



Victory Garden Reference Guide

This Victory Garden Reference Guide provides useful information for both novice and experienced gardeners on planning, planting, and maintenance of Victory Gardens.

Call the Penn State Extension **Master Gardeners Garden Hotline** at 610-690-2671 if you have specific questions about planting or caring for your Victory Garden.

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Victory Gardens Today

Victory Gardens originated during World War I and reemerged during World War II to support the war effort by ensuring adequate food supplies for civilians and troops. Individuals, organizations, and communities grew these vegetable gardens where land was available to support the war effort at home. Since then, Victory Gardens have become an iconic symbol of the patriotism and resourcefulness of our ancestors to work together to grow needed food supplies. Today's Victory Gardens have evolved to encourage gardeners to incorporate current research-based best garden practices to maximize their success.

Today's Victory Gardens in Delaware County:

- Commemorate our ancestors' patriotism and resourcefulness in serving their country
- Build community by uniting people in a common purpose for a common good
- Provide improved nutrition and health benefits associated with gardening
- Foster sharing the gardens' abundance with family, neighbors, friends, and those in need.

Getting Started on Your Victory Garden

Answer the following questions to help determine what you will plant and the size of your garden.

- Who will do the work and how much time do you have available? For example, a new 4 ft x 8 ft garden may initially take 12-16 hours to prepare the soil and plant the vegetables. Another few hours will be needed each week to maintain the garden. Remember a small weed-free garden will likely produce more than a large untended garden.
- What vegetables do you want to plant? Select vegetables based on what your family likes to eat. Some of the easiest vegetables to grow in this region include lima beans, snap beans, broccoli, Brussel sprouts, carrots, corn, cucumbers, eggplant, kale, lettuce, onions, peppers, radishes, spinach, squash, and tomatoes.
- How much space is available? Pick a sunny spot because most vegetables do best with lots of sun.
- How will your garden be laid out? Plan your garden on paper during the winter months showing plant arrangement and spacing. Place tall or trellised crops on the north side of the garden to prevent them from shading other shorter vegetables. Consider the growing season of each selected plant. Cool weather crops planted in the spring (e.g., lettuce, peas, spinach) can be grouped together so that later warm weather crops (e.g., tomatoes, peppers, cucumbers) can be planted in the same location when the spring crops have matured.

Vegetables grow best in a level, well-drained location with loose soil and at least 6 hours of full sun. Sloped areas require contoured rows to prevent soil erosion.

Site your garden to:

- ✓ Ensure adequate sun exposure



- ✓ Avoid low-spots or windy locations. Low spots are slow to warm up in the spring and often have poor drainage. If you have to use a windy spot, build or grow a windbreak to prevent wind damage to your plants.
- ✓ Avoid planting near trees and shrubs that compete for nutrients and water and provide shading.
- ✓ Make sure you have easy access to water.
- ✓ Avoid harmful chemicals in the soil. For example, do not plant your garden where buildings with lead paint or other sources of lead once stood.

Fence your garden to exclude rabbits and groundhogs. Erect a deer fence before planting if there are deer in your area.

If space is limited, consider raised beds or container gardening. Refer to the **Raised Beds** or **Container Gardens** sections for more information.

Selecting Vegetables and Specific Varieties (Cultivars)

Browse through garden catalogs and at garden stores to help you select which vegetables you want to plant. Also review Table 1 for pertinent plant information.

Table 1: Vegetable Planting Guide			
Vegetable	Planting Outdoors	Approximate Field Planting Dates*	Days to Maturity/Harvest**
Beans, Lima	Seeds	May 12 to June 10	75-80 days
Beans, Snap	Seeds	May 12 to August 1	50-65 days
Beet	Seeds	April 1 to July 15	50-70 days
Broccoli, Spring	Transplants	April 5 to May 20	60-100 days
Broccoli, Fall	Transplants	June 10 to July 15	60-100 days
Brussel Sprouts	Transplants	June	60-90 days
Carrots	Seeds	April 10 to July 15	55- 90 days
Corn, Sweet***	Seeds	May 12 to June 15	65 to 100 days
Cucumbers	Seeds	May 12 to June 15	60-80 days
Eggplants	Transplants	May 20 to June 10	90-100 days
Kale	Seeds	July15 to August 1	50-200 days
Lettuce, Leaf, Early	Seeds	April 1 to May 20	45 days
Lettuce, Leaf, Late	Seeds	July 20 to August 20	45 days
Onion	Transplants	April 1 to April 20	110 days
Peas	Seeds	April 1 to April 20	50 to 80 days
Pepper	Transplants	May 12 to June 10	70-90 days
Radishes, Early	Seeds	April 1 to April 20	25- 35 days
Radishes, Late	Seeds	August to September 5	25-35 days
Spinach, Early	Seeds	April 5 to April 25	40-60 days
Spinach, Late	Seeds	August 10 to September 10	40-60 days
Squash, Summer	Seeds	May 12 to June 15	50-80 days
Tomato	Transplants	May 12 to June 15	75-100 days

*Dates specific to Southeastern PA

**Days to Maturity/Harvest may vary per cultivar.



***Corn requires numerous side-by-side rows for good pollination.

Once you have decided which vegetables to grow, select vegetable cultivars that are adapted to the area or zone in which you live, have been grown successfully by neighbors, and are disease resistant.

Pay close attention to the useful information on the seed packets. Each seed packet provides: a description of the plant; when to plant; planting depth and spacing; light exposure requirements; whether seeds should be planted indoors or outdoors; basic care instructions; and days to harvest. Make sure the seeds are packaged for the year you intend to plant them (e.g., “Packaged for 2018”). As seeds age, their viability decreases and fewer seeds will germinate in subsequent years.

Establishing the Garden

Follow these steps to prepare the soil in your garden:

1. Remove sod with a spade in new garden spots. Leave the removed grass to dry in the sun, then shake the top soil from the dried grass clumps back onto the garden surface. Place the dried grass in your compost pile or discard.
2. Rototill the upper layers of soil in large gardens or simply use a shovel to work the soil in small gardens. Ideally, work when the soil crumbles freely. Avoid completely turning over the soil. Work the soil when it is not too wet or too dry. Excessively wet soil sticks to the shovel and forms mud balls. Excessively dry soil is powdery and clumpy and difficult to work.
3. Add 4-8 inches of organic matter for the first year or two in new gardens if the soil is poor quality. Home-made or store-bought compost provide good options for adding organic matter.
4. Add 1-2 inches of compost each year subsequently.
5. Perform a soil test and address nutrient needs. Refer to the **Soil Improvement/Fertilizing Your Garden** section for more information.
6. Break up any large clumps and rake the bed level evenly just before planting. This provides smooth, fine soil which is optimum for germination of small-seed vegetables.

Recently, as an alternative to tilling or working the soil, some gardeners are planting no-till gardens where the soil is not turned or tilled. This type of garden requires year-round soil cover with cover crops, plant residues, and mulches between crop plants. Although this type of garden system is more complex to manage, it can result in higher soil quality.

Soil Improvement/Fertilizing Your Garden

The key to soil improvement is the continuous addition of organic matter resulting in a soil that is deep, crumbly, well-drained, and biologically active. The addition of organic matter (e.g., compost) improves soil structure (capacity to hold water and nutrients) and improves the nutrient content in the soil. The goal is to have organic matter comprise 25% of the top 8 inches of soil. Consider the following guidance to improve your soil:

- Refer to the **Establishing the Garden** section for specific recommendations on how much organic matter to add to new and existing gardens.



- Add compost as top-dressing or mulch throughout the growing season, but incorporate it lightly to keep it from washing away. Gardens that have yearly additions of organic matter may have sufficient nutrients to grow most crops without the need for supplemental fertilizer.
- Perform a soil test to provide information about the pH (acidity and alkalinity) and available nutrients in your soil. A soil test also provides recommendations on how to amend your soil to better support plant growth. For more information on Penn State soil testing, go to <https://extension.psu.edu/soil-testing>. Penn State soil test kits can be obtained at the Penn State Extension Offices in Smedley Park, Springfield, PA.
- Address pH issues, as appropriate. Most garden crops do well with a soil pH of 6.2-6.8 or slightly acidic soil. If the pH is too high or too low, it will impact how the plant takes up nutrients and may result in poor plant growth.
 - If the pH number is too high (greater than 6.8), lower the pH number to an acceptable range by adding a little sulfur or aluminum sulfate.
 - If the pH number is too low (less than 6.2), add dolomitic lime or calcium carbonate to increase the pH number to an acceptable range.
- Determine nutrient needs based on the results and recommendations of your soil test and the types of crops you are growing. It is likely that some crops at certain times will need additional nutrients (especially nitrogen). Some vegetables are heavy feeders meaning they require more nitrogen (e.g., broccoli, Brussels sprouts, cabbage, corn, carrots, potatoes, onions, tomatoes, spinach). Others are light feeders (lettuce, cucumbers, eggplant, endive, peppers, squash). Some vegetables (e.g., beans, peas) actually help build nitrogen in the soil. It's advantageous to group plants in your garden based on their fertilization requirements.
- Consider this general rule of thumb. Nitrogen is for leafy top growth, phosphorus is for root and fruit production, and potassium is for cold-hardiness, disease resistance, and general durability. Nitrogen application has the greatest effect for three to four weeks after application. Therefore, the timing of application is important. For example, if a tomato is heavily fertilized on June 1, there may be no flower production until after July 1, which will delay fruit ripening in late August.
- Do not over fertilize. Both chemical and organic fertilizers can burn plants or overstimulate leaf growth at the expense of fruit production.

Table 2 summarizes soil improvement tasks throughout the growing season:

Table 2: Soil Improvement/Fertilization Guide		
Timing	Soil Improvement Task	Comment
Prior to planting in spring	Amend soil with organic matter	Use store-bought or homemade compost
Prior to planting	Perform a Penn State Soil Test	Follow recommendations to amend the soil
In spring, when seedlings come up or when planting transplants	Apply water-soluble fertilizer for quick and strong start growth	Follow instructions carefully; do not overapply
When the first fruit appears on tomatoes, peppers, and eggplants (if the plant growth is	Side dress with fertilizer diluted in water	Follow instructions carefully; do not overapply.



Table 2: Soil Improvement/Fertilization Guide		
Timing	Soil Improvement Task	Comment
(lagging)		
Throughout the growing season	Top dress or mulch with compost	Apply lightly
In the fall when your garden is no longer productive and you have pulled up all dead and diseased plants	Spread compost or other organic material	Refer to “Preparing the Soil for Winter” section of this guide.

Cover crops, such as small grains (e.g., winter rye, barley) or legumes (e.g., clover, vetch) are an alternative means to protect and improve soils. They keep soil covered during the winter months when crops are not growing and prevent soil erosion.

Starting Seeds Outdoors

Many seeds can be sown directly in the garden. Soil temperature has an effect on the speed of germination. In general, cool weather vegetables can be planted when the optimum soil temperature for germination is 50-65°F, and warm weather vegetables can be planted when the optimum soil temperature for germination is 65-85°F. Generally, in Southeastern PA, cool weather vegetables can be planted after April 1, and warm weather vegetables can be planted after danger of frost has past (typically after Mother’s Day). To sow seeds outdoors:

1. Follow the planting time recommendations on the seed packet. Also, refer to **Table 1-Vegetable Planting Guide** for approximate planting dates.
2. Plant according to seed packet instructions. A good rule of thumb is to plant seeds 2-3 deeper than their width. Firm the soil over your seeds to increase soil contact and speed up germination.
3. Plant vegetables in single rows, broadcast in wider rows, or plant in hills:
 - a. **Row planting:** Tie a string between two stakes (one stake at each end of the row) to provide a guide for making the row straight. Use a hoe handle or furrow hoe to make a furrow of the appropriate depth. Sow seeds thinly and evenly and draw the soil over the seeds. Water to keep the soil moist. When the seeds have grown 4-6 inches high, thin the plants according to seed packet directions so there is adequate room for growth. One methodology for thinning seedlings is to clip the excess seedlings at their stem base to allow room for the strongest seedlings to grow.
 - b. **Broadcast planting:** This approach is well-suited to crops such as beans, beets, carrots, lettuce, and spinach. Sow seeds in wide rows evenly over the row area and then cover with soil using a rake. Firm the soil over the seeds. Water to keep soil moist. Thin young plants to allow room for growth.
 - c. **Hill planting:** This approach is often used for larger vegetables such as cucumbers, melons, and squash. Mound the soil to one foot or so in diameter at the recommended spacing. Plant four to six seeds per hill and firm the soil over the seeds. Water to keep the soil moist and improve soil contact. After the seeds have emerged fully, thin the seedlings to 3-5 plants per hill.



Planting Transplants

Using transplants allows long-season plants a chance to grow to maturity in the climatic conditions. For this reason, warm-season crops such as tomatoes or peppers must be sown indoors, grown for a time period, and then moved outdoors to ensure a long harvest. Some cool-season crops like onions and broccoli benefit from an early start indoors to reach their prime harvest stage in spring.

Starting seeds indoors requires time, attention, and controlled climatic conditions. Therefore, many gardeners prefer to purchase such plants for their garden. When purchasing and planting transplants outdoors:

1. Purchase vegetable plants that are stocky, disease-free, insect-free, and have good roots (but not encircling the bottom of the container). Do not select overly mature plants. Bigger is not better.
2. Be sure the plants have been hardened off so that they will adapt to environmental changes. Hardening off is a process of gradually acclimatizing a plant raised indoors to the harsher outdoor environmental conditions.
3. Plant transplants on a cloudy, windless day in the late afternoon or early evening to prevent wilting.
4. Water the plants several hours before transplanting. Do not allow the roots to dry out.
5. Handle transplants carefully to avoid bruising the stems or disturbing the roots.
6. Dig a hole large enough to hold the roots and set the plant just slightly deeper than previously planted. One exception is that tomatoes should be planted deep enough to leave only two or three sets or leaves exposed since tomatoes will develop new roots along the stems.
7. Press the soil firmly around the roots of the transplant.
8. Water and pour starter solution around the roots of the plant per instructions on the starter solution label.
9. Plant remaining plants, maintaining recommended plant spacing.
10. Protect plants from wind and direct sun for a few days after transplanting. This can be accomplished by erecting a cardboard barrier on their South side or covering them with plastic jugs. However, make sure there is adequate ventilation so the plants do not overheat.

Watering

Sufficient soil moisture is essential for good vegetable growth since a healthy plant is composed of 75-90 percent water. This level of water is vital to plant functions such as photosynthesis, support, and movement of nutrients and sugars to various parts of the plant. General guidance includes:

- Keep the soil moist during the first two weeks of plant growth for the root system to become established.
- Water regularly during the entire growth period. Vegetable plants need about 1 inch of water per week from rain water, irrigation water, or both. Monitor rainfall amounts with a garden rain gauge or from the local weather service and then supplement with irrigation water as needed.
- Apply a thorough watering at least once per week during dry spells
- Wet the soil to a depth of 5-6 inches each time you water, and do not water again until the top few inches of soil begin to dry out.



Managing Weeds

Mature weeds compete with vegetable plants for nutrients and water; therefore, it is essential to control weed growth. Guidelines for weed management include:

- Remove weeds when they are young and tender when removal is easiest. This can be accomplished by hand-pulling in small areas or by cultivating using a hoe with a light touch in larger areas.
 - Do not deeply cultivate as this approach may damage the stems or roots of your vegetables. In addition, dormant weed seeds will be brought to the surface starting the weed cycle all over again.
 - Cultivate when the soil is somewhat moist. When the soil is dry, weeds are hard to pull up. When it is too wet, cultivating the soil can ruin the soil structure.
- Never leave weeds in the garden until they go to seed. More weed seeds result in more weeds.
- Mulch with organic matters to reduce the need to weed. A thick layer of organic mulch prevents weed growth, moderates soil temperature, maintains soil moisture, and adds organic matter to the soil.

Vertical Gardening

Vertical gardening is the use of trellises, teepees, strings, cages, or poles to support growing plants to prevent them from falling over and to limit vine sprawl. Some plants entwine themselves on the supports (e.g., pole beans, cucumbers, squash) while others may need to be tied to the support (e.g., tomatoes).

Consider utilizing vertical gardening to:

- Provide good plant support
- Minimize the ground space taken up by large plants and vines
- Maximize produce yields per garden space
- Minimize susceptibility to diseases caused by fungus.

Water vertically-grown plants more frequently. Vertically grown plants are more exposed to the sun and air and dry more quickly.

Plant shade-tolerant plants next to vertically grown plants since vertical plantings will cast a shadow.

Disease and Pest Management

The foundation for effective disease and pest management is prevention. Use these prevention strategies:

- ✓ Focus your time and attention on growing the right plant, in the right place, in the right way. Select plants that are healthy, well-adapted to your area, disease resistant, and not insect infested.
- ✓ Employ good cultural practices to reduce the susceptibility to disease or insect infestation. Such practices include pruning (as appropriate), controlling weeds, mulching, watering, and fertilization.
- ✓ Monitor plants daily to observe plant health. Look for signs of problems such as leaf spot, powdery mildew, wilting, holes in leaves, chewed leaf borders, distorted fruit, and end rot on fruit.



- ✓ Don't panic when you see an insect unless you observe plant problems since most insects are beneficial. The best approach for managing insect pests is to use a variety of strategies to reduce pest populations to a tolerable level and to reduce pesticide use.
- ✓ Rotate crops of the same plant family to different parts of your garden every three years to prevent insects and disease from building up.
- ✓ Contact the Master Gardeners' Garden Hotline with your observations and questions about how to prevent, diagnose, and treat plant disease and insect problems. Refer to the **Master Gardeners' Garden Hotline** section for contact information.

Preparing Soil for Winter

Prepare your garden soil for winter:

1. Pull up all dead or unproductive plants and place on top of soil to be tilled under or remove and add them to your compost pile.
2. Remove any diseased or insect-infested plant materials to prevent overwintering stages of disease organisms or pests and discard them. Do not compost diseased or insect-infested plant materials; haul them away.
3. Spread compost or other organic material such as shredded leaves on your garden. The compost contains nutritious decomposed plant materials and beneficial organisms to build the soil.
4. Consider planting a cover crop (e.g., legumes, winter rye, barley) as an option to keep the soil covered during the winter months, prevent soil erosion improve soil porosity, and add nutrients.

Raised Beds

Raised beds are basic units suitable for intensive gardening. Intensive gardening focuses on creating an optimum plant environment in limited space to maximize produce yields per square foot of space. Raised beds provide the following advantages:

- Warming up earlier in the spring and holding heat in the fall
- Minimizing soil compaction because no one walks on the planted bed
- Better drainage
- Ease of planting and care
- Greater yields per smaller space.

Some general guidelines for raised bed gardens include:

- ✓ Use rigid material (e.g., concrete blocks or wood) to build elevated beds above ground level. Wood beds (typically pine, oak, or cedar) can be built or purchased as kits.
- ✓ Review directions for building raised beds on YouTube.
- ✓ Never use chemically-treated lumber since harmful chemicals can leach into the garden.
- ✓ Select a bed width that allows you to reach the center of the bed comfortably. Bed lengths can vary. Examples of some typical sizes include 8 to 12 inches high, 3 to 4 feet wide, and 4 to 8 feet long.
- ✓ If planning for more than one raised bed, leave sufficient space for a walking path between beds.



- ✓ Before installing the raised bed, remove sod with a spade and use a shovel to break up compacted layers of soil to allow for better aeration and drainage. Level the bed with a rake and install the raised bed.
- ✓ Fill the raised bed with a lightweight mixture of top soil and organic matter (compost).
- ✓ Utilize various spacing patterns to space plants closer together than in traditional garden beds. For example,
 - **Row-planted bed:** Plant closely spaced rows with each row being a different type of vegetable
 - **Square-center spacing:** Plant a single type of vegetable in individual squares in a grid-like pattern.
 - **Equidistant spacing:** Plants are treated as circles and staggered in rows so that plant centers are not perpendicular. This approach is most efficient if the bed is planted with a single type of vegetable.
- ✓ Utilize vertical gardening to minimize space needed
- ✓ Water more frequently because soil tends to dry out more quickly.

Container Gardens

If space is limited, consider raising homegrown vegetables in containers. Containers can be located indoors on a windowsill or sunny spot and outdoors on patios, balconies, doorsteps, or along driveways. Follow these general guidelines:

- ✓ Select plants that do not take up much space (e.g., carrots, lettuce, radishes), plants that bear fruit over a period of time (e.g., tomatoes, peppers), dwarf or miniature plant cultivars, and cultivars developed specifically for containers.
- ✓ Use containers that are big enough to support plants when they are fully grown.
- ✓ Make sure the container has adequate drainage and drainage holes so that roots do not stand in water.
- ✓ Provide sufficient soil depth. Most plants need 6 to 8 inches of soil depth for adequate rooting. Some plants require a depth of 8-12 inches (e.g., beans, beets, carrots, pepper, eggplant, tomato)
- ✓ Provide adequate pot volume. Use containers that are 1-3 gallons in capacity for herbs, radishes, peppers, dwarf tomatoes, and dwarf cucumbers. Use containers that are 4-5 gallons in capacity for full-size tomatoes, cucumbers, eggplant, beans, and broccoli.
- ✓ Use lightweight porous potting soil to provide roots with adequate air and water.
- ✓ Consider using a soil mix with added fertilizer to provide sufficient nutrients for 8 to 10 weeks.
- ✓ Plant at the same time you would plant an in-ground garden.
- ✓ Follow seed packet instructions for sowing seeds or setting transplants.
- ✓ After planting, gently soak the soil with water.
- ✓ Water frequently as containers can dry out quickly especially on sunny concrete or asphalt locations. Check plants frequently as daily or even twice-daily watering may be necessary. Apply the water until it runs out the drainage holes.
- ✓ Fertilize every two to three weeks with a water-soluble fertilizer at the recommended rate. If you have used soil mixture with fertilizer added, do not begin fertilizing until after the initial added nutrients have been expended (e.g., 8-10 weeks). Do not overfertilize.