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Environmental Horticulture

PUBLICATION 426-418

Tomatoes

*Diane Relf, Alan McDaniel and Ronald Morse**

Environmental Preferences

LIGHT: Sunny.
SOIL: Well-drained, loam.
FERTILITY: Medium-rich.
TEMPERATURE: Warm (70 to 80°F).
MOISTURE: Moist, but not waterlogged.

Culture

PLANTING: Transplant after all danger of frost is past and when the soil has warmed.

SPACING: 18 to 36 inches by 36 inches if staked or caged.

HARDINESS: Tender annual.

FERTILIZER NEEDS: Heavy feeder. Use starter solution for transplants. Sidedress one to two weeks after the first hand or cluster of tomatoes begin to develop with 3 tablespoons 33-0-0 per 10-foot row. Sidedress again two weeks after the first ripe tomato with a balanced fertilizer such as 5-10-5; repeat one month later.

Cultural Practices

Tomatoes are valuable garden plants in that they require relatively little space for large production. Each standard 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 the variety name indicate tolerance or resistance to the following:

Fusarium Wilts Race 1 (F)
Early Blight (As)
Fusarium Wilt Race 1 and Race 2 (FF)
Bacterial speck *Pseudomonas* (B)
Root-knot Nematodes (N)
Septoria leaf spot (L)
Tobacco Mosaic Virus (T)
Stemphylium Gray leaf spot (St)
Alternaria Stem Canker/Crown Wilt (A)

The varieties of tomato plants 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. VCE Publication 426-480, *Vegetables Recommended for Virginia*, may also be helpful. Several major types of tomatoes exist that can be chosen according to need:



Based on plant characteristics –

- Midget, patio, or dwarf** tomato varieties have very compact vines best grown in hanging baskets or other containers. The tomatoes produced may be, but are not necessarily, the cherry type (1 inch diameter or less). Some produce larger fruit. These plants are usually short-lived, producing their crop quickly and for a short period.
- Compact or determinate** tomato plants refers to the plant habit of growing to a certain size, setting fruit, and then declining. Most of the early ripening tomato varieties are determinate and will not produce tomatoes throughout a Virginia summer.
- Indeterminate** tomato plants are the opposite of the determinate types. The vines continue to grow until

* Extension Specialists, Horticulture, Virginia Tech and Associate Professor, Horticulture, Virginia Tech



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frost or disease kills them. These are the standard, all-summer tomatoes that most people like to grow. They require support of some kind for best results, since otherwise the fruit would be in contact with the soil, thus susceptible to rot.

Based on fruit characteristics –

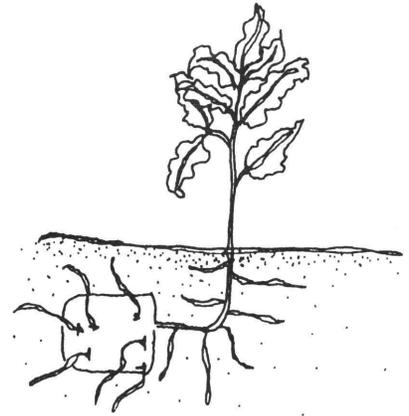
- (a) **Cherry** tomatoes have small, cherry-sized (or a little larger) fruits often used in salads. Plants of cherry tomatoes range from dwarf (Tiny Tim) to seven-footers (Sweet 100). One standard cherry tomato plant is usually sufficient for a family, since they generally produce abundantly.
- (b) **Beefsteak** type tomatoes are large-fruited types, producing a tomato slice that easily covers a sandwich, the whole fruit weighing as much as two pounds or more. These are usually late to ripen, so plant some standard-sized or early tomatoes for longest harvest.
- (c) **Paste** tomatoes have pear-shaped fruits with very meaty interiors and few seeds. They are less juicy than standard tomatoes and are without a sizeable central core. Paste tomatoes are a favorite for canning since they don't have to be cut up and since they are so meaty.
- (d) **Color** of tomatoes include orange, yellow, pink, or striped, and often the only way to get a specific one is by growing your own. Most are heritage varieties obtained through seed-saver groups. Tests have shown that there is no relationship between color and acidity of tomatoes.
- (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.

Planting Tomatoes

Tomato plants may be started indoors from seed or transplants may be purchased. If starting your own plants, 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 you have a sunny, south-facing window, supplemental light will probably be necessary. The seed are sown six to eight weeks before the last frost date in your area. A few weeks before transplanting time,

harden-off indoor-grown plants by exposing them to an increasing number of hours outdoors each day. Bring plants in if there is danger of frost. A few varieties of tomato (the 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.

When you are ready to put home-grown or purchased plants into the ground, select stocky transplants about 6 to 10 inches tall. Set tomato transplants in the ground covering the stems so that only two or three sets of true leaves are exposed.



Horizontal planting of tomato plants is an effective way to make plants grow stronger, especially leggy ones. Roots will form along the buried portion of the stem, giving better growth and less chance of plant injury from a too-weak stem. Do not remove the containers if they are peat or paper pots, but open or tear off one side to allow roots to get a good start. If non-biodegradable containers are used, knock the plants out of the pots before transplanting, and loosen the roots somewhat. Press the soil firmly around the transplant so that a slight depression is formed for holding water. Pour approximately one pint of starter solution or dilute fish emulsion around each plant to wash the soil around the roots.

Plants should be staked or caged. Though it requires more initial work, this makes caring for tomatoes easier than letting them sprawl. Since they are off the ground, fruit



rots are reduced, spraying is easier and may be required less, and harvesting is much less work. For staking, space them 24 inches apart in rows 3 feet apart. Use wooden stakes 6 feet long and 1 1/2 or 2 inches wide. Drive them 1 foot into the soil about 4 to 6 inches from the plant soon after transplanting. Attach heavy twine or strips of cloth to the stakes every 10 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 and tied and pruned in a manner similar to that used with stakes.

Growing tomatoes in wire cages is one method popular among gardeners because of its simplicity. 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, if heavy duty, will last many years.

Be sure to get fencing with at least 6 inch spacing between wires so that you can get your hand inside to harvest the tomatoes. If tomato plants in wire cages are pruned at all, once is enough; prune to three or four main stems. 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 must be handled less frequently than staked plants. However, it helps to space the plants somewhat further apart (3 feet is good) to allow good air circulation between plants; humidity is higher 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. This type of culture is especially suited to indeterminate varieties.

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 considerable 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 trips, 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.

Common Practices

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, Japanese beetles.

OTHER PESTS: Nematodes.

CULTURAL: Blossom-end rot, irregular soil moisture or calcium deficiency; poor color, yellow spots or large whitish-gray 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 toxin from black walnut tree.

Harvesting And Storage

DAYS TO MATURITY: 55 to 105 days.

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

APPROXIMATE YIELDS: 15 to 45 pounds per 10-foot row.

AMOUNT TO RAISE: 20 to 25 pounds per person if used fresh; 25 to 40 pounds for canning.

STORAGE: Medium-cool (50 to 70°F), moist (90% relative humidity) conditions for one to three weeks for green tomatoes. Cool (45 to 50°F), moist (90% relative humidity) conditions for four to seven days for ripe tomatoes.

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

Heirloom Tomatoes

Heirloom tomato varieties are treasures from the past. Chosen for outstanding flavor, color, or overall performance, they can be grown in your garden, but probably never found in a supermarket.

With the change in trends of food production after WWII, there came a need to develop tomatoes that could be harvested green, withstand shipping, etc., and maintain a good, uniform appearance. These qualities were achieved through hybridizing. The sacrifice of this breeding was flavor – which, in recent years, scientists have been trying to re-introduce. Though hybridized tomatoes have their place, heirloom tomatoes definitely surpass them in one general characteristic – their taste.

Here are some common heirloom tomato varieties you may want to try:

- **Big Rainbow** – This very large tomato is a gold/red bicolor, and is described as being meaty and mild-flavored.
- **Brandywine** – This large beefsteak variety tomato is legendary for its “exceptionally rich, succulent flavor” and “old-fashioned tomato taste.” An Amish heirloom, it is solid pink-red.
- **Black Krim** – This Russian beefsteak variety is deep maroon red when ripe. It is a medium-sized tomato that has a “rich” flavor.
- **Evergreen** – When ripe, this juicy and flavorful tomato is green with yellow highlights.
- **Green Zebra** – This green and yellow tomato has “a sweet zingy flavor” and is “as sweet as an apple.” It is beautiful when served with yellow, red, orange and pink varieties.
- **Stupice** – This smallish Czechoslovakian tomato is great for northern climates, is early to ripen, and is very productive. It is a smooth red tomato with great flavor.
- **Yellow Pear** – This variety produces an endless supply of yellow, bite-sized, pear-shaped fruit that have a mild flavor.

Check the Internet for current sources of plants, seeds and information, or contact your local Virginia Cooperative Extension Office for sources.