



Vegetables:

Growing Tomatoes in Home Gardens

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS145E

Crop at a Glance

Growing season: May through October

Time to transplant: After the last frost date in May or June

Spacing: Approximately 4 square feet per plant

Days to harvest: Ranges from 65–80 days

Average yield: 4–10 pounds per bush, depending on variety

Common starting method: Seed or transplant

makeup through each generation. Hybrid varieties tend to have desirable traits like improved vigor or disease resistance; however, hybrids lack genetic consistency from generation to generation. Check varieties for the initials VFNT. If all four initials are listed on the seed packet or plant stake, the plants will be resistant to Verticillium wilt (V), Fusarium wilt (F), nematodes (N), and tobacco mosaic virus (T).

Be sure to select a plant variety that matches your taste and cooking needs. You may want small cherry tomatoes (1 inch) for salads, while the larger beefsteak tomatoes (over 4 inches) would be best for slicing. There are also plant varieties whose “solids-to-liquids” ratio makes them specifically well suited for sauces and salsas.

Choosing a Planting Site

Tomatoes grow best in full sun, so they need to be located in an area that receives at least 6 hours of direct sunlight every day. Tomatoes prefer a location with well-drained soil; they do not grow well in a heavy clay soil. Also, the soil should be high in organic matter and phosphorus. Tomatoes will require water regularly during the growing season, so you need access to a nearby irrigation source.

Planting Guidelines

Start seeds indoors in a sunny location 6–8 weeks prior to the first frost-free date. Seeds germinate best at 70°F–80°F and grow best at daytime temperatures of 70°F–75°F and nighttime temperatures of 60°F–65°F.

Be sure to harden-off transplants, that is, acclimate them to being outside, before they are placed outside permanently. Hardening-off transplants is necessary to promote strong, healthy plants. Start by setting transplants outside for a few hours each day in a partially sunny area. Increase the time they are out over the next week. After a week, leave plants outside overnight. If temperatures drop below 50°F, keep them indoors. After 12 days, you can transplant your seedlings outdoors. Do not plant them before the frost-free date for your area because spring frost can kill young tomato plants.

Introduction

Tomatoes are a favorite for gardeners everywhere, whether grown in a garden or container on the deck. Tomato fruit is a staple in the American diet and in many ethnic cuisines. Plus, tomatoes are naturally high in antioxidants, a chemical that may reduce the risk of some cancers.

Selecting Types to Plant

There are 7,500 varieties of tomatoes with differences in color, shape, growth habit, length to harvest, taste, and disease resistance. Tomatoes are classified as either determinate or indeterminate. Determinate varieties are bush-like, with all the tomatoes ripening about the same time. Indeterminate varieties are vine-like, with the tomatoes ripening throughout the growing season—until frost kills the plant. Consider tomatoes with short growing seasons (less than 75 days) if you live in western Washington or high elevations in eastern Washington because fruit needs to reach maturity quickly in cooler summer temperatures. Varieties that have longer growing seasons are better suited to the warmer summer temperatures of eastern Washington.

If you are planning to save seeds, select an open-pollinated (heirloom) plant variety that will hold true to its genetic

This fact sheet is part of the WSU Extension Home Garden Series.

Performing a soil test is the best method for determining soil pH, as well as a plant's potential nutrient needs and nutrient overloads during the growing season. Tomatoes grow best in slightly acidic soils, those with a pH between 6.0 and 6.5. West of the Cascades, soil pH is often naturally in this range or lower. Where pH is below 6.0, add the manufacturer's recommended quantity of lime (calcium carbonate) to adjust the pH to the ideal range. East of the Cascades, soil pH is often above the ideal range; pH can be lowered using the manufacturer's recommended amount of elemental sulfur.

Typically, tomatoes require 1.5 to 2 ounces of nitrogen per 10 linear feet of planting bed and roughly equal amounts of phosphorus and potassium. Prior to planting, submit garden soil samples to a soil-testing laboratory for nutrient-level testing. (See Further Reading section for information on laboratories serving the Pacific Northwest.) Based on test results, choose a fertilizer that meets the nitrogen, phosphorus, and potassium requirements of your site in order to give your tomato plants the best possible care. For more information on how to calculate the amount of fertilizer to add to your tomato-growing area, see the publication *Soil Fertility in Organic Systems: A Guide for Gardeners and Small Acreage Farmers* (Collins et al. 2013) cited in the Further Reading section.

Mixing fertilizer and other soil amendments into the soil immediately before planting will help get your tomatoes off to a good start. Early plant needs can be met by tilling in the recommended quantity of lime or sulfur and one-half the annual nitrogen requirement for your planting area.

Bury as much of the plant stem as you can when transplanting tomatoes. The stem, when buried, will produce roots and promote a more vigorous tomato plant. Begin by removing all the leaves from the lower two-thirds of the plant. Dig a trench 3 inches deep, lay the transplant on its side in the trench, and cover it with soil. Do not compact the soil when replacing it, instead, gently pat it in place. Space plants 18 inches apart, and be sure to thoroughly water the new plant at this time.

Transplanting is also the time for staking or caging to support the plants as they grow heavier with increased leaf canopy and fruits. Trying to insert stakes or cages after transplanting will only damage the tomato plant. The basket-weave method (Figure 1) is another support method useful for row plantings.



Figure 1. The basket-weave method.

If you use stakes, check each week to see if the plant has grown enough that another tie is needed. A series of free videos from the University of Maine, listed in the Further Reading section, will show you how to correctly stake, trellis, or basket-weave tomatoes for maximum support.

Plant Maintenance

Tomatoes can be very temperamental, and if not cared for correctly, you can end up with few fruit or mostly green tomatoes. Water is key to a healthy plant. Expect to water about 1 inch per week during peak tomato growth. To determine how long it takes for an overhead sprinkler to deliver 1 inch of water, obtain two straight-sided cans, such as empty tuna fish cans. Set one can 12 inches away from the sprinkler head, and set the second can 18 inches away from the sprinkler head. Turn the sprinkler on for 20 minutes. Measure the amount of water in each can after 20 minutes using a ruler. Average the two measurements. If the averaged water amount is less than 1 inch or more than 1 inch, adjust the watering time based on the measurement. Continue testing until you know the exact amount of time to let the sprinkler run so that an average of 1 inch of water is being supplied to the tomato plant. Once the plant is receiving the correct amount of water, using mulch will help reduce water loss.

Overwatering can cause increased leaf growth at the expense of tomato production. Too much water also encourages plant disease. Remove plant leaves touching the ground to reduce disease transmission. Try to avoid getting water on the leaves because this stimulates fungal growth. Test the soil (insert your finger into the first inch of soil to see if it is moist) to know when water is needed.

As the tomato plant grows, resist providing too much nitrogen. Excess nitrogen stimulates leaf growth, decreasing fruit production. Use a slow-release fertilizer in arid regions, where frequent watering is necessary.

Pruning indeterminate plants will not increase overall tomato production but will give you larger fruit earlier in the season. Regularly look for and prune suckers on the lower third of the stem as they appear on the plant (Figure 2). A sucker is a non-flowering, leafy shoot that grows in the joint between branches and the main stem of the plant.

In short-season locations, pruning will allow the plant to focus energy on fruit

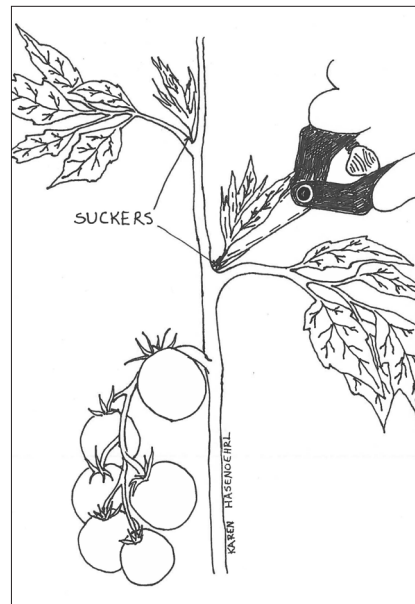


Figure 2. Remove suckers growing on the lower third of the plant stem.

production. If left on the plant, suckers unnecessarily divert water and energy that would otherwise be used for fruit development.

Pest Management

If you have a problem with plant disease or insects, you need to identify the source of the problem before taking action. Using the correct approach can stop disease progression and help prevent future problems. Contact your local WSU Extension office to help you identify plant disease or damaging insects and confirm corrective measures. Consult with a WSU Master Gardener or the WSU publication *Hortsense: Home Gardener Fact Sheets for Managing Plant Problems with IPM or Integrated Pest Management* at <http://pep.wsu.edu/hortsense> for additional information on pest management, including pesticide products.

Diseases: Tomato production and quality can be drastically reduced when plants are damaged by disease. Reduce the presence of plant disease by

1. Purchasing seeds or transplants certified as disease-free,
2. Planting tomato plants in well-drained soil in a sunny location,

3. Waiting until air temperatures are above 65°F to transplant,
4. Keeping water off leaves when watering,
5. Regularly keeping the soil around tomato plants weed-free,
6. Regularly removing suckers to improve air movement in the plant canopy, and
7. Regularly monitoring plants and promptly moving and discarding diseased plant material offsite. (Composting does not kill many disease-causing organisms, so if you put diseased plant material in your compost pile you may accidentally infect other garden and landscape areas.)

Insects: Healthy plants are your best defense against problem insects. Be sure to identify the problem insect before you take action to avoid killing beneficial insects accidentally. Avoid broad-spectrum insecticides because they also kill beneficial insects. Encouraging the presence of general insect predators, such as lacewings or ladybugs, in your garden will help reduce many insect problems. Inspect plants regularly for insect damage to leaves and fruit. Minor leaf damage is not considered a problem and may not require action.

Common Problems

Anthracnose (fungal disease)

Photo: Paul Bachi, University of Kentucky REC, Bugwood.org

Symptoms: Small dark spots on fruit. May also affect leaves. Dark spots have a yellow circle around them and will become sunken.

Corrective Action: Plant in well-drained soils. Avoid overhead irrigation. Control weeds in and around the garden and remove plant debris. Rotate crops on a three- to four-year cycle to avoid fungus surviving in the soil.



Blossom-End Rot (nutrient deficiency)

Photo: Jeremy Cowan, WSU

Symptoms: A lesion develops on the end of the fruit that turns black and leathery. It can be caused by low calcium, infrequent watering, uneven watering, or high temperatures early in the season.

Corrective Action: Send a soil sample in for testing. Your county extension agent can recommend soil-testing laboratories in your area. If low in calcium, use lime or dolomite lime at least 2–4 months before planting. Plant in well-drained soils and water consistently. Mulching plants may be helpful. Fertilize moderately to avoid buildup of salts in the soil and to prevent excessive growth.



Catfacing (development disorder)

Photo: Jeremy Cowan, WSU

Symptoms: Affected fruits are scarred at the blossom end. Fruit appears puckered and lumpy. Caused by low temperatures during fruit set.

Corrective Action: Avoid cultivars prone to this problem, such as “Oregon Spring.” Is limited to early fruit or fruit developing during cool periods. Fruits set later in the season should be normal. Do not over fertilize; high levels of nitrogen may increase the problem.



Curly Top (viral disease transmitted by leafhoppers)

Photo: R.S. Byther, WSU

Symptoms: Leaves thicken and become brittle. Older leaves yellow and leaf edges roll upward. Plants are of poor quality.

Corrective Action: Do not plant tomatoes near spinach or beets. Plant disease-resistant varieties, such as "Columbian," "Rowpac," "Roza," and "Saladmaster," among others. Pull out and destroy infected plants. Controlling leafhoppers is not effective for preventing disease.



Late Blight (fungal disease)

Photos: Jeremy Cowan, WSU

Symptoms: Gray-green areas appear on leaves, stems, and fruit and become dark blotches that look wrinkled. Blotches appear on upper portion of fruit.

Corrective Action: Avoid overhead watering. Remove infected plants or plant parts when symptoms are noticed, but do not compost them. Space plantings to provide good air circulation and minimize humidity.

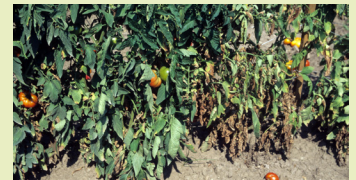


Verticillium Wilt (fungal disease)

Photo: Gerald Holmes, Valent, Bugwood.org

Symptoms: Infected plants wilt, become stunted, and develop yellow leaves that tend to roll inward. Yellowing occurs first on the lower leaves. Leaves dry out, turn brown, and die.

Corrective Action: Plant disease-resistant varieties. Crop rotation in following years is important.



White Mold (fungal disease)

Photo: W.J. Sorensen, WSU

Symptoms: Attacks dead flower petals or leaves, then spreads. Look for a rapidly spreading soft rot. Affected tissues turn gray and may be covered with a mass of cottony, white fungal growth.

Corrective Action: Avoid overhead irrigation. Plant in well-drained soils. Space plantings to improve air circulation, particularly around the base of the plants.



Aphids

Photo: Brian Kunkle, University of Delaware, Bugwood.org

Symptoms: Infested leaves will curl about aphids. Leaves may appear sticky and shiny.

Corrective Action: Wash aphids from plants with a strong stream of water.

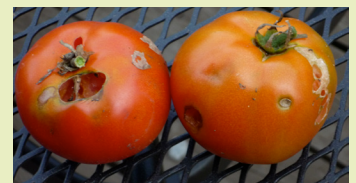


Slugs (A more common problem in western WA)

Photo: Karen Jeannette

Symptoms: Foliage of older plants is raggedly chewed, while younger plants are completely consumed. Fruit shows "hollowing damage."

Corrective Action: Clean up weeds and debris, which provide shelter. Encourage the presence of predators, such as birds, snakes, frogs, ducks, and predacious ground beetles. Hand-pick and kill slugs when detected (slugs feed at night). Use chemical baits with caution around pets.



Spider Mites (A more common problem in eastern WA)

Photo: W. Cranshaw, Bugwood.org

Symptoms: Whitish yellow stippling along leaf midrib. Whole leaves turn yellow, then bronze, then die. Mites and webbing can be found on the underside of leaves.

Corrective Action: Wash mites from plants with a strong stream of water. Drought-stressed plants are susceptible to mites, so focus on proper watering.



Tomato Hornworm

Photo: W. Cranshaw, Bugwood.org

Symptoms: Leaves chewed down to the midrib and dark pellets (frass) can be found on or under plants.

Corrective Action: Monitor plants daily. Hand-pick and destroy hornworms. Encourage natural enemies, including birds, spiders, and parasitic wasps, for control.



Harvest

Pick tomato fruits when they reach mature color but still retain some firmness. Size and color will depend on the plant variety selected—yellow, orange, pink, purple, and green varieties exist, as well as the typical red varieties. Tomatoes usually ripen about one month after the fruit begins to show. As the fruits continue to ripen, they will begin to lose firmness, and the flavor may be affected. Tomatoes can be picked early, after the fruit begins to change color, and will continue to ripen off the vine, with best results occurring at temperatures from 68°F to 77°F.

End Uses

Tomatoes are a versatile fruit and can be used in a variety of forms: fresh, frozen, juiced, pickled, stewed, dried, preserved and canned. For details on how to use and store tomato fruit, go to the National Center for Home Food Preservation website (<http://www.uga.edu/nchfp/>), which offers research-based recommendations for most methods of home food preservation. Additionally, the publication PNW300 *Canning Tomatoes and Tomato Products* can be found at <http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/13728/pnw300.pdf?sequence=1> and is also available for purchase from the WSU Extension Online Store at <https://pubs.wsu.edu/ItemDetail.aspx?ProductID=14761&SeriesCode=&CategoryID=&Keyword=PNW300>.

Additional Reading

Cogger, C. 2012. Raised Beds—Deciding If They Benefit Your Vegetable Garden. *Washington State University Publication* FS075E. <http://cru.cahe.wsu.edu/CEPublications/FS075E/FS075E.pdf>.

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Header photo by Jeremy Cowan, WSU.

Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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