

Soil and Planting



Soil and Bed Preparation

To forget how to dig the earth and to tend the soil is to forget ourselves.

~ Mohandas Gandhi

Introduction to Soil

Soil composition

Soil is made from decomposed rock particles, air, water, living organisms, and organic matter from decomposing plants and animals. Soils differ in the quantities and characteristics of each of these components, but all five are essential for healthy soil.

Soil texture and type

Soil type is generally classified by the size of the broken down rock particles in the soil. Sand has a large particle size, silt has a medium particle size, and clay has a very fine particle size. The proportion of sand, silt and clay particles determines the texture of your soil and affects drainage and nutrient availability.

Soil water-holding capacity

Sandy soils have large particles and a very low water-holding capacity—water drains through them quickly. Clay soils have very fine particles and a very high water holding capacity. Knowing this is important because it tells you something about how often and how much you will need to water your plants.

Soil structure is determined by how individual soil particles aggregate. Good soil structure allows for water, oxygen, and microorganisms to penetrate the soil and that, in turn, increases the amount of nutrients available to plants. Structure can be influenced greatly by management. Consistently adding compost to a soil will improve its structure, increase its water-holding capacity, and make it easier to work in the long run.

Soil testing

A professional soil test provides a wealth of information about your soil, including its type, pH level (relative acidity or alkalinity) and nutrient levels. If you are starting a new garden and have concerns about potential soil toxins, such as lead, in your area, a soil test that screens for common environmental toxins is a good idea.

Keeping garden soils fertile

Soil fertility, in part, determines a soil's capacity to produce. Fertility management should focus on feeding the soil (including the organisms in the soil), so that the soil can feed the plants. Three key methods for feeding the soil are:

- Compost
- Cover crops
- Addition of other amendments

Compost

Compost adds plant nutrients, organic matter and beneficial microbes to the soil. Adding a very thin layer (just more than a sprinkling) of good quality compost can supply most or all of the nutrients needed to maintain soil fertility and healthy plants season after season. Increasing a soil's organic matter content by adding compost can improve soil tilth, allowing for increased water and air penetration. If you are using compost to improve tilth, add about ¼-inch thick over the surface and then mix it in to the soil. This is much more than is required to simply maintain soil nutrient level.

Cover crops

Cover cropping is the practice of planting an area with plants that will cover the soil surface to prevent or reduce erosion and then, once turned back into the soil, will improve soil structure and fertility. This practice has many benefits for the soil, as well as potential benefits for pest management. Cover crops increase soil organic matter, fix atmospheric nitrogen into a form that plants can utilize, improve soil structure and soil-water relations, prevent (or reduce) erosion and nutrient leaching, and compete with weeds.

Cover crops can be chopped into the soil or can be removed and turned into compost. Ideally cover crops are used before they set seed. If you turn them into the soil, expect to wait about three weeks for the cover crops to break down before planting in the bed. Most cover crops are relatively easy to grow and can be interesting, low-maintenance annuals in the school garden.

There are two types of commonly grown cover crops: legumes and grasses.

Easy cover crops for school gardens

	Legumes	Grasses
Winter	vetches bell or fava beans peas berseem clover	oats wheat barley rye
Summer	cowpeas (black eyed peas)	Sudan grass sorghum annual buckwheat oats rye

Preparing soil for planting

Your primary goal is to loosen the soil so that roots, water, and oxygen can easily penetrate the soil environment. Soil that has been prepared well will exhibit a nice "crumb" structure, and will be easy to penetrate with a tool when damp. Secondary goals are to mix in compost or other soil amendments and to build a bed or "plant place" that is distinct from paths or "people places." Making this distinction clear for children can prevent them from compacting the soil or trampling plants in the beds.

Pre-irrigate to prepare the soil

The amount of moisture in your soil before you start digging is the most important factor in determining how effective your work will be. Ideally, it should be about as moist as a wrung out sponge. Why?

- Too little water and the ground will be hard. Clods won't break up easily. The beneficial "crumb" structure of the soil is also fragile when the soil is too dry and can break down into dust if the soil is worked when too dry.
- Too much water and the ground will be heavy. Mud will stick to your implements and you may tire yourself out just moving the weight of water in the soil. The crumb structure of the soil is also fragile under wet conditions and can easily become compacted when worked.

Irrigate areas well at least two days before you plan to work them. Test the soil for the right moisture level by making a ball of soil in your hand. If the soil is wet enough to stick together when squeezed but then dry enough to break apart into small pieces when tapped, you are at the right moisture level for preparing your bed.

Suggested steps for “single digging” a bed

This means loosening the soil one implement depth below the surface. Single digging can be easy and fun, after the first few times your soil is worked and once you have had crops growing in it for a few seasons.

1. Clear all plants and other debris off the bed.
2. Thoroughly wet the bed as described above.
3. Thoroughly loosen the soil using a digging fork or spading fork. If children are helping with bed prep, consider using hand trowels instead of large tools.
4. Rake the surface smooth and level and rake up the edges of the bed so that they are clearly defined.
5. Add compost and any other amendments to the surface.
6. Work in amendments using a hula hoe.
7. Re-rake the surface so that it is flat and smooth and re-rake the edges of the bed.

Other methods of bed preparation for difficult or never-before worked soils

When first putting in garden beds, you may want to consider using a rototiller. While rototilling may not be child-friendly or ideal for your soil in the long run, it can be a great way to get the beds started initially.

You may also consider “double digging,” which means loosening the soil two implement depths below the surface of the soil (up to 2 feet deep). This is a lot of work! It is great for a bed when it is first dug, but you do not need to do this every time you prepare the bed. The most effective method of doing this is described and illustrated in John Jeavons, *How to Grow More Vegetables Than You Ever Thought Possible*.

Purchasing soil

If you are starting your garden from scratch and constructing raised beds, soil can be one of your biggest expenses. Soil is usually sold in cubic feet or cubic yard

measurements. If you need large quantities of soil, you can look for a soil company in your area that can deliver to your school site. Delivery of soil will take some coordination as the delivery truck will need direct access to garden, and/or you'll need to move large quantities of soil by hand to the desired place in the garden. Local hardware companies and nurseries sell bags of soil for amending or filling beds in different cubic feet quantities.

Tips for purchasing soil

- Purchase organic soil to ensure that the soil is safe for children to handle.
- Do some research and cost estimates on how much soil you need to fill your raised beds or amend your current soil. You can engage students in measuring the volume of raised beds to see how much soil is needed.
- Be cautious when accepting soil donations from others' yards or other unverified sources. While it could save money, you might be introducing soil infested with weed seeds or chemicals.

Soil Measurements

27 cubic feet = 1 cubic yard

10'x 3'x 1.5' raised bed (10 feet long, 3 feet wide, 1.5 feet high) needs 1.66 yards of soil

Tips for working the soil with kids

- Always discuss, demonstrate, and review safety rules with children before handing tools out. Suggested rules include holding the point down, putting tools away when not in use, and keeping the metal parts below the hips.
- When working with a large group of children or small children, consider using hand trowels instead of large tools to prepare the soil.
- Make sure every student has his/her own job, whether it is adding compost to the soil, breaking up clods, or pulling out stubborn weeds.
- Make sure students are spaced safely apart so they are not interfering with each other's tools.
- When kids are working with tools, refrain from working so that you can keep your eyes on all of them. Enforce the rules consistently, and provide an alternative activity for any student who is not using tools safely.
- Musical Shovels: A fun digging activity is to circle students around the area that needs to be worked and have them turn the soil in front of them while music plays (or is sung by everyone). When the music stops, students rotate to a different position. This is fun, and keeps the soil from being over dug in some spots.

OUTDOORS ✿ GRADES 4-6 ✿ FALL, SPRING ✿ PROJECT



The Nitty-Gritty

DESCRIPTION

Through a simple process, students separate soil into its three major components: sand, silt, and clay.

OBJECTIVE

To explore the composition of garden soil and determine its quality.

TEACHER BACKGROUND

Soil is composed of a blend of various-sized particles. The proportion of sand to silt to clay is one factor that determines the quality of the soil. Sand, silt, and clay may seem to be uniformly categorized as small particles, but there is a great difference in the size of each of them, and this difference affects soil quality. If a particle of sand were the size of a beach ball, then silt would be roughly the size (and shape) of a Frisbee, and clay would be roughly the size and shape of a dime (see illustration, right).

Gardeners describe soil types in many ways: heavy, light, sandy, clay, loam, rich loam, and so on. Scientists and horticulturists classify soil types by the proportion of sand, silt, and clay particles they contain, based on the sizes of mineral particles. The texture of the soil is determined by the blend of these various-sized particles. Classifying the soils in our garden will give us some indication of the problems we are likely to encounter in working with them: *Soil that has too much clay is hard to work* and *Soil that has too much sand dries out fast*. Through the years it is possible to change the texture of soil by adding amendments such as sand and compost to balance the proportions.



sand (beach ball size)



silt (Frisbee size)



clay (dime size)

MATERIALS

- ✿ One glass quart jar with a lid per group of five
- ✿ One piece of masking tape per group
- ✿ One trowel per group
- ✿ Markers
- ✿ Soil samples gathered by student groups during activity
- ✿ Water
- ✿ One Clay, Silt, Sand Chart (blackline master) per group, p. 388

CLASS DISCUSSION

What have we learned about how soils are made? (*They are made when materials break down.*) Are all soils the same? (*no*) Why would some be different from others? (*They are made from different types of materials, during different weathering processes, and in different climates.*) Do you think all soils are good for growing food? (*no*) What might make some soils better than

others? (*good drainage, ability to hold nutrients, easy to dig, lots of living things*) In this activity, we are going to do a simple demonstration to determine the parts of soil. We will find out if it will be hard or easy to dig and if it holds water.

ACTION

1. Divide the class into groups of five. Give each group their materials.
2. Fill each quart jar about $\frac{2}{3}$ full of water.
3. Demonstrate how to take a soil sample. First dig a few inches (2 to 7 cm) below the surface. Then carefully scoop up soil for the sample.
4. Help each group select a different location in the garden or schoolyard to take soil samples.
5. Instruct each group to add soil to their jar until it is almost full, then put the lid on the jar.
6. Have groups label the jar lids with the group name and soil location.
7. Have students shake each jar vigorously. Let the soil settle. Have each group observe their jar. What do they see happening? (*In a short time the heaviest sand particles sink to the bottom and the sand layer becomes visible, but the silt and clay particles will take hours to settle.*)
8. Place the jars in a location where they may be easily observed. Be sure no one lifts the jars to observe them.
9. In 24 hours the soil will be completely layered. Have each group describe the layers. Which layer is on the bottom? (*one with the heaviest, biggest particles*) Is that the same for each group? Which layer is the thickest? (*Answers may vary.*) How do you think the thickest layer will affect your soil for gardening?
10. Each group can use the Clay, Silt, Sand Chart, p. 388, to determine their soil name. Then have them mark off the layers on a piece of paper held up to the jar, as shown on the chart, and compare each one to the chart. If the particles divide into about 40% sand, 40% silt, and 20% clay, the soil is called **loam** — a very good kind of soil to have. If the soil falls into other classifications, you could add sand or organic matter to change its classification.

WRAP UP

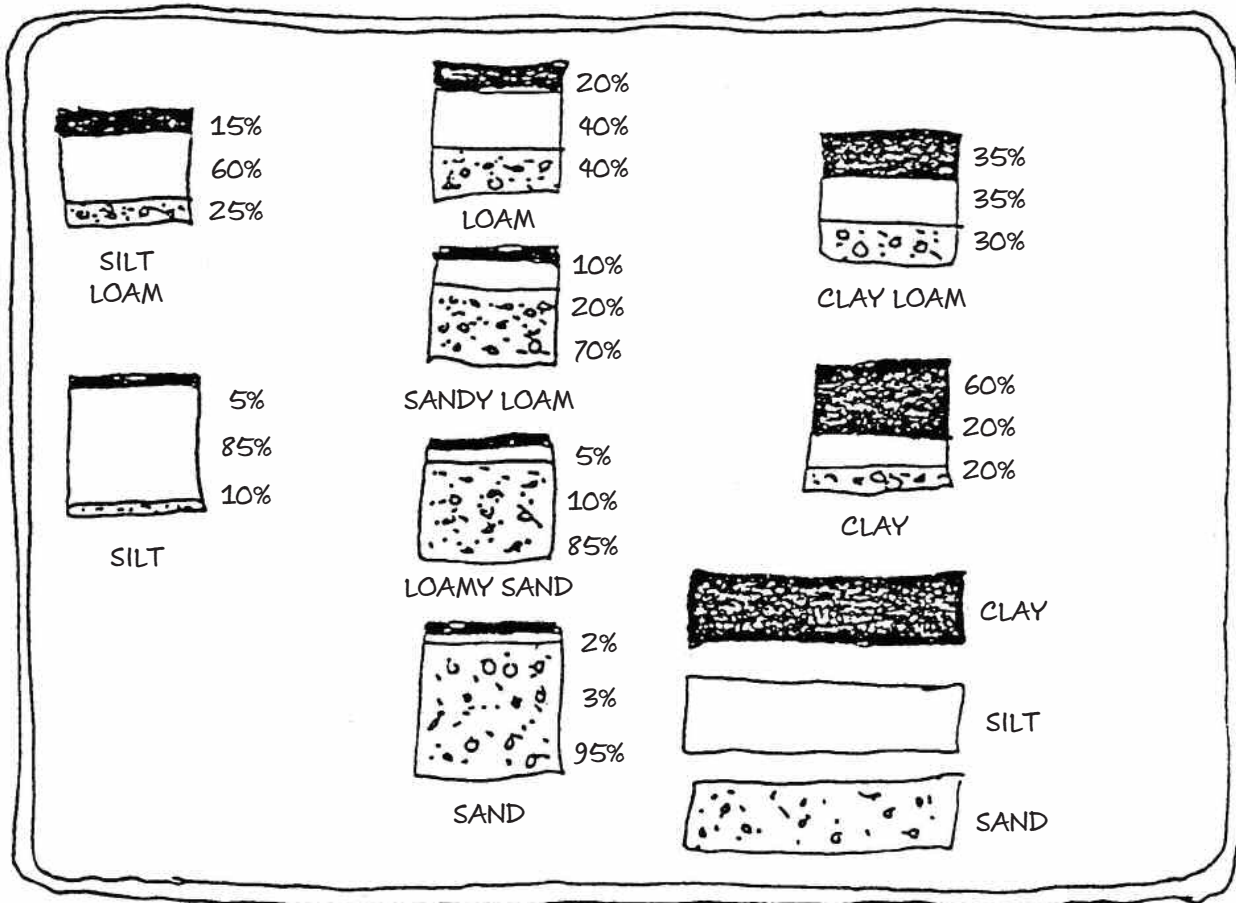
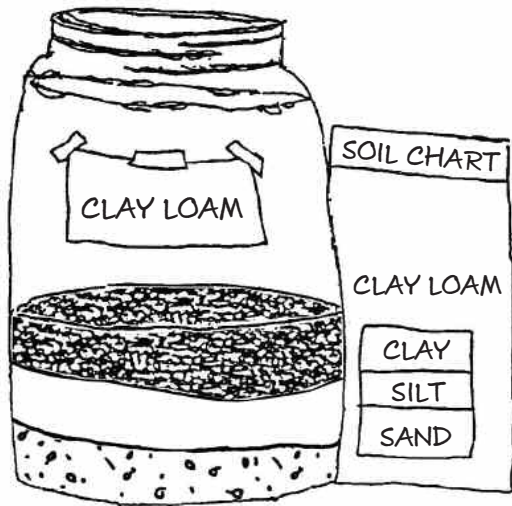
Were all of the soils the same? How did they differ? What are the three different particles in soil? Which is the biggest? Which is the smallest? What do you predict will make your soil better for gardening? Why? Which soil sample will be easiest to dig? Which will not let water drain?

DIGGING DEEPER

Keep a soil history from year to year for comparison.

🍏 Clay, Silt, Sand Chart

(From: The Nitty-Gritty, p. 85)



Basic Garden Tools

Essential Garden Tools for a School Garden

Basic garden tools

Wheel barrow (\$80-\$130)
50ft-100ft kink resistant hose (\$35-\$60)
Fan sprayer hose attachment (\$3)
Watering cans (\$8-\$10)
Scissors

Adult tools:

Long handled shovel (spade) (\$15)
Metal soil rake (\$15)
Digging fork (\$20-\$30)

Children sized tools:

Hand trowels (\$8)
Short D-handled shovels (\$10-\$15)
Short D-handled 4-tined cultivators (\$10-\$15)
Class set of clipboards

Other Good Garden Tools

Leaf Rake (\$10-\$15)
Long handled hoe (\$15)
Hula hoe (\$18)
Adult and children's sized gloves (rubber coated) (\$4-\$6)
Short and long handled pruners (\$10-\$60)
Push broom (\$15-\$20)
Tool cleaning brush (you can use a BBQ brush)
Buckets: large and small for moving soil, mulch, and starting seeds
Plant labels
Twine & stakes
Harvest baskets
Thermometer
Magnifying glasses

Garden Bed Types

Advantages and Disadvantages

In-Ground Beds	Raised Beds	Containers
<ul style="list-style-type: none"> • Garden beds dug directly in the ground level with the soil surface. There may be a visible edge or physical border, but the soil surface is not significantly higher than surrounding areas. • This system relies mainly on the existing soil, although amendments such as compost or other fertilizers may be added to improve the soil. • Typically these beds are no more than 3 feet wide so students can easily reach into the middle of them to work the soil, weed, or harvest without stepping in them. <p>Pros:</p> <ul style="list-style-type: none"> • Little requirement for materials to start. No building materials, no imported soil. • Easy to expand or change the layout of your garden. • With a decent soil, these are very easy to dig and prepare. • Makes good use of the vast resource of water and nutrients provided and stored in the existing soil. <p>Cons:</p> <ul style="list-style-type: none"> • Needs a site with workable, uncontaminated soil. • May be difficult to install gopher wire so that it is effective. 	<ul style="list-style-type: none"> • Essentially in-ground beds with a significantly raised edge or border. This allows the soil in the bed to be built up or improved soil to be brought in and added above the existing soil. Strictly speaking “raised beds” do not have a solid bottom, although structures with wood borders and solid bottoms are often referred to as such. • Borders are made from materials such as redwood, plastic lumber, cinder block, broken blocks of salvaged concrete (“urbanite”), or logs. Avoid using railroad ties or pressure-treated woods—both contain materials toxic to humans. • Raised beds are generally no more than 3 feet wide so that students can reach into the middle without stepping in them. <p>Pros:</p> <ul style="list-style-type: none"> • Can be good in areas with poor soil. • They create clear bed borders and add definition to garden design. • Can be made wheelchair accessible. Other users may find the higher soil surface level more convenient to work as well. • Edges can be designed as seating areas. • Possible to install gopher wire to bottom edge of frame before filling with soil. <p>Cons:</p> <ul style="list-style-type: none"> • Requires found and/or purchased materials to construct the edges. Can be costly. • May require purchased soil or soil moved from another area. • Edges can make digging and preparing the soil more awkward. 	<ul style="list-style-type: none"> • Containers are varying sizes and differ from raised beds in that they have bottoms. Planting containers need drainage holes and should be made from materials that hold up well when wet and left outdoors. Ceramic, recycled plastic, and other types of plastic containers are available at nursery centers. Other cast-off containers can work well so use your imagination (old bathtubs, sinks, wheelbarrows). • Large plants such a tomatoes or squash should be grown in larger containers that can hold over 4 gallons of soil. Smaller containers are suitable for shallow-rooted crops such as lettuce, spinach, onions, strawberries and herbs. • Containers require a “light” planting mix rather than soil. You may make your own: 1/3 compost, 1/3 coco pith, and 1/3 horticultural sand. <p>Pros:</p> <ul style="list-style-type: none"> • Can be used on top of asphalt or where there is no soil. • Location is relatively flexible. They can be strategically placed to beautify school grounds. • Tall containers can be wheelchair accessible. • Small containers or containers on wheels can be moved inside to protect from weather or vandalism. • Good for areas with limited space. <p>Cons:</p> <ul style="list-style-type: none"> • Requires initial cost of container and/or purchased materials to construct the containers. Can be costly. • Requires special soil mix that must be purchased or made from purchased ingredients. • Containers need to be watered and fertilized more often than in-ground beds.

Seeding and Transplanting

*One for blackbird, one for the crow,
one for the cutworm, and one to grow.*

~ American saying

Indoors or Outdoors?

What crops are best started indoors in containers?

Plants that can tolerate root disturbance and will benefit from a jump on the season are best to start indoors. You can find this information on seed packets and in planting guides.

- Cool weather crops such as broccoli, cauliflower, and cabbage can be transplanted into the garden up to a month before the last danger of frost.
- Warm weather crops, like tomatoes, peppers, and melons, should be transplanted into the garden after all danger of frost is past in your area.
- Flowers planting requirements vary, so check the seed packets. You can find your average last frost dates by asking local gardeners or your Cooperative Extension Office (Master Gardeners).

What crops are better started outdoors?

Some crops prefer to be started directly in the garden. Root crops such as carrots, radish and beets don't transplant well, nor do other crops such as corn, beans, peas, squash, melons, and cucumbers.

Sometimes, caring for seeds directly sown in the garden is a challenge at schools (e.g., protecting them from pests, keeping seed beds watered). In that case, you can start corn, beans, peas, squash, melons, and cucumbers in containers. However, you should do so in larger individual containers rather than the pricking out method described above.

Seeding Outdoors

Direct sowing methods

Seeds planted directly in the garden can be drilled (poked), broadcast (sprinkled) or planted in little furrows (lines). Refer to the seed packet for suggested methods of sowing seeds.

- **Drilling seeds** is as simple as poking a hole in the soil to the appropriate depth and then covering it with soil.
- **Broadcasting seeds** is a common method for grass or wildflower seeds. Broadcasting involves sprinkling seeds over the planting area and covering them with soil or lightly "scratching" in the seed.
- **Furrow seeding** is often used with crops such as carrots, beets or radishes. Dig a shallow furrow in the soil where you want your seeds to go and then drop in a line of seeds. Cover the seeds and pat gently. Furrow-planted crops may need to be thinned to the recommended spacing listed on the seed packet. Thinning is done once the plants begin to grow.

Moisture needs for direct sown seeds

After you have directly sown your seeds in the ground, it is important to keep them moist until they germinate.

- Use a watering method that delivers a “gentle spring rain,” e.g., watering can or hose fan attachment. It may take many passes of light sprinklings to be sure the soil is moist beyond the depth of the newly planted seed.
- Avoid flooding your newly planted area as this can wash away seeds and/or cause your soil to form a “crust” on the top, which makes it difficult for some seeds to push through the soil.
- Keep an eye on your seedbed, and keep it constantly moist. Depending on the weather, you might need to water daily.

Pest protection for young seedlings

Young sprouts are often tempting to birds and other critters! Try covering your seedbeds with floating row cover, bird netting, upside down strawberry baskets, or by hanging bird flash tape over your bed.

Tips for sowing seeds with kids

- Help younger students to properly space their plantings. A few kid-friendly measuring techniques include
 - **using a sowing string:** before planting, stake down a string with knots or tape marking where the seeds should be sown.
 - **using “farmers’ measurements”:** before planting in the garden have children measure the distance from thumb to pinkie on their open hand and use their hand as a spacing guide.
 - **using marked trowels as rulers:** have kids measure and mark inches on their trowels and use it as a ruler.
 - **pre-“drilling” holes in the soil:** kids place their seeds into holes that are poked in the soil, or place large seeds on the soil surface where you want them to be planted.
 - **using sticks to mark spots where you want a seed:** have the student remove the stick and plant a seed.
- Another rule of thumb is “the smaller the kid, the bigger the seed.” Larger seeds are easier for younger children to count and sow. Otherwise you might have 50 radishes sprouting where you only wanted a few.
- Make sure you demonstrate the depth the seed needs to be planted at. Kids can use the knuckles on their forefinger as a marker of depth. You can also make drilling sticks by marking pencils or chopsticks every quarter inch and using these to poke the seeds into the soil.
- If working with many kids at one time have some students be the “inspector” whose job is to make sure the seeds are planted and at the right spacing.

Seeding Indoors in Containers

Why start seeds indoors

Starting seedlings indoors allows students to observe plant germination and provides a more controlled environment for young plants.

Seeding containers

Select any type of container that is about 2-3 inches deep with drainage holes.

- Yogurt containers, small milk cartons and similar small containers work well.
- Nurseries often donate used, empty, plastic six-packs designed for seed starting.
- Paper pots are a resourceful container choice. See “Making Paper Pots” handout.
- If you wish to save space, you can sow seeds close together in wider containers called “flats” and then transplant them into individual containers once plants are 1-2 inches tall.

Seed starting mix

It is best to use seed starting mix because it is light, absorbent, weed-free and sterile.

- Typical potting soil may be too light for consistent soil to seed contact.
- Garden soil is often too heavy for proper transplant root development.
- You can purchase seed starting mix, or make your own: Mix
 - one part horticultural sand
 - one part compost
 - one part coco pith fiber

Planting seeds

Before planting, wet the soil mix completely so that it is as damp as a wrung out sponge.

- Fill containers then tap them to settle the soil.
- A good rule of thumb is to plant seeds about two to three times as deep as they are wide. You will also find the recommended planting depth on seed packets.
- A few types of seeds need to be closer to the top of the soil. They either require light to germinate or are very small. For these, press them gently into the top of the soil without covering them (check the seed package).
- After planting to the appropriate depth, water seeds with a gentle spray of water, let the water soak in; repeat so that water is sure to penetrate to the depth of the seed.

Germinating seeds

Seeds are living organisms and, with proper conditions, they will sprout to life. Seeds need moisture, warmth, and, in some cases, light to germinate (sprout). Once seeds sprout, these same factors are essential for healthy seedling development.

- **Moisture.** Be sure to keep the soil surrounding your germinating seeds moist, but not soggy. Check frequently by gently probing to the depth of the seed or young root to make sure the soil is moist below the surface. Water seedlings when they

need it rather than on a regular schedule. Gently sprinkle them regularly so they don't dry out. A spray bottle works well in the classroom.

- Once seeds have sprouted, have students test soil moisture with a finger, and water only when the top 1/2 inch of soil is dry.
- **Fertilizing.** If you use a rich seed starting mix, your plants may have all the nutrients they need to get established. However, if your seedlings start to fade in color or appear weak, you can add organic fertilizers once their first true leaves have formed. Be careful not to overdo it. The right amount of fertilizer will keep seedlings looking dark green (rather than pale yellow), but too much can be harmful. A good rule of thumb is to fertilize with half the recommended dose once every 10 to 14 days. Students may want to experiment to discover for themselves the consequences of too much of a good thing!
- **Warmth.** When starting seeds in the classroom, temperatures will usually not fall below the 60 degrees needed to germinate most seeds.
- **Light.** Most seeds germinate best in a dark, warm environment, surrounded by soil. There are a few types of seed that need light to germinate (check seed packets) and should be covered with little or no soil. Seedlings, or baby plants, grow best with 14 to 16 hours of light a day, much more than windows can supply in late winter. Seedlings grown on windowsills tend to be "leggy," and therefore will generally grow better under fluorescent lights. To prevent stretched, leggy stems, the lights should be kept within a few inches of the top leaves.

Transplanting

Transplanting to larger containers

If you planted many seeds in a container close together to save space, you will have to move or "prick" them out to individual containers with more space.

- Wait until after the first true leaves appear (after the cotyledons).
- Gently tease out closely planted seedlings with a Popsicle stick, or butter knife.
- Then transplant them to individual containers where they have more space.
- Lift seedlings by their cotyledons or leaves rather than by stem.

When are your plants ready to transplant?

Your seedlings are ready to be transplanted when they have at least two sets of true leaves and their root system is established enough to hold soil around them.

Hardening off

"Hardening off" refers to getting small seedlings accustomed to harsher outdoor conditions before moving them outdoors permanently. Do this by setting them outside for

progressively longer periods each day, starting with a few hours and increasing to a full day over the course of a week or so.

Transplanting pointers

Transplant your seedlings into moist garden soil that is neither too dry nor too soggy. Ideally, it will be about as moist as a wrung out sponge. Refer to the planting guide or seed packet to determine the appropriate spacing of your plants.

- If your transplants are root-bound, with a large mass of roots at the bottom of the plant, gently break up the root ball before transplanting.
- Transplant your plants to the same depth that they were in their containers.
- Water transplants with many passes using a gentle spray, letting the water seep in between passes, or by trickling water directly around the base of the transplants.
- Water thoroughly so that the soil and water settles around the roots. Use your finger to make sure there is moisture at the depth of the roots. Unless directed otherwise, students may stop watering when they see that the soil surface is wet.
- Avoid transplanting during midday heat if possible.
- Protect your transplants from pests like birds by covering the young plants with upside down strawberry baskets, upside down nursery trays, netting or floating row cover (thin, lightweight fabric).

Tips for transplanting with kids

- As with sowing seeds, you can have children measure the distance from thumb to pinkie on their open hand to use a spacing guide. We call this their “farmers’ measurements.” You can also have them measure and mark inches on their trowels to use as a garden ruler.
- For transplants that grow into large spaces (e.g., cabbages, lettuce) mark the spaces to be planted ahead of time with labels, sticks, or hand trowels. Students can bring out rulers or use their “farmers’ measurements” to help you map the bed. This will allow you to check the spacing and correct any errors before any plants have gone in the ground.
- To demonstrate why small plants need to be spaced so far apart, place 4” plastic nursery pots upside down in configurations to represent full-grown plants.
- Often times you have more kids than seeds or transplants to put in the ground. One way to ensure all students can participate in planting is to pair them up into “planting buddies” where one digs the hole and the other places the plants/seed in the ground and both cover with soil.

Making Paper Pots

Students can make their own mini paper pots and these can be transplanted directly into the garden. The basic idea is to wrap a newspaper strip around a mold, squish the bottom, fill it with soil and use it to plant a seed in.

Materials

- Commercial potmaker molds are available from Lee Valley tools <http://www.leevalley.com> or <http://www.kidsgardening.com>. Alternatively, you can use a small unopened V-8 juice can.
- Newspaper, cut into strips 3 inches wide by 10 inches long
- Scissors
- Bag of seed starting mix
- Watering can
- Nursery tray or container to hold and support paper pots.

Instructions

1. Students place the strip of newspaper lengthwise in front of them and then place the mold at the end of the newspaper strip closest to their own body in such a way as to be able to roll the mold along the paper strip. Leave about 1 inch of the newspaper hanging over the mold's bottom.
2. Roll the mold along the strip, rolling the paper around it (not too tight, not too loose).
3. When the newspaper is entirely around the mold, twist and fold the extra 1" of paper at the bottom over onto itself.
4. The commercial wooden mold has a matching bottom piece. If using it, take the top, place it on the bottom, and turn it while pressing down. "Push and turn, push and turn" we say to the children. If using a V8 juice can, do the same on a flat table surface.
5. Gently ease the newspaper "pot" off its mold. Fill with soil to the top of pot. Plant a seed by poking a hole in the dirt with the index finger, sticking the seed in and covering. (Optional: write student's name on newspaper pot.)
6. Place pots in a tray right up against each other so that they support each other. Water pots after you have placed them in a supportive tray. If students plan to take them home, put them in a small container. Milk cartons cut long-ways with drainage holes make a great "4-pack."
7. You can use normal office paper to make more durable pots. Have kids decorate the strip of paper with rubber stamps and garden wishes before rolling into a pot. Tape the bottom of the pot if necessary.

Transplanting paper pots: When the plant is about 3-5" tall, transplant it into garden. It is possible to transplant the newspaper pot directly into the ground. The newspaper will eventually decompose. With younger kids, this is an easier method—to have them transplant the whole pot in the garden. However, it is better for the plant's root system to take the seedling out of the paper pot to transplant it, as the roots will have an easier time establishing themselves in the ground. If students plant their whole paper pot in the ground, make sure that no part of the paper is exposed above the soil. Paper exposed to air can wick the moisture from the soil leaving a dried out little plant.