

GROWING TOMATOES ABOVE 6000 FOOT ELEVATIONS IN ARIZONA

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Introduction

Tomatoes are the most popular vegetable item in the home garden. Only a half dozen plants will supply an average family's needs. Throughout much of the country tomatoes are considered an easy crop to grow, but at the higher elevations of Arizona it becomes very difficult. Late spring frosts and low night time summer temperatures are the two major limiting factors. Tomatoes have to be planted early enough to ripen fruit by fall yet not too early or they will be killed by a late spring frost. This means that the familiar long-season varieties prove disappointing in Arizona at high elevations. The varieties that are successful are the small-fruited, quick-growing types (60-70 days); such as cherry, pear, and Siberian types.

Six Steps to Growing Tomatoes Successfully at High Elevations

1. CHOOSE SHORT-SEASON VARIETIES (LESS THAN 70 DAYS).

Seed catalogs list varieties by the number of days required to ripen fruit. Days are counted from when a six inch healthy plant is set in the garden until the first fruit is ripe. Experience of Master Gardeners in Coconino County indicate the following varieties produce good yields: Early Girl, Pixie Hybrid, Cold Set, Sweet 100, Galina, Olympic, and Stupice.

2. GET AN EARLY START BY PLANTING 6-INCH PLANTS BY EARLY-JUNE.

This is best done by sowing seeds in late April and growing plants under protection from cold. It will take about six weeks to grow good plants from seed. In June retail nurseries may have plants of the desirable varieties that are too large. When tomato plants are planted in early June they *must* be protected at night to prevent damage or stunting from cold (see step 3 for details).

3. ENCOURAGE RAPID GROWTH BY INSURING GOOD SOIL PREPARATION AND SOIL WARMING.

Soil fertility should be moderately high but not should not have too much nitrogen. (Plants grown in soil high in nitrogen will be green and very lush with few fruit). Soil high in organic matter will improve growth. At planting, water with a starter solution that has a higher percent of phosphorus than nitrogen. Thereafter, do not allow the plant to dry out.

Select a warm, sunny, wind sheltered part of the garden. Cover the soil with plastic, clear does the best job, to warm the soil. Surround the newly planted tomato with one of the following; a tall cage made of construction wire with clear plastic wrapped around it, a 'Wall-O-Water', a plastic milk jug with the bottom cut out and the top open, or three to five plastic milk jugs filled with water and surrounding the plants. All of these methods creates a greenhouse effect around the plant. If a single plastic jug is used over the plant mound soil half way up the jug (Fig. 1).

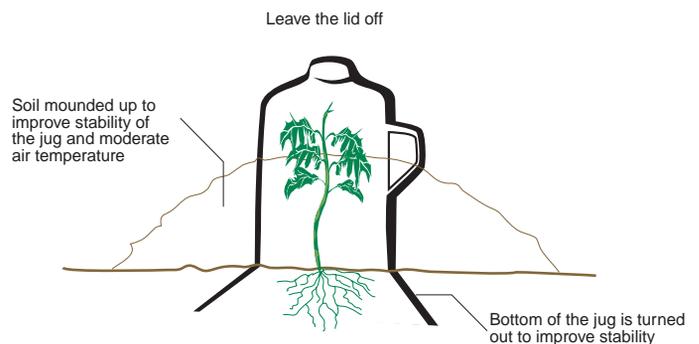


Figure 1. Mounding soil half way up a plastic mil jug will moderate the temperature of the air inside the jug.

By growing tomatoes in five gallon cans or tubs, some flexibility is achieved. Plants can be moved into the sun during the day and moved to a protected spot during the night.

4. FLOWERS DO NOT SET FRUIT WHEN NIGHT TEMPERATURES ARE BELOW 55°F.

Blossoms which eventually turn into fruit are sensitive to low temperature. Fruit set can be initiated by spraying the young flowers with "Tomato Bloom Set" or by covering the plants at night. Bees are not necessary for pollination but it does help to manually shake the flowers by gently tapping the stem to promote self-pollination.

5. COVER THE PLANTS WITH FLOATING ROW COVER OR SLITTED CLEAR PLASTIC TO IMPROVE GROWTH AND FRUIT SET.

Row covers such as Remay, Tufbell, Agryl, and Kimberly Farms, can keep night time temperatures up to 10oF warmer. Clear plastic works well also, but must be slitted or removed daily to let hot air out. Optimum temperature for tomato growth and development is 65-80°F.

6. PROPER WATERING WILL GIVE A BIGGER HARVEST.

Tomato plants need frequent watering when young. When flowering starts it is best to reduce the frequency but increase quantity. When the first fruit can be seen, reduce both frequency and quantity of watering. Always add water if the plant is wilted.

Starting Your Own Plants from Seed

Individual or multi-pack pots are excellent for starting tomatoes. However other containers can also be used. If the side of a ½ gallon milk carton is cut off and some drainage holes punched in the base, it makes a suitable container for six starter plants. Many other kinds of containers can be salvaged from the kitchen.

Nearly fill the carton with equal parts of sterilized house plant soil mix and coarse building sand. Soak it till water comes out the drainage holes and the soil is settled. With the blunt end of a pencil, make six ¼" deep holes and sow two seeds in each hole. Cover the seeds with soil, put in a warm place (60-85°F), and keep moist but not wet. The seeds will germinate in 5-14 days. This same basic process can be used for individual or multi-pack pots.

The first few days after emergence are important. Young seedlings must have good light as soon as they come out of the soil, otherwise they will grow toward the light source and stretch. Choose the location for the seedlings carefully. A place such as the kitchen window is usually too dark to grow strong seedlings. Adding bright light with a fluorescent As the seedlings grow, thin them by pinching out the weaker plant of each pair. Do not apply any fertilizer until more than five true leaves have developed. Young tomato plants

are tender; they burn easily when sprayed or fertilized. After they reach two inches in height, they can be watered with a fertilizer solution made of house plant food or a fish emulsion suitably diluted. In 6-8 weeks the plants will be ready for planting out; being six inches tall, a dark green color and getting ready to flower.

Choosing a Good Plant in the Nursery

A plant of good quality is dark green in color with a sturdy series of leaves starting low down on a strong stem. It should be six inches high, with young flower buds not yet open, and showing new growth at the tips. Nurseries generally sell smaller plants in packs of six or eight, although single plants are sometimes available for a higher price.

Plants in a pack should be of even size and sturdy. Check them for insect infestation and discard leggy plants that have a bronze coloration. Such plants are growth-checked because their roots had no room to grow in the small containers. Avoid plants that are in flower because they are over mature.

It can be advantageous to make an early purchase of three-inch or four-inch plants in a six-pack. Pot these plants into 4-6" diameter single containers and grow them in a sheltered place three or four weeks before planting out. Growth is encouraged by watering with a fertilizer solution as often as necessary to keep the plants looking healthy. Given adequate space on their own, the plants make more branches and sturdier stems in a larger container such as a cut-off milk carton standing on its base.

Planting Out into the Garden

Tomatoes need, as do all vegetables, deep fertile soil that drains well. In a permanent site, this means a deep digging, putting in well rotted manure and ammonium phosphate as outlined in publication AZ1435 "Ten Steps to a Successful Vegetable Garden."

Tomato plants should be set deep in the soil or on their side in a shallow trench up to the first leaf branch, since the stem, once in the soil, produces additional roots (Fig. 2). Some growers remove the lower two or three leaves from a sturdy plant to get even deeper planting. This encourages additional root formation, which in turn gives a stronger plant, provided it is in a well-prepared fertile soil that is warm at root depth. Planting in a trench puts the root system in the warm upper part of the soil.

Keep the leaves and fruit off the ground in the interest of disease control, but allow the plant to bush out. A good support is provided by encircling the plant with a cylinder of construction wire two or three feet tall and one to two feet across. The branches grow through and are supported by the six inch squares.

If you were not able to add compost or well rotted manure before planting, water with a balanced fertilizer solution

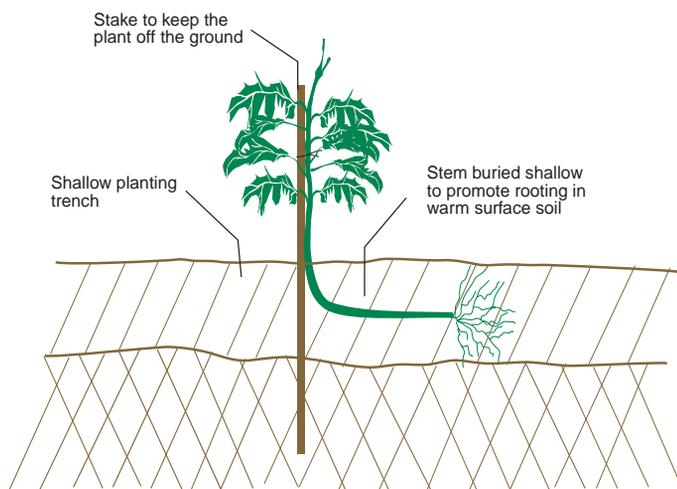


Figure 2. Planting tomato plants on their side in a shallow trench will promote root growth along the stem.

every week to ten days to encourage growth. Water-soluble fertilizers are easiest to use after the plants are growing in garden soil. However, heavy nitrogen feeding reduces fruit production and makes for lush leaf growth. A plant that has been well-fertilized early in its life will not generally need further fertilizing after the first fruit is set.

Pests

Few diseases infect tomato plants at the high elevations of Arizona, the number one killer of tomatoes in the high country is cold weather.

Old garden soils that have grown several crops of tomatoes often become infested with nematodes. These are microscopic worm-like creatures that invade vegetable plant roots and cause them to be swollen and distorted. No chemical treatment for this problem is licensed for home use so the best solution is to leave the ground vacant for a year and then add 3-6" of organic matter to the soil before reusing. There are varieties of tomatoes, designated by the letters V.F.T.N. after their name, that show some resistance to verticillium wilt (a fungus), fusarium (a fungus), tobacco mosaic virus and nematodes.

Aphids sucking on the young leaves weaken the plants. Home use pesticides are labeled for their control. Organic nicotine spray or insecticidal soap can be effective.

Caterpillars, such as tomato hornworms, and tomato fruitworms can be picked off by hand, sprayed with home use pesticides labeled for their control, or sprayed with an insect disease organism *Bacillus thuringiensis* (Bt).

Blossom-end rot is caused by a lack of calcium in the fruit and is often associated with irregular watering. This typically affects the larger, longer season varieties. A deep soil, well-supplied with humus and the use of mulches helps prevent this occurrence.

References

Obeker, N.F. and R.E. Call. 2008. Ten Steps to a Successful Vegetable Garden. University of Arizona, College of Agriculture and Life Sciences Bulletin. AZ1435. Tucson, Arizona.

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