



Vegetable Gardening

Stanislaus County has an excellent climate for gardening. Our mild weather means many crops can be grown throughout much of the year.

Most vegetables can be divided into the categories of cool and warm weather crops. Cool weather crops such as peas are planted in the fall or winter and harvested in spring. Warm weather crops like tomatoes are planted in spring and harvested in summer.

Not all crops can be put into distinct seasonal categories, as you will see from the guide on pages 5-7. Some can be planted twice in one year, as long as the temperature conditions are met during their growing season.

To start a spring garden, wait until after March 21st. This is due to statistical information available from the National Weather Service that shows only a 10% chance of frost after this date. Traditional spring crops like peppers, eggplants and squash do best after danger of frost is passed.

Late maturing crops like pumpkin and winter squash are planted in spring also but mature in the fall.

Many vegetable crops such as potatoes, artichokes and asparagus may be planted in

your garden in January and February. Potatoes arrive at local nurseries and garden centers as “seed potatoes”, and asparagus and artichokes arrive as bareroot plants.

Preparing the Site

Clear garden soil of rocks, debris and weeds. Till to a depth of 6-12” and work in humus, compost or composted manure. Wait until soil has dried somewhat before tilling. Working wet soil can destroy soil structure, cause compaction and reduce drainage.

Selecting the Site

Most vegetable plants require at least 6-8 hours of full sun for optimum growth. Often, vining or tall plants can shade nearby crops. These shadier spaces can work well for certain types of flowers and herbs that need less sun and add a bit of decoration to your garden. Plan well so each crop will have sufficient sunlight.

Irrigation

Locate your garden near a water source. For small spaces, a garden hose used in conjunction with furrow irrigation works well. For larger gardens, consider using drip irrigation.

Sprinklers work well for shallow-rooted plants like lawn or annual flowers, but most vegetables will need more water. Garden soil should be wet to a depth of at least 2 feet, especially during the hot summer months in the Central Valley.

Drip irrigation systems are easy to install but do require periodic maintenance. Several garden publishing companies have helpful books on this topic. Employees at local hardware and garden stores are also helpful in determining needed supplies and installation methods.

If you grow vegetables in a container, be aware that certain containers may need to be watered twice daily during hot summer days. Make sure the container has drainage holes and use potting mix specifically for use in containers.

Seed Starting

Some gardeners prefer to grow their own vegetable plants from seed. Start seeds 4-6 weeks before March 21st, choosing an end date when you will be able to plant outdoors.

To start seeds, use sterile containers and planting medium. Containers should have adequate drainage holes.

To reuse containers, sterilize with 1 part bleach to 10 parts hot water.

The planting medium should be labeled for use in containers. Moisten soil until it resembles a well-wrung sponge before adding it to containers. Avoid using garden soil to grow seedlings, as it may have soil-borne diseases such as damping off.

Seeds need a warm place to grow and a light source to support growth. Light should be bright, such as a south facing window. If you do not have enough light indoors, use two 40-watt light bulbs. Place them about 6 inches above the containers and keep the lights on for 14-16 hours per day. While seedlings grow, monitor to ensure they do not get too close to the lights, as contact with hot lights can cause leaf burn.

Unfortunately, fluorescent lights do not provide all light wavelengths needed by plants. Some exposure to infrared light through a window or incandescent light bulb is needed. Using grow lights is one way to give your plants all the necessary wavelengths for growth, but it can be costly.

Follow seed packet instructions to ensure proper planting depth. Seeds buried too deeply may sprout, but without enough resources to break through the top of the soil, they will die. Place tiny seeds on top of soil and sprinkle a small amount of soil over the top to cover.

Water seeds carefully, as splashing can wash them out of the container. Keep soil moist, but not soggy. Many seedlings look similar when they first emerge, so label all containers after planting.

If desired, use a houseplant fertilizer mixed in your water, at ½ the recommended strength. Wait a few days until seedlings have emerged before fertilizing. Fertilize at 2-week intervals with recommended strength on label. Do not overfertilize, as young seedlings are easily damaged.

After seedlings have reached 6-8 inches tall, they can be moved outdoors to be “hardened off.” This process helps seedlings acclimate to outdoor temperatures. Place plants outside in a protected location for a few hours each day until they become used to ambient air temperatures.

To start seeds directly in the soil, always use 3-5 seeds per hill or sprinkle seeds liberally in rows. Thin several weeks later according to the guide on page 4, when seedlings are well established.

Although the chance of frost is less than 10% after March 21st, cool temperatures and rain can cause damage and/or slow growth. Use row covers to protect from wind and promote warmer daytime temperatures. Before removing protective coverings, seedlings will once again need to be “hardened off” by temporarily exposing them to full sunlight.

A Note About Seeds

Before planting, take note of how many days are required for germination. If seedlings do not sprout, you may need to replant. There are several reasons seeds may not sprout, including burying seed too deeply or planting old seed. Replant as necessary or purchase new seed if you believe your seeds have expired.

Transplants

Before planting, water transplants well and let them dry out slightly. Then, squeeze the container lightly in your hands to separate the sides of the root ball from the container. (The root ball is the area of soil surrounding plant roots). Tilt the container on its side and gently slide it out.

Your soil is prepared, so it's not necessary to add amendments to the planting hole. When planting, dig the hole for your plant about the same depth as the root ball. Be aware that air space in the soil may cause the plant to sink. When finished planting, the top of the root ball should be level with the soil. Do not add additional soil on top of the root ball and brush off any that has gathered on top.

Garden Beds

If your garden has poor soil or drainage, consider using raised beds. To create a raised bed, use 2x12 redwood planks for the sides and ends, and fill with

amended soil. For ease of use, it is recommended a raised bed not be wider than 4 feet.

Small rows work well for many crops. Decide how long to make your rows, then cut a piece of string to this length. Tie the string between two sturdy wooden stakes. You can then use this tool to create all of your rows. Follow the string with your hoe to form each row. Keep the tool in a safe place for use each year.

Make a shallow basin between the rows for furrow irrigation or add drip tape alongside the row for drip irrigation.

For hill plantings (great for vining plants) pull the soil up with a hoe and make a small island. Ensure it's not built too high so irrigation water can reach the plant.

Seedlings and new transplants should be kept moist. Once vegetable crops are established, let the soil dry out somewhat between watering, as roots need air as well as moisture.

Continuous Crop

In order to have continuous production of food in your garden throughout the spring and summer, plant vegetables with differing maturity dates. Also, direct seed or transplant favorite varieties every few weeks to ensure a continuous supply.

Rows vs Hills

Some plants are traditionally spaced in rows, while others do

well on hills. Ensure rows are evenly spaced and you are able to comfortably walk along them.

Some gardeners like to use wooden planks for walking in between rows, as this helps lessen soil compaction.

Hills are small "islands" created by gardeners where one to two vining plants grow with ample room. Always seed hills with 3-5 seeds to ensure a good crop, then thin to the best plant.

Pests and Diseases

Often after planting a garden, you may find insects are drawn to your little square of paradise.

Seedlings are especially susceptible to attack from pests like snails and earwigs, which can consume a newly emerged crop in one night. Use a cover to protect seedlings from pests until your plants are established. Older plants can afford to lose some leaves, while seedlings cannot.

Identification

Identification of pests is the first step in controlling them. Use the UC IPM Pest Notes page online located at: <http://www.ipm.ucdavis.edu/PMG/menu.homegarden.html> or an insect identification handbook. Often pests are not seen during the day, because they are active at night. To get an idea of what happens in your garden in the evening, go outside with a flashlight and do some research. You may be surprised at what you find.

Using Insecticides

Insecticidal soaps and oils kill pests such as aphids, scale and whitefly on contact. They have a less negative impact on the environment than many other available registered products. Be sure to follow directions on the label, as applying soaps or insecticides when temperatures are above 80°F can damage plant tissue. Both types of pesticide have labels that list specific pests that can be controlled. Be aware that spraying while bees are active, even with less toxic alternatives, can kill bees.

Earwigs and Sow Bugs

Earwigs often chew on seedlings and other garden plants. Look for non-toxic alternatives to control them or try placing rolled newspapers in the garden in the evenings and removing them in the morning. Earwigs like to hide in the papers and can be disposed of each day by dropping them into a can of soapy water. Sow bugs are often blamed for more damage than they actually do. Their preferred food is organic matter, although occasionally they will prey on seedlings. They rarely require control measures.

Snails and Slugs

Snails and slugs can decimate a garden of seedlings in one night. Many baits are available, but some are poisonous (as well as attractive) to pets, wildlife and small children. Try using

nontoxic alternatives that contain iron phosphate. Irrigate before applying bait to promote snail and slug activity.

Other Control Measures

For gardeners who prefer not to spray for pests, use yellow sticky traps to reduce whitefly numbers. Set up traps at the same height as your plants using wire to hang them. Larger pests like tomato hornworms or squash bugs can be controlled by hand picking, or by knocking them off into a handheld container of warm, soapy water. Large populations of aphids often develop in early spring. By late spring, natural enemies-insect predators and parasites-often bring aphids under control.

Diseases

Diseases of seedlings like damping off cause the plant to collapse and die. Damping off is encouraged by over watering. Ensure seedlings dry out somewhat between watering. Seedlings that die may also have been chewed by cutworms or earwigs, so examine the stem of your plants to determine the cause or bring a sample of the damage to the UC Cooperative Extension Office or a local nursery person.

Powdery mildew is a common garden plant disease that is prevalent during the dry, summer conditions of the Central Valley. It's easily recognized by white, powdery growth on the surfaces of

leaves, shoots and sometimes fruit, vegetables or flowers. To control mild to moderate cases, spray plants with a horticultural oil. Never apply sprays when temperatures are over 90°F or to drought stressed plants.

Information by Crop

Local vegetable guides are available for peppers, squash and tomatoes from the UC Cooperative Extension Office at 3800 Cornucopia Way Suite A in Modesto, and online at: http://cestanislaus.ucdavis.edu/Gardening/Gardening_Articles.htm

Another neat resource is available on the web from the University of Illinois. Just remember the information on weather from this site is not for use in California. The sections "Vegetable Garden Basics" and "Q&A" contain detailed information and tips that are very informative.

<http://www.urbanext.uiuc.edu/veggies/directory.html>

Harvest & Storage

After growing food, it's important to use proper harvest and store methods. For more detailed information, see Harvesting and Storing Vegetables, available at Stanislaus County Cooperative Extension Office.

Be aware that some crops have prickly stems and leaves which may cause skin irritation. Harvest most crops using gloves

and pruning shears or a sharp knife.

The Vegetable Guide

In the comments section for each vegetable, planting dates are listed. Early dates are best for seed, while all dates work well for transplants. As the season progresses, planting vegetables from transplants is the best way to ensure that crops have a chance to reach maturity. Check seed packets for days to maturity and then determine if the crop will have enough time to bear vegetables before planting.

Many warm season vegetables can be planted in March. However, this guide advises waiting until April due to the chance of frost, wind damage and cold weather.

Onions, Leeks, Shallots and Garlic

For a comprehensive guide to these crops, see Stanislaus County Publication "Alliums in Your Garden".

Vegetable Guide

Artichoke

- 4' plant spacing
- 5' row/hill spacing
- Plants are available bare root in winter, also as small plants in spring. Artichokes are sensitive to frost which may damage or kill plants. Purple coloring on flowers (from frost) may occur but doesn't affect taste. Most plants will produce within one year. To harvest, cut off flower bud with 2-3" of stem. Artichoke plants are productive for at least 5 years.

Asparagus

- 1' plant spacing
- 5' row/hill spacing
- Plants are available bare root in winter. Amend soil thoroughly with compost. Create a trough 8" deep, 1' wide. Set crowns 1' apart and cover with 3" of soil. As crowns sprout and grow, gradually fill in soil around them until they are level with the top of the trench. Do not harvest the first 2 years. Begin harvest the 3rd year, and the bed will last at least 15 years. Cut spears during spring when they are 8" tall.

Beans (Snap Bush/Snap Vine and Pole)

- 3"/24" plant spacing
- 2-3' row/hill spacing
- Can be planted from seed in April; early May and July; August. Bush beans stand erect without support; pole beans can be grown on a trellis or 3 poles tied together. Pole beans give a higher yield over a longer harvest period than bush types. Harvest continuously (every 3-5 days) for best crop. Grasp vine with one hand and bean with the other and pull gently to avoid damaging the plant.

Beans (Bush Lima/Pole Lima)

- 6"/24" plant spacing
- 2-3' row/hill spacing
- Plant from seed May-June. Limas need more days for harvest (70-90) than other beans. Harvest when pods become swollen. To determine if pods are ready, open a pod and examine. If ready, the beans will fill the pod and be light green in color or creamy white in color for butterbean types.

Beets

- 2" plant spacing
- 1 ½' row/hill spacing
- Plant from seed January-February for spring harvest. Plant August for winter harvest. Plant in 3-week intervals for a continuous crop. Scatter seeds in rows and thin when 4" tall. Thin when needed for beet greens. Harvest promptly as beets can become tough.

Broccoli

- 9-12" plant spacing
- 3' row/hill spacing
- Plant from transplants December-February or in July. Harvest when heads are 4-6" in diameter and before flower buds open. 4-8" of the stem is edible. Harvest can last as long as 3 months.

Brussel Sprouts

- 2' plant spacing
- 3' row/hill spacing
- Plant from 8-week-old transplants June-August, then 80-100 days to harvest. Sprouts mature from the bottom of the plant upward. Harvest can last over 1 month. Pick when green, hard, and approximately 1-2". Break away the leaf just below the sprout and snap off the sprout.

Cabbage

- 2' plant spacing
- 3' row/hill spacing
- Plant from 8-week-old transplants in March or July. Harvest any time after heads begin to form. Avoid planting too early, as low temperatures during development may cause bolting (early flowering).

Carrots

- 2" plant spacing
- 2' row/hill spacing
- Plant from seed February-early April or August-September. Germination can take up to 2 weeks, keep soil moist to avoid crusting. Thin seedlings when they are 1" tall. Harvest after 90 days when desired size is attained. Carrots left in the ground too long become woody and may crack.

Cauliflower

- 2' plant spacing
- 3' row/hill spacing
- Plant from seed February-early April or August-September. Germination can take up to 2 weeks, keep soil moist to avoid crusting. Thin seedlings when they are 1" tall. Harvest after 90 days when desired size is attained. Carrots left in the ground too long become woody and may crack.

Celery

- 5" plant spacing
- 2' row/hill spacing
- Plant June-August. Most successful when planted from 10-12-week-old transplants. Celery requires extra nitrogen fertilizer and should be kept well-watered. Harvest is 90-120 days after transplanting.

Chard

- 1' plant spacing
- 3' row/hill spacing
- Plant in January-February. Only needs 50-60 days from seed. For harvest, break or cut off outer leaves, leaving 1-2" of greens left to grow. Take care not to damage the central bud.

Chinese Cabbage

- 6" plant spacing
- 2-3' row/hill spacing
- Plant from transplants in August. Harvest when cabbage is firm.
Chinese cabbages include 'Nappa' cabbage, 'Michili' cabbage & Pak or Bok Choy.

Corn

- 1' plant spacing
- 3' row/hill spacing
- Plant from seed late March-July. Does best planted in short blocks of four or more rows. Plant every 2-3 weeks for continuous harvest. 20 days after silks appear, corn is ready.

Cucumber

- 1 ½" plant spacing
- 4' row/hill spacing
- Plant from seed or transplant April-July. Can be grown vertically on a heavy wire trellis. There are two types of cucumber: slicing and pickling. Harvest salad types when 8-10", pickling types when 3" long. Bitter flavor occurs when not enough water is provided.

Eggplant

- 2' plant spacing
- 3' row/hill spacing
- Plant from seed or transplant April-May. Very sensitive to frost and cold temperatures, don't put plants out too early. Harvest when 6-8" long and skin is glossy.

Lettuce (Head/Leaf)

- 1'6" plant spacing
- 2' row/hill spacing
- Can be planted in early spring, fall and/or winter. Keep soil evenly moist. Lettuce does not like hot weather or to be overcrowded. Thinning and row space depends upon variety, consult seed packet for specific information. Plant crops every 2 weeks for a continued harvest.

Muskmelon

- 1' plant spacing
- 6' row/hill spacing
- Plant from seed late April-June. Can be grown vertically on a heavy wire trellis. Harvest when tendril near fruit begins to turn brown and the fruit begins to turn yellow.
Musk melons include cantaloupe, crenshaw and honeydew.

Okra

- 1 ½' plant spacing
- 3' row/hill spacing
- Plant April-May. Soak seeds for 24 hours before planting, plant only the swollen seeds and keep soil moist. Harvest when pods are 2-3" long.

Peas (Bush/Snap)

- 2" plant spacing
- 3'4' row/hill spacing
- Plant from seed September-January. Provide support for climbing types. Avoid use of overhead irrigation, as this promotes mildew. Harvest when pods are well-developed but tender. Peas over-mature quickly; harvest promptly and consume or preserve by freezing or cooking.

Pepper (Bell)

- 2' plant spacing
- 3' row/hill spacing
- Plant from seed or transplant April-early May. Very sensitive to frost and cold temperatures. Harvest when green, yellow, orange or red, depending on variety or desired color.

Pepper (Chile)

- 2' plant spacing
- 2 ½" row/hill spacing
- Plant April-early May. Very sensitive to frost and cold temperatures. Most hot peppers turn red when ripe, although jalapenos are harvested green. To dry peppers, leave them on the vine.

Potato

- 1' plant spacing
- 2 ½' row/hill spacing
- Plant "seed" potatoes in winter. Use small potatoes for best results. Bury 3" deep in furrows spaced 6-12" apart. Closer spacing equals smaller potatoes. Harvest early potatoes when they are large enough for use. For storage potatoes, harvest after vines have died (June-July). Use a shovel or spading fork to gently remove them from the soil.

Pumpkin

- 4' plant spacing
- 6' row/hill spacing
- Plant from seed late April-June. To ensure they are ready for desired holiday, count days to harvest. Can be grown vertically on a heavy wire trellis. Harvest when tendril near pumpkin turns brown and dies. Rind should be hard.

Radish

- 1" plant spacing
- 6' row/hill spacing
- Plant late September-April. Harvest when small and tender, as old radishes can be "hot" and spongy.

Spinach

- 3" plant spacing
- 1 ½' row/hill spacing
- Plant September-January. Plant may bolt (make seed) if temperatures turn warm. Plants produce for about 7 weeks before going to seed. Carefully cut plant above the growing point to receive a second crop later or harvest the entire plant or outer leaves as desired.

Squash (Summer)

- 2' plant spacing
- 4' row/hill spacing
- Plant from seed April-May. Can be grown vertically on a heavy wire trellis. Harvest when 3-6" long, large squash become seedy and lose flavor.

Summer squash includes zucchini, crookneck, pattypan, etc.

Squash (Winter)

- 2-4' plant spacing
- 6' row/hill spacing
- Plant from seed April-May. Can be grown vertically on a heavy wire trellis. Can be eaten early or left on the vine to mature. Mature fruits have a hard shell, and the tendril growing nearby will die. See Stanislaus County Publication *Harvesting & Storing Vegetables* for more information on how to harvest and keep winter squash.

Tomato

- 1 ½-3' plant spacing
- 5-6' row/hill spacing
- Plant April-May. Install cages soon after planting. Plants are sensitive to cold temperatures, do not plant until soil warms. Tomatoes can be determinate (all tomatoes are ready for harvest at once) or indeterminate (tomatoes constantly develop during the season). See Stanislaus County Publication *Growing Tomatoes in Your Garden* for more information.

Tomatillo

- 2 ½' plant spacing
- 3' row/hill spacing
- Plant April-May. Easily grown from seed but use caution as can easily take over a garden. Remove all fruits and seeds before they have a chance to fall to the ground and sprout. (Great for use in salsa)

Watermelon

- 6' plant spacing
- 7' row/hill spacing
- Plant April-June. Needs at least 90 days of warm weather. Can be grown vertically on a heavy wire trellis. Harvest when tendril closes to melon dries up.

Bibliography

Geisel, P, and Unruh, C. (2002). Vegetable Garden Basics, publication 8059. Davis, CA: University of California Agriculture and Natural Resources.

Perry, E. "Seeds Started Indoors Need the Right Conditions." Modesto Bee 19 Feb. 2007.

Osterli, P., Perry, E. (1978). Stanislaus County Home Vegetable Garden Guide. Univ. Calif. Coop.Ext.

Pittenger, D.R. Home Vegetable Gardening. Oakland: Cooperative Extension, University of California, 1992.

UC IPM Online [http:// www.ipm.ucdavis.edu/PMG/ menu.homegarden.html](http://www.ipm.ucdavis.edu/PMG/menu.homegarden.html)

"Vegetable Directory." Watch Your Garden Grow. 2008. University of Illinois Extension. 10 Apr. 2008

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