

## Tomatoes

*Diane Relf and Alan McDaniel, Extension Horticulturalists  
Ronald D. Morse, Associate Professor  
Department of Horticulture, Virginia Tech*

### *Environmental Preferences*

**LIGHT:** Sunny  
**SOIL:** Well-drained loam  
**TEMPERATURE:** Warm (70° - 80°F)  
**MOISTURE:** Moist, but not waterlogged

### *Culture*

**PLANTING:** Transplant either after all danger of frost has passed and the soil has warmed or provide protection.

**SPACING:** 18-36" x 36"

**HARDINESS:** Tender annual

**FERTILIZER NEEDS:** Preplant broadcast with 2 lbs 10-10-10/100 sq. ft.; use starter solution for transplants; sidedress 4-6 weeks later, after first fruit has set, with 2 lbs 10-10-10 per 100 feet of row; sidedress again two weeks after first fruit ripens at same rate; repeat one month later at 1 lb 10-10-10 per 100 ft. row.

### **CULTURAL PRACTICES:**

Tomatoes are valuable garden plants in that they require relatively little space for large production. Each tomato plant, properly cared for, yields 10 to 15 pounds or more of fruit.

Choose varieties with disease resistance bred in for best results. Letters after variety name indicate resistance to: V-Verticillium Wilt, F-Fusarium Wilt, FF-Race 1 and Race 2 Fusarium Wilt, N-Nematodes, T-Tobacco Mosaic, A-Alternaria (Crown Wilt).

The many tomato varieties available may seem overwhelming to a new gardener; ask gardening friends for the names of their favorites. This will give you a good idea of what does well in Virginia. Virginia Tech publication no. 426-480, *Vegetables Recommended for Virginia*, will also be helpful. Several major types of tomatoes exist that can be

grouped according to plant size or fruit characteristics.



### **Plant size:**

(a) Midget, patio, or dwarf tomato varieties have very compact vines suitable for growing in hanging baskets or other containers. The tomatoes produced may be the cherry type (1" diameter or less), but some will produce larger fruit.

(b) Compact or determinate tomato plants grow to a certain size, set fruit, and then decline. Many of the early ripening tomato varieties are determinate and will not produce tomatoes throughout a Virginia summer. The concentrated fruit set makes them ideal for canning or making juice.

(c) Indeterminate tomato plants continue to grow until frost or disease kills them. These are the standard, all-summer tomatoes that most people grow. They require stakes or cages for best results. If not supported, the plant will occupy excessive garden space, and fruit in contact with the soil may rot.

### **Fruit Characteristics**

(a) Beefsteak-type tomatoes are large-fruited, producing a tomato slice that easily covers a sandwich, and the whole fruit weighing up to two pounds or more. These usually ripen later, so

LD  
5655  
A762  
no. 426-  
418  
1992  
VPI  
Spec

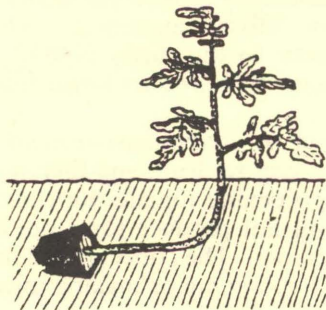
plant some standard-sized or early tomatoes for longest harvest.

(b) Cherry or salad tomatoes have small (about 1" diameter) fruits. Plants of cherry tomatoes range from dwarf (Tiny Tim) to seven-footers (Sweet 100). One standard cherry tomato plant is usually sufficient for a family, since they generally produce abundantly.

(c) Paste tomatoes have small pear-shaped fruits with very meaty, less juicy interiors, few seeds, and no central core. Paste tomatoes are a favorite for canning since they don't have to be cut up, and since they are so meaty, they cook down to paste quickly.

(d) Red tomatoes are most common, but within each plant type there are also pink, yellow, orange, and striped varieties. There is no direct link between fruit acidity and color. Preference for the other fruit is due more to variety differences in flavor and texture. Transplants of non-red varieties are not commonly available and must be grown from seed by the gardener.

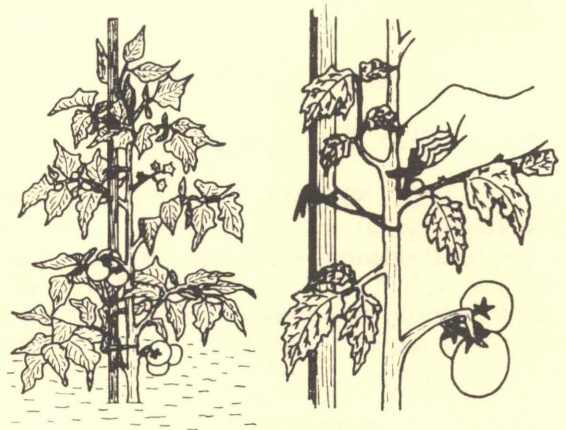
(e) Winter storage tomatoes are a relatively new item for gardeners. The plants are set out later in the season than most tomatoes and fruit are harvested partially ripe. If properly stored, they will stay fresh for twelve weeks or more. While the flavor does not equal that of summer vine-ripened tomatoes, many people prefer them to grocery store tomatoes in winter.



Tomato plants may be started indoors from seed or transplants may be purchased. If starting plants indoors, use a light soil mix and give the plants plenty of light. Tall, spindly transplants are usually caused by low light levels in the home. Unless a sunny, south-facing window is available, supplemental light will probably be necessary. Sow the seed six to eight weeks before the last frost date. A few weeks before transplanting to the garden, harden-off indoor-grown plants by exposing them to an increasing number of hours outdoors each day. Bring plants indoors if there is danger of frost. A few varieties of tomato known as sub-arctics are bred to grow well in low spring temperatures; however, these are

rarely available in the usual markets and ordinarily must be grown from seed.

Select stocky transplants about six to ten inches tall for planting. Set the transplant in the planting hole and cover the stem so that only two or three sets of true leaves are exposed. Horizontal planting of tomato plants, especially leggy ones, is an effective way to make plants stronger. Roots will form along the buried portion of the stem, giving better growth and less chance of plant injury from a weak stem. Do not remove peat-pot containers, but tear off the top edge and cover pot completely so that it will not later dry out and prevent the roots from growing into the soil. If non-biodegradable containers are used, knock the plants out of the pots before transplanting, and partially loosen the roots. Press the soil firmly around the transplant so that a slight depression is formed for holding water. Pour approximately one pint of starter solution around each plant to settle the soil around the roots.

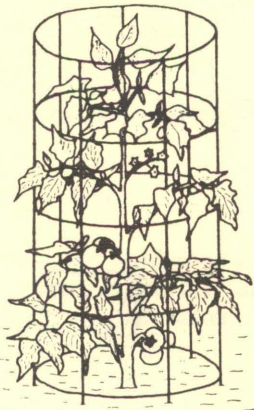


Indeterminate varieties should be staked, trellised or caged. Staking requires more initial work but later care is easier than with sprawling plants. Since they are off the ground, fruit rots are reduced, spraying is easier and may be required less often, and harvesting is much less work. Space plants 24" apart in rows three feet apart. Use wooden stakes six feet long and 1-1/2 or 2 inches wide. Drive them one foot into the soil about four to six inches from the plant soon after transplanting. Attach heavy twine or strips of cloth to the stakes every ten inches. As the plants grow, pull the stems toward the stakes and tie loosely.

Prune staked tomatoes to either one or two main stems. At the junction of each leaf and the first main stem a new shoot will develop. If plants are trained to two stems, choose one of these shoots, normally at the first or second leaf-stem junction, for the second main stem. Remove all other shoots,

called suckers, weekly to keep the plant to these two main stems. Pinch shoots off with your fingers. Tomato plants may also be set along a fence or trellis, with similar pruning and tying.

Cage-growing allows the tomato plant to grow in its natural manner, but keeps the fruit and leaves off the ground. Using wire cages requires a large initial expenditure and a large storage area, but many gardeners feel that the freedom from pruning and staking is worth it. The cages will last many years if made from concrete reinforcing wire with 6" openings to allow easy harvest. Stems are simply tucked back inside the cage as they grow. Wire-cage tomatoes develop a heavy foliage cover, reducing sunscald on fruits and giving more leeway when bottom leaves become blighted and have to be removed. Many staked plants are nearly naked by late summer. Caged plants are less prone to the spread of disease from plant handling, since they do not have open wounds and are handled less frequently than staked plants. However, it helps to space the plants somewhat further apart to allow good air circulation between plants; three feet is appropriate. Humidity is high because of the foliage density, and diseases such as late blight spread rapidly in humid situations. If well-nourished and cared for, caged tomatoes can produce exceptional harvests and make up for the extra space with high production.



### ***Causes of Poor Tomato Fruit Set***

**Fruit Set.** The transition of a flower into a young fruit is very sensitive to several environmental factors over which gardeners have some control. Following is a brief discussion of some of the causes of poor tomato fruit set with particular emphasis on urban gardening.

**Temperature and Humidity.** Daytime temperatures above 90°F and night temperatures above 70°F result in reduced flowering and fruit set. There is con-

siderable evidence that night temperature is the critical factor in setting tomato fruit, the optimal range being 59-68°F. With night temperatures much below or above this critical range, fruiting is reduced or absent. Low temperatures reduce the production and viability of pollen. High temperature, especially if accompanied by low humidity and moisture, hinders fruit set through failure in pollination and/or fertilization.

**Plant Nutrition.** Reduced fruiting may result from either stunted or excessively vigorous vegetative growth. Injury from disease and insects, especially sucking insects such as aphids and thrips, can severely check growth. Inadequate moisture and/or available nitrogen can hinder growth and flower production. Conversely, abundant water and nitrogen can stimulate rapid vegetative growth with low levels of carbohydrates remaining for the normal processes involved in fruit set.

Garden sites located on heavy subsoils are infertile and poorly drained. Gardeners create faulty nutrition by either not applying any fertilizer or by adding too much. In addition, water for irrigation is often not available during times of drought.

**Photoperiod (length of day).** Although the tomato plant can flower and fruit at any daylength (day neutral plant), fruit set has been shown to be retarded under continuous light. Thus, tomato fruit set may be reduced under the continuous illumination characteristic of some environments.

### ***Other Common Problems***

**DISEASES:** early blight, septoria leafspot, verticillium and fusarium wilts, late blight, tobacco mosaic virus, bacterial spot

**INSECTS:** flea beetle, hornworm, stink bugs, Colorado potato beetle, fruitworm, aphids, mites, whiteflies, cutworms

**OTHER PESTS:** nematodes

**CULTURAL:** blossom-end rot (irregular soil moisture, calcium deficiency); poor color, yellow spots or large whitish-grey spots (sunscald from lack of foliage cover); leaf roll (physiological condition often found in pruned tomatoes); fruit cracking (irregular soil moisture); black walnut wilt (caused by roots of tomato plants coming in contact with roots of black walnut tree).

### ***Harvesting and Storage***

**DAYS TO MATURITY:** 55-105 from transplanting into the garden.

**HARVEST:** Harvest fully vine ripened but still firm, most varieties are dark red. Picked tomatoes should be placed in shade. Light is not necessary for ripening immature tomatoes. Some green tomatoes may be picked before the first killing frost and stored in a cool (55°F), moist (90% RH) place. When desired, ripen fruits at 70°F.

**APPROXIMATE YIELDS** per 10 feet of row:  
15-45 lbs.

**AMOUNT TO RAISE PER PERSON:** 20-25 pounds for fresh use; 25-40 pounds for canning.

**FRESH STORAGE:** green tomatoes - medium cool (50-70°F), moist (90% RH) conditions; 1-3 weeks. Ripe tomatoes - cool (45-50°F), moist (90% RH) conditions; 4-7 days.

**PRESERVATION:** Can or freeze as sauces or in chunks (whole or quartered), peeled.

### FROST PROTECTION FOR TOMATOES AND OTHER EARLY TRANSPLANTS

Use covers to slow the loss of heat from soil around plants on cold nights. However, covers must be vented to allow free air circulation during the day. Watch the weather. The covers may cook your plants on warm, sunny days.

#### For Individual Plants:

##### Hotkaps

Commercially available paper protectors with vent for air circulation and cuff for soil to hold cap in place.



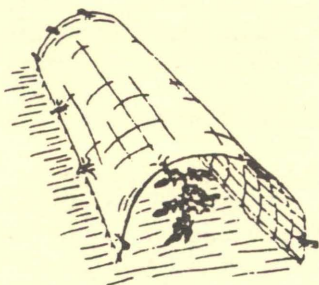
##### Plastic Jugs

Cut off bottom and set jug over plant. Keep cap on for cold nights. Remove cap on cool days or whole jug on warm days.

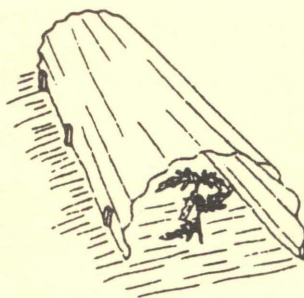


#### For a Row of Plants:

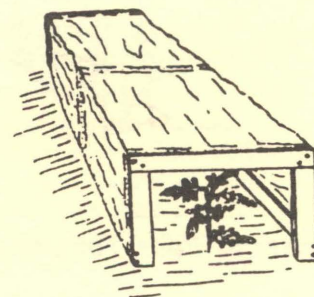
##### Tunnel Row Covers



Bend wire frame over plants and secure in soil. Drape clear plastic over wire and fasten with clothespins. Fold plastic back on hot days.



Bend fiberglass panel over the row and secure it with stakes.



Build a wood frame and cover it with clear plastic.