. When the seedlings have developed at least one true leaf, thin them so they are spaced 3 feet apart.

## **Watering**

Tomatoes need about 1 to 2 inches of water each week. This varies according to temperature, type of soil, rainfall and whether a mulch is used. Sandy soils, for example, require more frequent watering. Heavy weekly soakings are better than frequent light soakings that tend to maintain shallow root systems. Mulching helps reduce water loss.

## **Staking and Caging**

Staking or placing cages around the plants makes it easier to harvest and, in some cases, to cultivate tomatoes. When staking plants, use wooden stakes about 8 feet long and 1 1/2 inches wide. Insert the stakes about 4 inches from the plant. Do this soon after transplanting to prevent root damage. Set the stakes 1 1/2 to 2 feet deep for good support.

Tie strips of cloth, nylons, soft cord or commercial ties around the stake and under leaflet branches about every 12 inches up the stem. You also can tie the cord to the stake 2 to 3 inches above a leaflet branch, then loop the cord loosely around the main stem and tie it to the stake below the branch.

Tomatoes also can be supported by enclosing them in cages constructed of wire or wood. The size of the cage varies with the type of plant. A cage 4 to 5 feet tall and 14 to 18 inches wide will support most plants. Nearly indestructible cages can be made from concrete reinforcing wire mesh. The 6-inch square openings make it easy to harvest even extra-large fruit. For a cage 18 inches in diameter, cut the wire in 4.75 foot lengths and

form each into a circle. To make cages of other diameters, use the formula for the circumference of a circle. Bend the end wires to hold the cage together.

**Formula for the circumference of a circle**

$(2 \times 3.14 \times r)$  where  $r$  is the radius

-or-

$(3.14 \times d)$  where  $d$  is the diameter

If you use another type of wire mesh, make sure the openings are large enough for your hand to fit through while holding a large tomato fruit. Place the cages over the young plants and stake the cage to the ground to guard against wind damage and breakage. Electric fence posts make sturdy, inexpensive stakes. Check the plants weekly and adjust the main stem so it grows inside the cage and not through a side opening. Some gardeners wrap nylon netting around the outside and secure with clothespins or clips to eliminate the need to train the stems. The net can be removed once the plants fill the cage.

As the plants grow, remove the "suckers" or side branches and tie the main stem to the stake (*Figure 1*). Be careful to remove the suckers and not the fruiting stems or leaflet branch. Suckers appear at the point where the leaflet branch joins the main stem. Do not remove suckers from cultivars with a strongly determinate growth pattern.



**Figure 1. Remove plant "suckers" as the plants grow.**

### Hail Protection

If your garden tends to be damaged by hail, you can reduce the injury to your tomato plants by covering the top of each cage with half-inch hardware cloth. Place a square of the wire on top of each cage and bend the corners down to secure. Using both nylon netting and hardware cloth greatly reduces hail damage from early summer storms.

### Weed Control

Weeds compete with tomato plants for sunlight, nutrients and water. In the average garden, weeds are best controlled when small with cultivation or with mulches. Weeds can be removed by hand or with a hoe or cultivator. Cultivating too deeply may damage tomato roots and bring weed seeds to the surface for germination. In large plantings, herbicides can be used.

Mulches help keep weeds down, reduce water loss and help stabilize soil temperature. Inorganic mulches, such as polyethylene, paper and newer types of fabric, are available in most garden stores or from mail order garden supply companies. Organic mulches, such as straw, leaves or grass clippings, can also be used.

Spread organic mulches at least 2 inches deep on the soil surface. Mulching the soil too early in the spring with organic mulches keeps the soil cool, resulting in slow growth and shallow rooting. Inorganic plastic mulches increase soil temperature and promote earlier growth and production. Keep young stems from touching the plastic, however, as it can become hot enough to burn them on a sunny day. Be sure to water tomatoes adequately during the summer to prevent wide variation in soil moisture. Although mulches reduce evaporation from the soil immediately around the plant, a large, well-established tomato plant may use several gallons of water a day.

## Harvest

Harvest fully ripe tomatoes to get the best flavor and color. Fully ripe tomatoes may be refrigerated for several weeks, although flavor will deteriorate. Nearly mature fruit ripens if stored at 60°F to 70°F. Do not place immature tomatoes in the refrigerator as this will prevent ripening and flavor development.

In the fall, just before frost or a light freeze, pick green tomatoes for later ripening or pickling. Remove the stems and discard any damaged or diseased fruit. Wipe the tomatoes clean, let them dry and wrap loosely in paper and place on a tray in a cool (not under 50°F), unlighted area. Make sure the tomatoes are not touching. When the fruit starts to turn light pink, remove the wrap and allow it to ripen at room temperature.

## Problems

Tomatoes are subject to a number of problems including diseases, insects and environmental stress.

Many tomato diseases, such as septoria leaf spot, early blight, late blight and anthracnose fruit spot, can be controlled or minimized by chemical sprays and sanitation. Reduce fusarium and verticillium wilts by planting wilt-resistant cultivars and rotating crops. Remove diseased plants immediately to reduce future disease problems.

**Blossom drop**, a common problem, rarely persists through the season. Blossom drop is caused by, 1), low spring temperatures, usually below 60°F, 2), high summer temperatures, especially daytime temperatures above 85°F or, 3), nighttime temperatures above 70°F; or excessive nitrogen fertilization.

Low temperatures reduce pollen production and viability. In some cases, spring blossom drop due to low temperatures may be prevented with a fruit set hormone. The easiest solution is to wait for later flowers to set fruit. Row covers can be used to encourage earlier fruit set by increasing temperatures around the plant.

High temperatures also can reduce flower development and pollen viability. High temperature, especially if accompanied by low humidity and moisture, hinders fruit set through pollination and/or fertilization failure. The adverse effect of high daytime temperature on flower formation and fruit set is somewhat mitigated when night temperatures are within the optimal range of 59°F to 68°F, as occurs in western Nebraska.

**Fruit cracking** is common in home gardens. Heavy moisture following dry periods may cause fruit cracking. Some cultivars crack more easily than others. Mulching plants to help maintain uniform soil moisture levels helps reduce cracking. To minimize cracking during stress periods, pick pink fruits and let them ripen indoors.

**Leaf curl** commonly occurs in hot weather or after cultivation. Keep plants adequately watered. Deep cultivation around the plants can damage roots and cause wilting. Some cultivars have naturally curling leaves even when not stressed.

**Herbicide damage** may develop if even a slight amount of a hormone-type weed killer, such as 2,4-D, is used in the vicinity. Curling, twisting and abnormal leaf and stem growth are common symptoms. Avoid using weed sprays close to the garden. If herbicide damage is slight, plants usually return to normal after several weeks.

**Walnut wilt** of tomatoes may develop if tomato plants are grown too close to black walnut trees. The plants wilt and the lower portions of the stems brown internally. A root rot occurs at about the time of death. The plant injury is caused by juglone, a substance produced by the roots of walnut trees. The injury may not occur every season. To minimize this problem, locate tomato plants at a greater distance from the base of black walnut trees than the tree height.

**Blossom-end rot** of tomatoes results from an irregular or insufficient supply of moisture and/or not enough calcium in the fruit. Indications of blossom-end rot are that the tips of tomato fruits, especially the first fruits to ripen, become water-soaked, turn light brown in color and become sunken as the fruits enlarge and begin to ripen. To reduce this condition: mulch to maintain uniform soil moisture; do not cultivate deeply around the plant; and avoid using high-nitrogen fertilizer. Disease organisms are not responsible for blossom-end rot, so fungicides are of no value in its control. Soil calcium levels in Nebraska are usually adequate and application of calcium sprays is not necessary if uniform soil moisture is maintained. For additional information, see NebFact 91-43 *Blossom-end Rot in Tomatoes*.

Insect identification and control recommendations are found in EC78-1507, *Insect Control Recommendations for Vegetables in the Home Garden*.

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