Debbie Delatour

> When I get into the garden, I feel like I am in another world. I feel special because [the garden] has a part of me. I planted something.
>
> Student
>
> Dr. Martin Luther King, Jr. Academy
>
> Salinas, CA

Planting Your School Garden

After planning and preparation, the excitement builds to the day when everyone can really "dig in" and get their hands dirty. Watching the garden design magically come to life sparks curiosity and amazement in both youth and adult participants. Although planting involves a lot of hard work, gardeners are usually too captivated by the activity to notice.

This chapter offers some planting basics and tips for garden installation. It is important to remember that your focus is on creating an educational tool, and planting is just part of the learning process. Planting Day should be the beginning of a wonderful exploration. Base planting decisions on researched methods, but leave room for students to experiment. Some of your team's design ideas may thrive and others may fail; just keep trying until you are successful. If you approach the garden with a positive and adventurous attitude, the students, parents, and other garden team members will follow.

Western Growers Charitable Foundation

California Department of Education

Preparing the Soil and Beds

Your team's first step will be to prepare the soil and beds. This procedure will vary greatly in time and intensity depending on the size of the project and the location and type of the garden.

Indoor Garden

If your class is creating a windowsill garden, the main preparation for installation will be to find a way to protect the windowsill or table from water damage. Place pots in individual plant saucers or in a large plastic tray to catch drainage.

If installing grow lights, follow the directions included with the materials or research an approved design. Be sure to follow all safety precautions and, if possible, ask your school district's electrician to review construction.

For indoor gardens, your team will need to obtain a supply of containers and soil. A wide range of pots can be used. Just make sure they have drainage holes at the bottom to avoid waterlogged plant roots. Plastic pots are the most common containers because they generally are inexpensive, can be reused, and are lightweight. You could also use clay pots, fiber pots, school milk cartons, growers' flats or market packs, egg cartons, plastic planting bags, and plastic soda bottle bottoms. Students may be able to bring many of these items from home.

The growing medium in which you raise your plants is important. It anchors the roots so the plants don't fall over and serves as a reservoir for the water, air, and nutrients taken up by the roots. The best medium to use is soilless potting mix, made from peat moss (or coco peat), vermiculite, and/or perlite (it does not contain any true soil). Soilless potting mix is light enough to allow for good water drainage, root aeration, and root movement, yet heavy and spongy enough to provide anchorage and to hold on to adequate water and nutrients. Additionally, it is easy to transport and readily available in most garden stores. Another good feature of such potting mixes is that most are sterilized so that they do not contain weed seeds, insects, or diseases that could flourish in the favorable conditions of an indoor garden. And soilless mix doesn't produce mud, so if it gets on clothing, it brushes off easily.

Outdoor Garden

Jonnalee Henderson

Container Gardens. For smaller planting projects, preparing container gardens is much easier than in-ground or raised beds. First, obtain appropriate containers. Your class can use just about any container that will hold soil and has holes for drainage. Examples of common containers: clay and plastic pots, wooden barrels, window box planters, and plastic or metal buckets. Your team can also be creative and use items like bathtubs, wheelbarrows, shoes, and hollowed-out pumpkins or gourds. Smaller containers will need more frequent watering and fertilization than larger containers. Just make sure, if you are planting fruits and vegetables, that the containers were never used to hold toxic materials.

Fill your chosen containers with a good potting soil mix. Although you can use garden soil, it tends to compact in containers, making it heavy and poorly drained, so it is best to use potting soil designed for containers. Potting soil can be obtained from garden centers.

Most common garden plants will need 8 to 12 inches of soil at the most, so if the chosen containers are deeper than that you may want to add a layer of rocks (will add weight) or Styrofoam peanuts (make sure they are made from plastic, not biodegradable materials) at the bottom. This layer can help with drainage in addition to decreasing the amount of soil needed.

> "Give back to the garden more than you take and you will be rewarded with glorious abundance."
>
> Alan Chadwick

Raised Beds. As mentioned in Chapter 5, Designing Your School Garden, there are two different ways to make raised beds. The simplest way to create a raised bed is to measure and stake each planting area (use a string from stake to stake to better delineate the garden bed), then loosen the existing soil with a spading fork and add soil, compost, or both until the bed is 8 to 12 inches high. The soil can be brought in from another location or taken from surrounding areas. Rake the surface smooth to create a flat-topped bed, which increases water retention and decreases soil erosion.

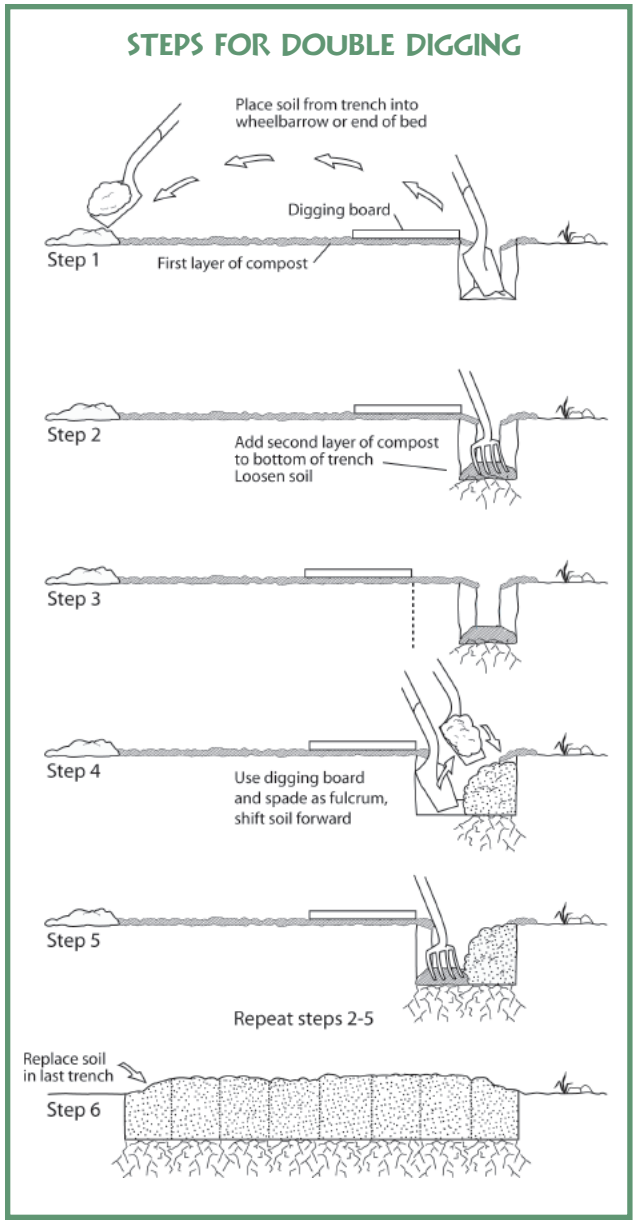
To create permanent, well-defined raised beds, create frames using rot-resistant wood, such as cedar or redwood, or other materials, such as recycled plastic boards, bricks, rocks, or cement blocks. When installing framed raised beds, consider installing landscaping fabric to suppress weeds from growing up in your bed and/or gopher wire as a barrier. Avoid pressure-treated lumber; it has been treated with toxic chemicals. Fill beds with soil or a mixture of soil and compost.

University of California Department of Agriculture and Natural Resources

Raised beds have numerous benefits. They look neat, support healthy plant growth, and help keep young students on paths. The loose soil encourages roots to grow strong and deep, and moisture soaks in easily. In areas with cool, wet spring weather, soil in raised beds drains and warms more quickly, allowing gardens to be started earlier. Conversely, in arid areas, raised beds soak up available moisture well, but they also dry out more quickly. Beds that are constructed slightly below the soil surface conserve moisture more effectively than do raised beds.

In-Ground Beds. If your team is installing an in-ground garden, begin by tilling the ground to loosen the soil and help in removal of weeds. Tilling is a process of turning the soil to improve its structure. It is also called *cultivation*. You can till the soil by hand using shovels or digging forks, or mechanically using a tiller.

Soil is composed of sand, silt, and clay particles and has pore space reserved for water and air. An ideal garden soil is made up of 50 percent soil particles and 50 percent pore space (half filled with water and half filled with air). How the soil



Cathy Reinhart/UCSC CASFS

particles and pore space are configured is called the *soil structure.* Over time, as we walk on the soil, and through other environmental forces, the soil becomes compacted and the structure loses important pore space. By tilling the soil, we decrease compaction and increase the pore space. This improves the soil structure and makes it easier for you to plant and for plants to establish their roots.

Avoid tilling excessively wet or dry soil. If the soil is too dry or too wet, tilling can actually damage the soil structure rather than improve it. To test soil moisture, scoop up a handful of soil and try to create a ball. With perfect moisture, the soil will form a stable ball but will crumble easily when touched. If it is too dry, it will not stick together. If it is so tightly stuck together that it will not come apart when touched, it is probably too wet. Tilling dry soil is backbreaking work that results in a dusty mess and drifting soil particles. If the soil is dry, water the garden thoroughly one to three days before tilling. Wet soil, on the other hand, will stick to shoes and tools. Tilling in this condition will destroy air pore space; the weight of the wet particles will cause them to collapse into each other when turned. If the soil is too wet, give it time to dry out before tilling. If your area is experiencing heavy rainfalls, your class may need to cover the soil with plastic to decrease water exposure.

If the garden is fairly small, the soil can be tilled by hand with a shovel. This is a great activity for students with excessive energy. Try to turn the soil to a depth of 1 to 2 feet if possible. One method used to ensure a thorough tilling of soil by hand is called *double digging.* To do double digging, begin by having students dig out a row of soil in the garden approximately 1 foot wide and 1 to 2 feet deep and place the soil in a wheelbarrow. Next, dig out another row of soil 1 foot wide and 1 to 2 feet deep, and move this soil into the first empty row. Have students continue to move across the bed until they reach the end and then dump the wheelbarrow full of soil from the very first row into the last empty row. Although double digging is a lot of work initially, it ensures a thorough job of turning the soil and a bed that is easy to work in.

Your class can also till the soil mechanically using a tiller. Tillers are like small plows that work to loosen and turn the soil with blades powered by gas or electric engines. They come in a wide range of sizes and can often be rented from local landscape centers. If your site is larger than an acre, consider using a farm-sized tractor with plowing attachments to break up the soil.

The difference between using a shovel and using a tiller is like the difference between using a spoon and using an electric mixer when you're mixing cake batter. Both will get the job done, but they vary in the time and energy needed for completion.

Alicia Dickerson/Life Lab

If you are concerned about the composition or nutrient content of the soil, add a layer of compost when tilling. Compost is made up of decaying organic matter. The organic matter increases the moisture retention of the soil, and as it breaks down, it releases important nutrients. Also, as it decomposes, it provides additional pore space, improving the soil structure. First, till the garden once to break up the compacted soil. Next, add a 2- to 4-inch layer of compost to the surface and then till the garden again to incorporate it into the soil.

Tilling should be done several weeks before the planting season and again right before Planting Day if possible. Add any soil amendments such as compost or topsoil during your first till. Remove weed and grass plants during tilling. Grass and weeds will compete with garden plants for water, nutrients, and space. After tilling, rake the garden soil smooth, being careful to avoid walking through the beds so as not to compact the soil.

Although the landscape plan provides a general idea of the shape of the beds before tilling, after preparing the soil, you should stake out the beds. If planning straight rows, position stakes in the corners of the future beds and connect them with a length of string. For beds with a curved outline, lay a garden hose or length of rope on the ground as a guide. Remember to keep beds narrow enough so that kids can reach the middle of the bed without stepping in it.

After outlining the beds, install the irrigation system, if any. The next step will be to add the plants.

Obtaining Plants

Plants may be started from seed, grown from cuttings, or purchased as mature plants. Most classrooms begin their gardens by planting seeds because they are relatively inexpensive and their growth helps students to visualize the full life cycle of a plant.

Sowing Seeds

Seeds may be planted outdoors directly into the garden or started inside on a windowsill and later transplanted to an outdoor garden (or remain as indoor plants). At the end of this chapter are fall and spring planting guides with information about common vegetables, fruits, herbs, and flowers planted from seed in school gardens.

Debbie Delatour

Planting Seeds Outdoors

In moist, but not wet, soil, have students make holes or shallow trenches, place seeds in these holes, and then cover them with soil. In most cases, they will find proper seed

Alicia Dickerson/Life Lab

spacing and depth information on the back of the seed packets. If this information is not available on the packet, check planting guides for more details. It is important to avoid planting seeds too close together. Crowded seeds compete for resources as they grow. Place a label with the date and crop or variety name where it can easily be seen.

After planting, ask responsible students or adult volunteers to water the seeds with a gentle spray. If the water spray is too forceful, the seeds will move from their original planting spot, and seedlings will emerge in clumps. Make sure the initial watering is thorough enough to moisten the soil to the depth of the planted seed. They may have to provide a succession of gentle sprays to moisten the soil appropriately, allowing the water to soak into the soil before applying another gentle spray. Flooding newly planted areas can cause the soil to slick or form a "crust" that will inhibit germination. Overwatering causes a shiny soil surface; this is a sign to stop and let the water soak in before applying more. After planting, it is important to keep the soil constantly moist so the seeds will germinate. However, too much water will encourage disease and decrease germination rates.

Planting Seeds Inside to Transplant Outdoors

Starting seeds indoors extends the growing season, allows greater variety in plant choice, simplifies care of newly germinated seeds, and produces a lot of plants for less money. In most growing regions in California, it is a good idea to start vegetable seeds indoors to get a jump on spring planting so your class will have more mature plants to harvest by the end of the school year. Some vegetables, such as beans, carrots, and squash, prefer to be sown directly in the garden. Others, such as basil and lettuce, can be started indoors or direct seeded. Refer to the planting guides at the back of this chapter or read the information on seed packets for more information on growing time.

> "The nation that destroys its soils destroys itself."
>
> Franklin Delano Roosevelt

When to Plant. The best time to start seedlings depends on the crop and the climate. Generally, seeds should be started three to eight weeks before the typical last frost date for your area, or so that plants mature before excessive heat arrives.

Containers. Any container at least 3 inches deep will work for seed starting. Students can collect plastic yogurt containers, milk cartons, and plastic milk jugs and poke holes in the bottom for drainage. Commercial peat and plastic containers come in standard sizes, and some are reusable.

Potting Mix. Use a soilless seed-starting mix, available at any garden center. These contain a blend of finely ground materials that provide adequate moisture retention and aeration. Many also include a small amount of fertilizer to help seedlings get off to a good start.

Temperature and Light. Indoors, most seeds germinate best at soil temperatures between 70 and 75 degrees and air temperatures between 65 and 70 degrees. Once they're up, seedlings need lots of light, or they'll grow tall and weak. Relying on sunlight may limit seed options; grow lights and fluorescent lights provide more control over light availability. If you use grow lights, keep the tops of

PROGRAM SPOTLIGHT

> "The garden is an oasis ... in the midst of a gang-torn neighborhood, where [these kids] can experience the beauty and bounty of nature and the joy of working together to make a difference."

Transforming Schoolyard Soil

Dr. Martin Luther King, Jr. Academy, Salinas, CA

In 2003, when Alisal Union School District's 5 a Day nutrition education program initiated a school garden laboratory at the Dr. Martin Luther King, Jr. Academy (MLK), it faced numerous planting challenges. The quarter-acre location had previously been the site of a drive-in theater and flea market, and it had severely compacted and heavy clay soil. The group's original plan was to bring in a small tractor to till the soil during a ground-breaking ceremony, but after evaluation, they found the soil was too dry and hard for cultivating. So in order to begin gardening, they constructed 18 hexagonal raised beds, each 2 feet deep and 6 feet in diameter.

Debbie Delatour

Although a hexagonal bed is somewhat complicated to build, the design allows students to work together in a more circular fashion, facilitating interaction and cooperative work. Garden Coordinator Debbie Delatour notes that the beds "have been extremely successful at our site." They are divided into six triangular sections, and students work in pairs to design and install their own "plant part" garden. Students must plant crops with edible roots, leaves, stems, and flowers. Peas are planted in the center to represent fruit/seed crops.

While gardening in the raised beds, students worked on improving the rest of the soil to increase the amount of available growing space. They added gypsum throughout the garden to begin the long-term process of softening the soil. Debbie also coordinated a number of parent workshops during which parents used pickaxes and shovels to remove heavy soil from the perimeter area and inner fence line; it was replaced with a compost/topsoil mix. These areas were used to plant borders of annuals and perennials, climbing peas, sunflowers, tomatoes, and a strawberry patch.

The soil was not the only challenge. An adjoining grassy area sloped into the garden, creating serious flooding and drainage problems. After some trial and error, the group found the best solution was to plant on mounded soil and bring in loads of wood chips for mulch and walkways.

Debbie says that during the first year, "I think wood chips solved almost all of our problems! The fourth graders really enjoyed moving wheelbarrows full of wood chips and soil. They worked together very well with a purpose and great enthusiasm, and they felt like they had accomplished something. Wood chip moving brought out the best in them."

All of the sweat and time spent on bed preparation has paid off. "Now that we are in the third year of our garden, we rarely feel challenged by our soil," Debbie adds. "The layers of wood chips have decomposed over the years and seem to have lots of worms. When we need to reclaim more land for planting, we move aside the wood chips and add compost to what is now more workable soil." Watching and participating in the soil transformation process provided valuable lessons on decomposition and increased students' understanding of the importance of good soil in agriculture, fitting into the program's focus on science and nutrition. In addition to academic and horticultural success, Debbie explains, "the most touching element of this project is the children's love for the garden and their ongoing enthusiasm for taking care of it. During their lunch recess they literally arrive in droves (at times I have counted 60 kids) to water, cultivate, weed, and move wood chips and compost. The garden is an oasis for them in the midst of a gang-torn neighborhood, where they can experience the beauty and bounty of nature and the joy of working together to make a difference."

the seedlings within a few inches of the bulbs and leave the lights on for 12 to 16 hours a day. Check seedlings daily and raise the lights as they grow taller.

Water and Fertilizer. Until seeds germinate, keep the soil moist by spraying it with a pump sprayer or mister. Cover the pots with clear plastic to preserve moisture. Once the first seedlings germinate, remove the plastic and place the container under lights. Consistent moisture is very important, but be careful that soil doesn't get too wet, because excess moisture can cause rot.

Begin fertilizing the seedlings when they have their second set of true leaves. (The first leaves that emerge upon germination are seed leaves, also called *cotyledons;* they do not have veins as the true leaves do.) Use a mild fertilizer diluted for seedlings as directed on the product label. Some seed-starting mixes contain fertilizer, but your seedlings may use it up before the class is ready to transplant them. Always follow the warnings on fertilizer products and store them in a secure location.

Jim Morris/California Farm Bureau Federation

Transplanting. A week before transplanting seedlings into the garden, begin to acclimate them to the outdoors (a process known as *hardening off*). Have students place containers outside each day that week, gradually increasing the number of hours they spend outside. Start by placing them in a partly shady spot sheltered from the wind; each day, expose them to more sun and wind. By the end of the hardening-off period, they should be able to withstand full sun and stay outdoors overnight.

When it's time to transplant, water the seedlings well beforehand. Have students dig a hole for each transplant, spaced as noted on the seed packet. As they plant, your class may want to incorporate compost or fertilizer beside the plant to add to soil fertility (if using liquid fertilizer, read the label carefully; seedlings require a weaker solution than established plants). Instruct students to firm the soil around the root ball, water it well, and mark the bed. To reduce transplant shock, avoid transplanting in midday heat.

Planting Seeds Inside for Indoor Gardens

Use the directions above to start seeds for indoor gardens. However, instead of transplanting them outside, replant them in larger pots as they grow. Many plants can be grown from seed in indoor gardens. Low-light plants for windowsill gardens include vegetable plants with leaf or root crops, such as beets, carrots, collards, lettuce, mustard greens, parsley, radishes, Swiss chard, and turnips. With grow lights, your class can also raise beans, cucumbers, eggplants, peanuts, peas, peppers, and tomatoes. Some flowering plants you might want to try indoors: ageratums, alyssum, coleus, impatiens, marigolds, morning glories, nasturtiums, petunias, snapdragons, and zinnias. Many herbs can also be started from seed indoors. These include basil, catnip, coriander, chives, dill, marjoram, spearmint, oregano, sage, summer savory, and thyme. Indoor plants are usually smaller than outdoor plants and have lower production rates; however, they still provide excellent learning opportunities for your students.

Jim Morris/California Farm Bureau Federation

Garden Installation

Although you can add plants to your garden at any time, many schools dedicate one day to a majority of the installation. This allows students to come prepared and helps in coordinating volunteer recruitment efforts. Careful planning is needed to ensure a successful Planting Day.

Prior to Planting Day:

- Ask your students to research the growing needs of the plants you are planning to include in the garden. This will increase their involvement and understanding of the planting process.
- Recruit members of the garden team and additional adult volunteers to help on Planting Day. It is important to have extra hands and eyes to keep up with all the activities. Talk to the volunteers about how important it is for each child to be an active participant in the project.
- Publicize Planting Day to keep the community informed of your project. Newspapers love to run community-interest stories, and installing the garden provides wonderful photo opportunities.
- Make a list of all the tasks to be completed on Planting Day and be prepared to divide them among multiple small groups of volunteers and students.
- Take a "before" picture of the site for class archives.

On Planting Day:

- Encourage students to apply sunscreen and wear hats. Require everyone to wear closed-toe shoes.
- Begin your day with safety instructions and ground rules. Teach students how to use the tools, how to hold tools with sharp edges pointed down, and that they must walk, not run, when carrying them. Remind students to keep tools below the waist when working in the garden and to leave rakes, hoes, and shovels pointed down and out of pathways when not in use. Provide the right size of tools and gloves for your students.

> "The soil is the great connector of our lives, the source and destination of all."
>
> Wendell Berry
>
> *The Unsettling of America,* 1977

John Fisher/Life Lab

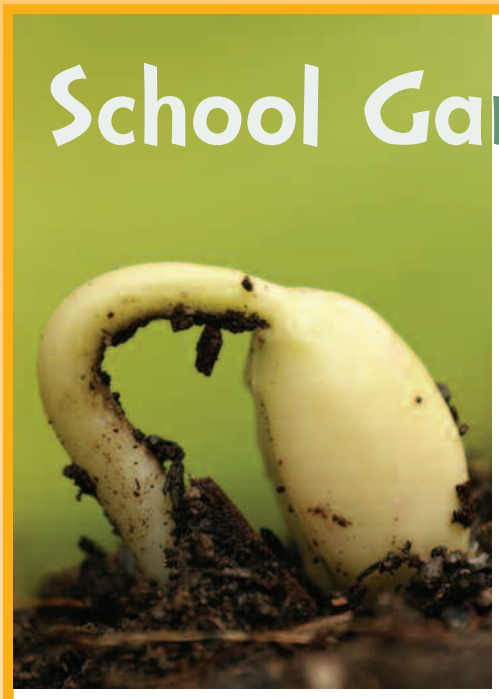
- Go over the design of the garden with the students and volunteers to make sure everyone knows how the garden is supposed to be installed. Lay out the beds as a group to avoid confusion, and have hard copies of the design available. If the area is large, lay out the beds prior to Planting Day to save time (make sure to involve students; this is a great math activity).
- Demonstrate proper planting and watering techniques and describe all the plants to be installed in the garden. If you do not feel comfortable with the demonstrations, recruit an experienced gardener or a member of the garden team to serve as a guest speaker.
- Divide the students into groups and have an adult volunteer available to work with each small group. Make sure the volunteers understand what their group should work on. Installation should be a hands-on experience for all students; working in small groups ensures that everyone will have a chance to participate.
- Keep a first-aid kit in the garden and provide plenty of drinking water to prevent students from getting dehydrated.
- Take lots of pictures to chronicle your work.
- Remember to HAVE FUN!

> "The earth laughs in flowers."
>
> Ralph Waldo Emerson

After Planting Day:

- Water plants with a gentle spray and check to see that the plants' root zones are moist.
- Make sure to clean all tools and store them in a safe location.
- Thank all students and volunteers for their hard work.
- Take "after" pictures of the newly planted garden.
- Share details from Planting Day with school administrators, sponsors, and the community through letters, the school Web site, and newsletter and newspaper articles. Thank them for their support. This follow-up will allow supporters to see the result of their contributions.
- Incorporate the garden into the curriculum and continue with basic maintenance activities.

School Garden Planting Guide



Alicia Dickerson/Life Lab

Key to Planting Guide Headings

Crop. This guide provides detailed information about crops commonly planted by seed in school gardens. We encourage you to experiment with additional plants that grow well in your area. Check with local gardeners, your Cooperative Extension Service office, and garden center employees for suggestions.

Plant Seeds Indoors. Many seeds can be started indoors and then transplanted to outdoor gardens. This column provides you with the weeks to plant your seeds indoors relative to your first or last frost date. Your Cooperative Extension Service office can tell you the frost dates in your area.

Plant Seeds or Transplants Outdoors. Some seeds can be planted indoors or outdoors. Other seeds will not transplant well and should be sown directly into outdoor gardens. This column provides you with the weeks to plant your seeds in outdoor gardens and also the approximate time to plant seedlings started indoors in outdoor gardens relative to your first or last frost date. Your Cooperative Extension Service office can tell you the frost dates in your area.

Planting Depth. Generally, seeds should be planted at a depth that is two to three times their width. This column lists specific planting depths in inches. Some of the crops listed either require light to germinate or are too tiny to be buried under soil. A "0" appearing in this column indicates that the seeds should be planted on top of the soil and pressed down lightly with a smooth surface, but not buried.

Spacing of Plants. Plants should be grown a certain distance apart to ensure they do not crowd each other and inhibit healthy growth. This column gives the recommended spacing for mature plants in inches. Since not all seeds will germinate, seeds should be planted closer than the distance needed by mature plants. Follow the spacing recommended on the seed packet when planting seeds outdoors. If more seeds germinate than expected, you may need to thin the crop.

Days to Germination. This column tells you approximately when seeds will sprout given reasonable conditions. Temperature and moisture can greatly affect this rate.

Days to Harvest. This column tells you approximately when plants will be ready to harvest. Temperature, water, and a number of other environmental factors can affect this rate.

Good Source Of. This column gives information on vitamins and minerals provided in substantial amounts for fruit and vegetable plants.

Western Growers Charitable Foundation

SPRING FRUIT AND VEGETABLE PLANTING GUIDE

Crop	Plant Seeds Indoors (weeks before or after last frost)	Plant Seeds or Transplants Outdoors (weeks before or after last frost)	Planting Depth (inches)	Spacing of Plants (inches)	Days to Germination	Days to Harvest	Good Source Of
Beans	3-4 weeks before	1-2 weeks after	1	6-8	4-10	60-80	Vit. C, fiber
Beets	*	2-4 weeks before	1/2	2-4	7-10	50-75	Greens high in Vit. A, C, iron, calcium
Broccoli	5-8 weeks before	5-8 weeks before	1/4	15-18	5-10	60-75	Vit. A, C, folate, calcium, magnesium, fiber
Cabbage	4-6 weeks before	5 weeks before	1/4	18	4-10	60+	Vit. C, fiber
Carrots	*	2-4 weeks before	1/4	2	10-17	60-80	Vit. A, fiber
Cauliflower	5-8 weeks before	1-2 weeks before	1/4	15-18	5-10	60-72	Vit. C, folate, potassium
Celery	8-10 weeks before	2-3 weeks before	1/4	6	7-12	75-100	Fiber
Corn	3-4 weeks before	1-2 weeks after	1	12-15	3-10	50-95	Thiamine, folate, potassium
Cucumbers	2-3 weeks before	1-2 weeks after	1	12-24	3-8	60-80	-
Garlic	*	6 weeks before	1/2	4-6	10-15	90-120	Vit. A, C, folate
Lettuce	3-4 weeks before	2-4 weeks before through 3 weeks after	1/4	10-12	4-10	45-60	Vit. A, K, calcium
Onions	*	3 weeks before through 2 weeks after	1/4	4	4-12	60-85	Vit. C
Peas	4-6 weeks before	4-6 weeks before through 2-3 weeks after	1	4	6-15	55-75	Protein, Vit. B_1
Peppers	6-8 weeks before	1-3 weeks after	1/2	10-12	8-20	70+	Vit. C
Potatoes	*	4-6 weeks before	6	10-12	10-15	70+	Vit. C, B_6, niacin, copper, potassium, fiber
Pumpkins	*	After last chance of frost	1	36	7-10	90+	-
Radishes	*	4-6 weeks before	1/4	1	3-10	25-40	-
Spinach	3-4 weeks before	3-6 weeks before	1/4	4-8	6-14	40-60	Vit. A, C, K, iron
Squash, Summer	*	1-4 weeks after	1	15-24	3-12	60-85	Vit. A, C, fiber
Squash, Winter	*	2 weeks after	1/2-1	24-36	4-10	80+	Vit. A, C, potassium, fiber
Tomatoes	6-8 weeks before	2-4 weeks after	1/4-1/2	18-24	6-14	65-85	Vit. A, C, potassium, fiber
Cantaloupe	2 weeks before	2 weeks after	1	24-36	7-14	60-90	Vit. A, C, thiamine, potassium
Strawberries (Alpine)	3-5 weeks before	*	1/8	6-8	20	85+	Vit. C, fiber
Watermelon	2 weeks before	2 weeks after	1/2-3/4	24-36	5-10	70-90	Vit. A, B_6, C, thiamine

*Not recommended

Photos: 5 A Day

Photos: Western Growers Charitable Foundation

SPRING HERB PLANTING GUIDE

Herbs may be harvested at any time once they reach a decent size, as long as you leave enough foliage to keep the plant alive.

Crop	Plant Seeds Indoors (weeks before or after last frost)	Plant Seeds or Transplants Outdoors (weeks before or after last frost)	Planting Depth (inches)	Spacing of Plants (inches)	Days to Germination
Basil	4-6 weeks before	1-2 weeks after	1/8	6-12	7-10
Catnip	6 weeks before	2-4 weeks before	1/8	12-18	5-14
Chives	6 weeks before	After last chance of frost	1/4	8-12	5-14
Cilantro	*	After last chance of frost	1/2	12-18	10-15
Dill	*	1-2 weeks before	1/4	3-12	20-25
Oregano	6-8 weeks before	2-4 weeks after	1/8	8-12	8-14
Parsley	4-6 weeks before	1-2 weeks after	1/4	6	11-27
Sage	4 weeks before	After last chance of frost	1/4	12	14-21
Spearmint	6 weeks before	After last chance of frost	1/8	18	10-16
Thyme	8 weeks before	2 weeks after	1/8	6-12	20-30

*Not recommended

SPRING FLOWER PLANTING GUIDE

Crop	Plant Seeds Indoors (weeks before or after last frost)	Plant Seeds or Transplants Outdoors (weeks before or after last frost)	Planting Depth (inches)	Spacing of Plants (inches)	Days to Germination	Days to Harvest	Edible?
Bachelor's Buttons	4-5 weeks before	1-2 weeks before	1/4	12-14	7-14	50-60	Yes, petals
Borage	*	After last chance of frost	1/4-1/2	12	5-10	45-50	Yes
Calendula	6-8 weeks before	After last chance of frost	1/4-1/2	10-12	5-15	40-50	Yes
Cosmos	4 weeks before	After last chance of frost	1/4	8-24	5-7	90-100	No
Hollyhocks	6-8 weeks before	Early summer	0 (press into soil)	24	10	120-150	Yes
Love-in-a-Mist	4-6 weeks before	2-4 weeks before	1/8	6-12	10-15	60	Yes
Marigolds	4-6 weeks before	1-2 weeks after	1/8	10-12	5-10	70-80	Yes
Nasturtiums	*	After last chance of frost	1/2	6-12	7-14	40-60	Yes
Sunflowers	3-4 weeks before	2 weeks before	1-2	12-24	7-14	80-120	Yes, seeds
Tithonia	6-8 weeks before	After last chance of frost	0 (press into soil)	24	10-15	75-105	No
Zinnias	6 weeks before	1-2 weeks after	1/8	6-12	5-10	70	No

*Not recommended

FALL FRUIT AND VEGETABLE PLANTING GUIDE

Crop	Plant Seeds Outdoors (weeks before first frost)	Planting Depth (inches)	Spacing of Plants (inches)	Days to Germination	Days to Harvest*	Good Source Of
Beets	8-10 weeks before	1/2	2-4	7-10	50-75+	Greens high in Vit. A, C, iron, calcium
Broccoli	14-17 weeks before	1/4	15-18	5-10	60+	Vit. A, C, folate, calcium, magnesium, fiber
Cabbage	13-14 weeks before	1/4	18	4-10	60+	Vit. C, fiber
Carrots	13 weeks before	1/4	2	10-17	60+	Vit. A, fiber
Cauliflower	14 weeks before	1/4	15-18	5-10	60+	Vit. C, folate, potassium
Garlic	Sept.-Nov. with mulch	depth of clove	4-6		160-200	Vit. A, C, folate
Lettuce	6-8 weeks before	1/4	10-12	4-10	45-65	Vit. A, K, calcium
Onions	Depends on variety	1/4	4	4-12	60-120	Vit. C
Peas	12 weeks before	1	4	6-15	55+	Protein, Vit. B_1
Radishes	7 weeks before	1/4	1	3-10	25+	-
Spinach	6-8 weeks before	1/4	4-8	6-14	40-75	Vit. A, C, K, iron
Strawberries, Alpine	5-8 weeks before	1/8	4	20	Next spring	Vit. C, fiber

*Maturity rates of overwintering vegetables vary depending on temperature and available sunlight.

5 A Day

Planting Guides adapted from:

Jaffe, Roberta, and Gary Appel. 1990. *The Growing Classroom.* Menlo Park, CA: Addison-Wesley Publishing Company.

Pranis, Eve, and Jack Hale. 1988. *GrowLab: A Complete Guide to Gardening in the Classroom.* South Burlington, VT: National Gardening Association.

NC State Herb Fact Sheets: *www.ces.ncsu.edu/depts/hort/consumer/factsheets/herbs/herbindex.html*

NC State Annual Fact Sheets: *www.ces.ncsu.edu/depts/hort/consumer/factsheets/annuals/annual_index.html*

Western Growers Charitable Foundation