

Planning The Garden

1. **Who Will Do the Work?** If it's just you - smaller is better. If you'll have help from your husband/children, then you can manage a larger garden. A smaller weed-free garden will produce more than a larger weed-filled mess!
2. **What Will Your Family Eat?** Make a list of your families favorite fruits/veggies and rank them in order of preference. This will help you decide what and how much of each to plant. Just like food storage, it will do you no good to plant food that your family will not eat! See <http://ag.arizona.edu/pubs//garden/mg/vegetable/guide.html>, Table 10.9 for information on the number of plants needed per person and the approximate yield.
3. **How Do You Plan To Use The Produce?** Whether or not you plan to freeze, can, or dry the produce will factor not only into the size of your garden but also into the varieties of seeds/plants that you choose. Some varieties store great, others are meant just to be eaten fresh!
4. **How Much Available GARDEN Space Do You Have?** This is NOT just how much empty ground space is in your back yard - you need to consider the following items: sunlight, water accessibility, quality of soil, pets, children's play area, and other uses of your backyard.
5. **Put Your Plan On Paper!** No matter what size garden you are planning, put your plan on paper. Put the tall(er) crops on the north side of your garden so that they don't shade other plants. It is extremely important to rotate crops, so having your plan on paper will facilitate this. As a rule, you should not plant crops from the same plant family in the same area of your garden for at least three years to avoid a build-up of insects and diseases. See the attached chart for common plant families. You may need two plans - one for cool season crops and one for warm season crops. See <http://ag.arizona.edu/pubs//garden/mg/vegetable/guide.html>, Table 10.10 for plant spacing information.

Plant Families

Family	Vegetables
Amaryllidaceae	garlic, leek, onion
Chenopodiaceae	beet, spinach
Compositae	endive, lettuce, sunflower
Cruciferae	broccoli, Brussels sprouts, cabbage, cauliflower, Chinese cabbage, collards, kale kohlrabi, mustard, radish, rutabaga, turnip
Cucurbitaceae	cucumber, muskmelon, pumpkin, squash, watermelon
Gramineae	corn
Leguminosae	bean, pea, peanut
Liliaceae	asparagus
Malvaceae	okra
Solanaceae	eggplant, pepper, tomato
Umbelliferae	carrot, celery, parsley, parsnip

Where Do I Put My Garden?

- Vegetables grow best in a level area with loose, well-drained soil, and at least 6 hours of sun (8 to 10 hours is ideal).
- Locate near a good and easily accessible supply of water, if possible.
- Choose a spot near your home so it is convenient to work in the garden when you have a few minutes.
- Avoid planting near trees and shrubs; they compete for nutrients and water, and may cause excessive shading.
- Sites too near buildings may result in plants not receiving enough sunlight. Observe shading patterns through the growing season; if possible, before starting the garden. If you have a shaded area, you will need to plant shade-tolerant crops or increase effective light by providing reflective surfaces around plants.

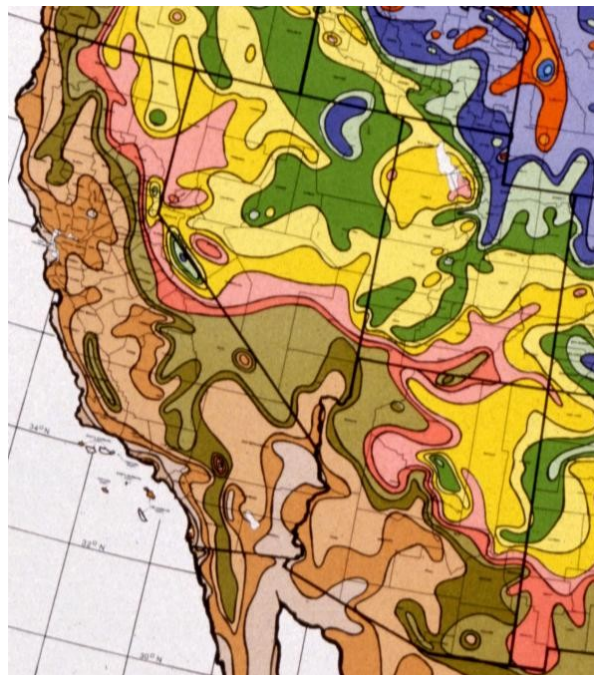
Preparing the Soil

The ideal vegetable garden soil is deep, friable, well-drained, and has high organic matter content. Proper soil preparation provides the basis for good seed germination and subsequent growth of garden crops.

1. **Remove Rocks:** Work only when the soil moisture conditions are right: To test, pick up a handful of soil and squeeze it. If it stays in a ball it is too wet. If it crumbles freely, it should be about right. Excessively dry soil is powdery and clumpy and may be difficult to work.
2. **Add Organic Matter:** manure, decaying plant material.
3. **Add Missing Nutrients:** In general soils in Arizona will be lacking in nitrogen, phosphate, and iron.
4. **Adjust pH:** Add sulfur to soils of high pH.

How Do I Choose Seeds?

1. Choose Varieties That Perform Well In Our Area
 - a. Check the USDA Hardiness Zone Map
 - b. Determine the length of the growing season and the number of days to maturity for the variety chosen
 - c. If you want to save seeds, choose an open-pollinated variety, not a hybrid!
 - d. Keep notes about the seeds you purchase - their germination qualities, vigor of plants, tendencies toward insects and disease, etc. From this information you can determine whether or not the seeds are meeting your needs, or whether the varieties you have chosen are unsuitable for your area or gardening style.
2. Buy Seeds: Seed purchased from a dependable seed company will provide a good start toward realizing that vision of bounty.
3. Saving Seeds
 - a. Hybrid varieties are not likely to be the same as the parent plants; therefore, only open-pollinated varieties should be used for home seed production.
 - b. Saving seeds from cross-pollinated crops is not generally recommended for the novice because of problems with selection, requirements for hand pollination and isolation, biennial habits, and genetic variability. Some common self-pollinated annual plants from which seed may be saved include lettuce, beans and peas, herbs, and tomatoes.
 - c. For all kinds of saved seeds, be sure to mark the storage containers clearly with permanent (preferably waterproof) ink, indicating the variety and date saved. Seeds will remain viable for some time if properly stored. To test for germination, sprout seeds between moist paper towels; if germination is low, either discard the seed or plant enough extra to give the desired number of plants.



Average Annual
Minimum Temperature

Zone	Temperature
1	Below -50 F
2a	-50 to -45 F
2b	-45 to -40 F
3a	-40 to -35 F
3b	-35 to -30 F
4a	-30 to -25 F
4b	-25 to -20 F
5a	-20 to -15 F
5b	-15 to -10 F
6a	-10 to -5 F
6b	-5 to 0 F
7a	0 to 5 F
7b	5 to 10 F
8a	10 to 15 F
8b	15 to 20 F
9a	20 to 25 F
9b	25 to 30 F
10a	30 to 35 F
10b	35 to 40 F
11	Above 40 F

VIABILITY OF VEGETABLE SEEDS
(Average number of years seeds may be saved)

Vegetable	Years	Vegetable	Years
Asparagus	3	Leek	1
Bean	3	Lettuce	5
Beet	4	Muskmelon	5
Broccoli	4	Mustard	4
Brussels sprouts	4	Okra	2
Cabbage	4	Onion	1
Carrot	3	Parsley	2
Cauliflower	4	Parsnip	1
Celery	5	Pea	3
Chinese cabbage	4	Pepper	3
Collard	4	Pumpkin	4
Corn, sweet	1	Radish	4
Cress, water	5	Rutabaga	4
Cucumber	5	Spinach	4
Eggplant	5	Squash	4
Endive	5	Tomato	3
Kale	4	Turnip	5
Kohlrabi	4	Watermelon	5

When Do I Plant?

1. **Starting Seeds Indoors:** 3-12 weeks prior to transplanting outside. Many types of containers can be used to start seeds. Flats or other large containers may be used; plant in rows and grow seedlings until they have one or two sets of true leaves, then transplant into other containers for growing to the size to transplant outdoors. Seedlings may also be started in pots, old cans, cut-off milk cartons, margarine tubs, egg cartons, or other throwaways.

Vegetable	Day (°F)	Night (°F)	Time (weeks)
Asparagus	70° - 80°	65° - 70°	8 - 10
Broccoli	60° - 70°	50° - 60°	5 - 7
Brussels Sprouts	60° - 70°	50° - 60°	5 - 7
Cabbage	60° - 70°	50° - 60°	5 - 7
Cauliflower	60° - 70°	50° - 60°	5 - 7
Celery	65° - 75°	60° - 65°	10 - 12
Sweet Corn	70° - 75°	60° - 65°	3 - 4
Cucumber	70° - 75°	60° - 65°	3 - 4
Eggplant	70° - 80°	65° - 70°	6 - 8
Lettuce	70° - 80°	50° - 55°	5 - 7
Muskmelon	70° - 75°	60° - 65°	3 - 4
Onion	60° - 65°	55° - 60°	10 - 12
Pepper	65° - 75°	60° - 65°	6 - 8
Summer Squash	70° - 75°	60° - 65°	3 - 4
Tomato	70° - 75°	65° - 75°	5 - 7
Watermelon	70° - 80°	65° - 70°	3 - 4

2. Starting Seeds Outdoors:

- a. **Cool Season Crops:** vegetables include beet, broccoli, cabbage, carrot, lettuce, onion, pea, potato, radish, spinach and turnip. Because they are hardy or frost tolerant and germinate in cold soil they can be planted in winter. For best quality these crops need to mature during cooler periods rather than in the heat of the summer. In Southern Arizona cool-season vegetables can also be planted in late summer (**best mid-September to early-October**) when the crop will grow into the cooler fall months. Mulch can also be used to modify soil temperatures. Inorganic mulches (plastic sheeting, weed mats, etc.) warm up the soil, while organic mulches (sawdust, compost, straw, newspaper, grass clippings, etc.) cool the soil. Plant growth can be enhanced by matching the right mulch to the type of crop and weather. Inorganic mulch can be

used early in the season to heat up the soil then an organic mulch can be applied later on to cool the soil as summer temperatures raise.

- b. Warm Season Crops: **vegetables include beans, cucumber, eggplant, melons, pepper, pumpkin, squash, sweet corn, sweet potato and tomato.** These do not tolerate frost but need warm temperatures to set and properly mature fruit. However, temperatures too high reduce quality; ex.- sunburn fruit, poor colored tomatoes and poor ear fill in sweet corn. These crops should be planted from mid- to late-February to ensure maturity before extreme high temperatures.
- c. Planting Styles
 - i. Row Planting: A string stretched between stakes will provide a guide for nice straight rows, if desired. Use a hoe handle, a special furrow hoe, or a grub hoe to make a furrow of the appropriate depth for the seed being planted. Sow seed thinly; it may help to mix very small seed with coarse sand to distribute the seeds more evenly. Draw soil over the seed, removing stones and large clods. Firming soil over seeds improves uptake of soil moisture, hastening germination. Water the seeds in to improve soil/seed contact. When plants have grown to 4 to 6 inches tall, thin according to seed packet instructions to provide adequate room for growth.
 - ii. Broadcast planting: Many crops may be sown in wide rows or beds instead of in long, single rows. Crops such as spinach, beans, peas, beets, lettuce, and carrots are especially suited to this type of culture. Sow seed evenly over the area, then rake it in. Firm soil over the seeds. Thin young plants to allow room for growth.
 - iii. Hill Planting: Larger vegetables such as melons, squash, corn, and cucumbers may be planted in hills. Soil is mounded to a foot or so in diameter, at the recommended spacing. Plant 4 to 6 seeds per hill, firming the soil well. Thin the seedlings to 3 to 5 plants per hill.

How Often Do I Water?

While growing, vegetable crops need about an inch of water per week in the form of rainwater, irrigation water, or both. Keep a rain gauge near the garden or check with the local weather bureau for rainfall amounts, then supplement rainfall with irrigation water if needed.

During dry periods, one thorough watering each week of 1 to 2 inches of moisture (65 to 130 gallons per 100 square feet) is usually enough for most soils. Soil should be wetted to a depth of 12 inches each time you water and not watered again until the top few inches begin to dry out. Average garden soil will store about 2 to 4 inches of water per foot of depth.

Watering Techniques:

1. To reduce run-off, adjust the flow rate of water to ½ inch per hour maximum.
2. To prevent diseases, do not get foliage wet in the evening. Morning watering is preferable.
3. Perforated (soaker) hoses should be placed with the holes down or under the mulch.
4. Frequent, light waterings will only encourage shallow rooting which will cause plants to suffer more quickly during drought periods, especially if mulches are not used. On the other hand, too much water, especially in poorly drained soils, can be as damaging to plant growth as too little water.
5. By knowing the critical watering periods for selected vegetables, you can reduce the amount of supplemental water you add. This can be important where water supplies are limited. In general, water is most needed during the first few weeks of development, immediately after transplant, and during development of edible storage organs.
6. Look for drought-resistant varieties.

Reducing Water Demands:

1. Adequate Soil Texture - clay holds water tightly not allowing it for plant use. Sandy soil doesn't hold enough water. Make sure you have adequate organic matter in your soil!
2. Mulch - a 4 to 6 inch layer of organic mulch can cut water requirements in ½ by smothering weeds and reducing direct evaporation.
3. Shade - shade cloth should be used only during the hottest part of the day. It can prevent scorching of plants and reduce surface temperature as the season extends into the hot summer months. It can also allow cool season crops to be planted earlier in September prior to temperatures dropping.
4. Windbreak - needed in especially windy areas to prevent the loss of moisture through plant leaves on windy days.

Note: To prevent powdery mildew and other water-born diseases in plants, use a soaker hose or drip system to water your garden, not a sprinkler.

How Often Do I Fertilize?

The amount of fertilizer to apply to a garden depends on the natural fertility of the soil, the amount of organic matter present, the type of fertilizer used, and the crop being grown. Vegetables fall into two main categories according to their fertilizer requirements: heavy feeders and light feeders. It may be advantageous to group crops in the garden according to their fertilizer requirements to make application easier.

PLANTS GROUPED ACCORDING TO NUTRIENT NEEDS

Heavy Feeders		Light Feeders	
Asparagus	Lettuce	Carrot	Alfalfa
Beet	Okra	Garlic	Beans
Broccoli*	Parsley	Leek	Clover
Brussels sprouts*	Pepper	Mustard Greens	Peas
Cabbage*	Potato	Onion	Peanut
Cantaloupe*	Pumpkin*	Parsnip	Soybeans
Cauliflower	Radish	Rutabaga	
Celery	Rhubarb	Shallot	
Collard	Spinach	Sweet Potato	
Corn, Sweet*	Squash, Summer*	Swiss Chard	
Eggplant*	Strawberry		
Endive	Sunflower		
Kale	Tomato*		
Kohlrabi	Watermelon*		

*Fertilize at least twice

How Do I Control Weeds?

The old saying, "One year's weed - seven years' seed," contains more truth than myth, as most gardeners soon learn. Many weeds which would otherwise not be growing in a lawn or natural area appear to spring up as if by magic when the soil is cultivated. Weed seeds may remain viable for those 7 (or more) years when conditions are not right for their growth. Then, brought to the surface by tilling, and uninhibited by sod, shade, or other factors, they germinate and become the pests that take water, nutrients, sunlight, and space from vegetable plants.

Control Methods:

1. **Cultivation:** Hand pulling/hoe near plants. Rototiller in between rows. A day or two after a rain or irrigation is probably the best time to cultivate.
2. **Mulching:** Mulching can be an alternative to weeding if you have a reliable source of mulching materials. Thick layers of organic mulch will not allow most annual weeds to poke through, and those that do are usually easily pulled.
3. **Close Spacing:** Once vegetable plants are established, if they have been planted close enough to each other, they will shade the soil and prevent the growth of many weed seedlings.
4. **Herbicides:** They should always be used according to label instructions and only for crops listed on the label. **The wrong herbicide can destroy a garden's productivity for years.** Drift from herbicide sprays used on lawns or in areas surrounding the garden can cause damage to vegetable plants. Drift from pre-emergence herbicides does not damage growing plants, but may prevent seeds from germinating.

How Do I Control Pests in My Garden?

1. Bugs:
 - a. Aphids/Whiteflies - control using lady bugs or praying mantis. Can be washed off plants with soap and water.
 - b. Snails & Slugs - bury a pot of beer at ground level. They will fall in and drown.
 - c. Worms & Beetles - pick off and destroy larvae. Most Home & Garden stores have pesticides to destroy/repel these pests. Use a bug zapper, placed away from your garden, to kill the adult moths.
 - d. If you're going to use chemical pesticides, make sure they are approved for the crops to which you will be applying them!
2. Birds:
 - a. Netting
 - b. Scarecrow/Scare Tactics: dog to scare away birds, hang CD/shiny object from a string so that it turns in the wind.

Resources

Books:

- Gardening in the Southwest by Kathleen Norris Brenzel
- Desert Gardening: Fruits and Vegetables by George Brookbank
- Extreme Gardening: How to Grow Organic in the Hostile Deserts by David Owens

Online Reference Information:

- Maricopa County Arizona Master Gardeners: <http://cals.arizona.edu/maricopa/garden/>
- Arizona Master Gardener's Manual: <http://ag.arizona.edu/pubs//garden/mg/index.html>
- Desert Botanical Garden: <http://www.desertbotanical.org/> 1201 N. Galvin Pkwy., Phoenix, AZ 85008. Phone: 480-941-1225
- The Garden Guy: www.gardenguy.com, Radio: KRXS FM 97.3 10-Noon on Saturday, TV: KTVK, Channel 3 news
- Arizona Federation of Garden Clubs: www.azgardenclub.org

People:

- Deanna Dunn: deannasellsaz@hotmail.com, 480-390-2796
- Anyone you know that has a garden - they're typically willing to share their knowledge!

Seeds:

- Gurneys: www.gurneys.com
- Burpee Seed Company: www.burpee.com
- Organica Seeds (organic): www.organicaseed.com
- WalMart, Target, Home Depot, Lowes Garden Centers (Make sure you check the packet label for info on the year the seeds were collected and germination rate expected)
- Arizona Home & Garden Show at the Maricopa County Fairgrounds - typically one or two booths hosted by local garden clubs where they sell seeds.