



Home Garden Tomato

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Tomato (*Lycopersicon esculentum*) can be grown throughout the year in most places in Hawaii by choosing varieties adapted to the particular area. Both bush and vining types are available. Vining types grown in the garden can be pruned and staked or allowed to spread over the ground. Tomato plants can also be grown in 3–5-gallon containers.

Varieties to plant

Tomato cultivars developed by UH-CTAHR horticulturists include the hybrids 'N-5', 'N-52', 'N-63', and 'N-65' and the open-pollinated cultivars 'Anahu', 'Healani', and 'Kewalo'. These were tested for resistance to root-knot nematode and other common tomato diseases, and they were also determined to be adapted to a wide range of growing conditions throughout the state. The hybrids produce indeterminate vines, which grow and produce fruits continuously if kept healthy; they should be pruned and trellised. The three non-hybrid cultivars are determinate—they grow to a certain height and then stop, and they tend to flower and set fruit within a relatively short period of time. They have bush form and do not need to be pruned or trellised. Sometimes side shoots may emerge and allow the determinate plants to keep producing.

The open-pollinated cultivars can be grown from seeds saved from a previous crop, but the hybrids will not reproduce true this way, and only plants from seeds purchased from the breeder will have the desired qualities.

Other cultivars grown in Hawaii include 'Celebrity', 'Better Boy', 'Red Cherry', and 'Roma'. Some people may try growing "heirloom" tomato cultivars sold by seed companies. These are old varieties that have been perpetuated by gardeners because of some unique characteristic such as taste, appearance, or pest resistance; however, they may not grow well in environments other than those where they were developed.

Gardening practices

Basic tomato plant management involves either leaving the plant unpruned, which will result in dense growth, or pruning to allow only one to three major stems to develop. The plants can be left to sprawl on the ground or suspended by trellising or staking. Keeping the plants off the ground helps minimize disease incidence and damage caused by insects, slugs, and snails. Pruning and staking or trellising also allow more plants to be grown in a given area.

Seedlings can be raised individually in cell trays or pots and transplanted 3–5 weeks after sowing. Plants can be supported by circular cages 3–6 feet high and 16–18 inches in diameter made with 6 x 6 inch mesh hog fencing or construction wire. Tall cages should be secured by a couple of stakes pounded into the ground. The construction wire mesh can also be used to make a trellis to support a row of tomatoes. Sturdy posts to support the trellis are needed at the ends and every 4–5 feet apart along the trellis. Seedlings should be spaced 15 inches apart in rows 24–30 inches apart.

Plant tomato seedlings with part of the stem buried along with the root ball. Additional roots will develop along the buried stem portion. Dig a small trench 6 inches long by 4 inches deep, lay one seedling in the trench at a slight angle with several inches of the top of the seedling above the ground, then bury the roots and lower portion of the stem. As the plant grows, train it to grow into the wire mesh for support. Plants can be pruned or left unpruned. Pruning involves removing the side shoots arising from the leaf axils and leaving only the central shoot. One or two additional side shoots can be left unpruned to grow out of the lower part of the main stem for additional yield.

*This document replaces Hawaii Cooperative Extension Service Home Garden Vegetable Series no. 5, "Tomatoes," 1978.

Tomato varieties that can be grown in containers such as 3–5 gallon plastic pots include bush varieties such as ‘Pixie Hybrid’, ‘Tiny Tim’, ‘Patio’, and ‘Healani’, as well as cherry tomato varieties. Plant one seedling per container and support the plant with a stake or wire cage.

Preparing the soil: amendments and fertilizer

Tomato plants grow best in well drained, moderately acidic to neutral soil (pH 6.0 to 6.8 is optimum) with a good level of soil organic matter. Have the soil analyzed to determine the soil pH and whether any soil amendments (including lime, dolomite, and phosphate) are needed. A soil analysis is particularly recommended for new garden sites. A “standard” soil analysis, which measures soil pH and available soil phosphorus, potassium, calcium, and magnesium, is relatively inexpensive and can be done by the CTAHR Agricultural Diagnostic Service Center* or a commercial laboratory (preferably one having experience with Hawaii’s soils).

Soil with pH below 5.5 requires application of agricultural lime to increase the pH to a level more favorable for plant growth. Soil in high-rainfall areas often requires lime to increase the calcium supply. For tomato, adequate available soil calcium is needed to prevent blossom end rot, which is a large black spot that forms on the bottom of tomato fruits in calcium-deficient soils, or when drought stress limits calcium translocation within the plant.

Low levels of available soil phosphorus limit plant growth in many of Hawaii’s soils. Both lime and phosphate fertilizer must be mixed thoroughly into the surface 6–8 inches of the soil before planting.

Home garden productivity can usually be increased by amending the soil with organic matter, such as compost or well rotted animal manure (see the CTAHR publications *Backyard composting—recycling a natural product* and *Composted animal manures—precautions and processing*). If a suitable material is available, make an annual application to the garden of 1–3 inches spread over the soil and mixed into the surface 6–8 inches. If

the material is in short supply, its application can be limited to the area within 6–10 inches from the planting row or spot.

To ensure adequate levels of the major plant nutrients, include a general fertilizer when preparing the garden before planting. Commonly available rapid-release fertilizer formulations suggested for vegetables are 16-16-16 (“triple-16”) and 10-20-20 (these numbers refer to the percentages of nitrogen, phosphate, and potash in the fertilizer).

Commercial growers often figure on applying a total of 175 pounds of N per acre to a tomato crop. In home gardens, this is best achieved by splitting the fertilizer into two or more applications. On a 100 square-foot (sq ft) basis, this can be achieved by two applications (one preplanting, the second to the bearing crop) of 2 pounds of 10-20-20 or 1¼ pounds of 16-16-16. Gardeners who prefer to use slow-release formulations will apply all of the nutrients before planting. Preplanting fertilizers should be mixed well with the garden soil.

For determinate tomato cultivars, two applications should suffice, one preplanting and the second when the plants begin to flower. For indeterminate cultivars, maintain good plant growth over an extended period by applying the second dose of fertilizer in smaller amounts given every two weeks after bearing begins.

Soil phosphorus can increase to an undesirably high level after long-term application of high-phosphate fertilizers, such as 10-30-10. If this is part of the garden’s history, a soil analysis should be done to check the phosphorus level. If it is in excess, a zero-P formulation can be created by mixing equal amounts of urea and muriate of potash to produce a formulation that is about 23-0-30. For the 100 sq ft basis fertilizer schedule mentioned above, about 14 oz of this fertilizer would be applied in each of two applications.

Fertilizer application to the bearing crop

When the plants begin to flower, apply the second dose of general fertilizer, in the case of determinate types, or begin the smaller biweekly applications to indeterminate types. Divide the amount of fertilizer being applied according to the number of plants in a 100 sq ft garden area, and apply it 6–8 inches from the base of each plant. Some gardeners spread the fertilizer on the soil surface, but others believe it is best to use a trowel to incorporate it 2–4 inches into the soil in one or two spots, using

*For information on sampling soil and arranging for its analysis by CTAHR-ADSC, see the CTAHR publication *Testing your soil—why and how to take a soil-test sample*, available at www.ctahr.hawaii.edu/freepubs under “Soil and Crop Management,” or from UH-CTAHR Cooperative Extension Service offices statewide.

care to minimize damage to the plant root system. Irrigate after the application. Water-soluble fertilizers containing micronutrients may also be used for postplanting applications.

Irrigation

Before fruit set, irrigate two to three times a week during periods of little or no rainfall. After fruit set, three to four irrigations per week with heavy soaking may be necessary for most soils and localities, depending on rainfall; container-grown plants should be irrigated daily after fruit set. To minimize leaf disease, avoid wetting the plant when applying water. If possible, irrigate only the soil using furrows, drip lines, or soaker hoses. If using overhead (sprinkler) irrigation, do it in the morning so the plants dry quickly as the day warms. Insufficient soil moisture or poor water uptake due to root damage or disease may produce fruits with blossom end rot.

Disease management

Tomato plants are susceptible to diseases caused by bacteria, fungi, viruses, and nematodes. Problems can be minimized by using varieties resistant to or tolerant of the diseases. Fungal and bacterial leaf spots and blights are common during warm, wet weather. If possible, irrigate only the soil and avoid wetting the leaves. Incorporating manure or compost into the soil will help increase the soil microbial activity to suppress nematodes. For more information on nematode control see the CTAHR publication *Plant-parasitic nematodes and their management*.

Two common virus diseases of tomatoes are tomato spotted wilt virus (TSWV), which is transmitted by thrips insects, and tobacco mosaic virus (TMV), which is transmitted by contaminated tools and by people's hands or footwear. Avoidance is aided by keeping the garden clean of weeds that are host plants of TSWV and thrips. TMV infection can be avoided by washing off any infected plant sap from tools and hands before touching tomato plants.

Insect pest management

Insect pests include whitefly and leafminer. Whiteflies can be washed off with a strong stream of water or sprayed with insecticidal soap. Leafminers are parasitized by tiny wasps; they can be removed by pinching through the leaf with your fingernails. Fruit fly infestation can be prevented by covering tomato clusters with cloth bags or paper sacks (do not use plastic bags), or row-cover fabric can be cut into pieces and tied around the tomato clusters. Mites, thrips, and treehoppers may infest the leaves and stems of tomato plants. Damage to the fruits by slugs and snails is reduced when the plants are supported and the fruits kept off the ground. Before using pesticides to control diseases, insects, or other pests, obtain the correct identification of the pest and a control recommendation from a knowledgeable source. Always read the pesticide label to make sure it is approved for the crop, and follow its directions.

Harvest

At the earliest, tomato fruits can be harvested when the bottom shows some pink. Fruits picked three-quarters to fully ripe will taste better than those picked earlier. Most varieties mature in 60–80 days. On average, one or two harvests per week will be necessary. Fruits should be harvested more frequently if cracking or splitting is a problem; this can occur during periods of heavy rainfall.

Seed availability

Seeds of tomato cultivars developed by UH-CTAHR are available from the CTAHR Agricultural Diagnostic Service Center Seed Lab on the UH Manoa campus and from some garden stores. Other varieties can be found in garden stores and seed company catalogs. CTAHR Seed Lab order forms can be obtained online at <www.ctahr.hawaii.edu/seed> or from Cooperative Extension Service offices statewide.