

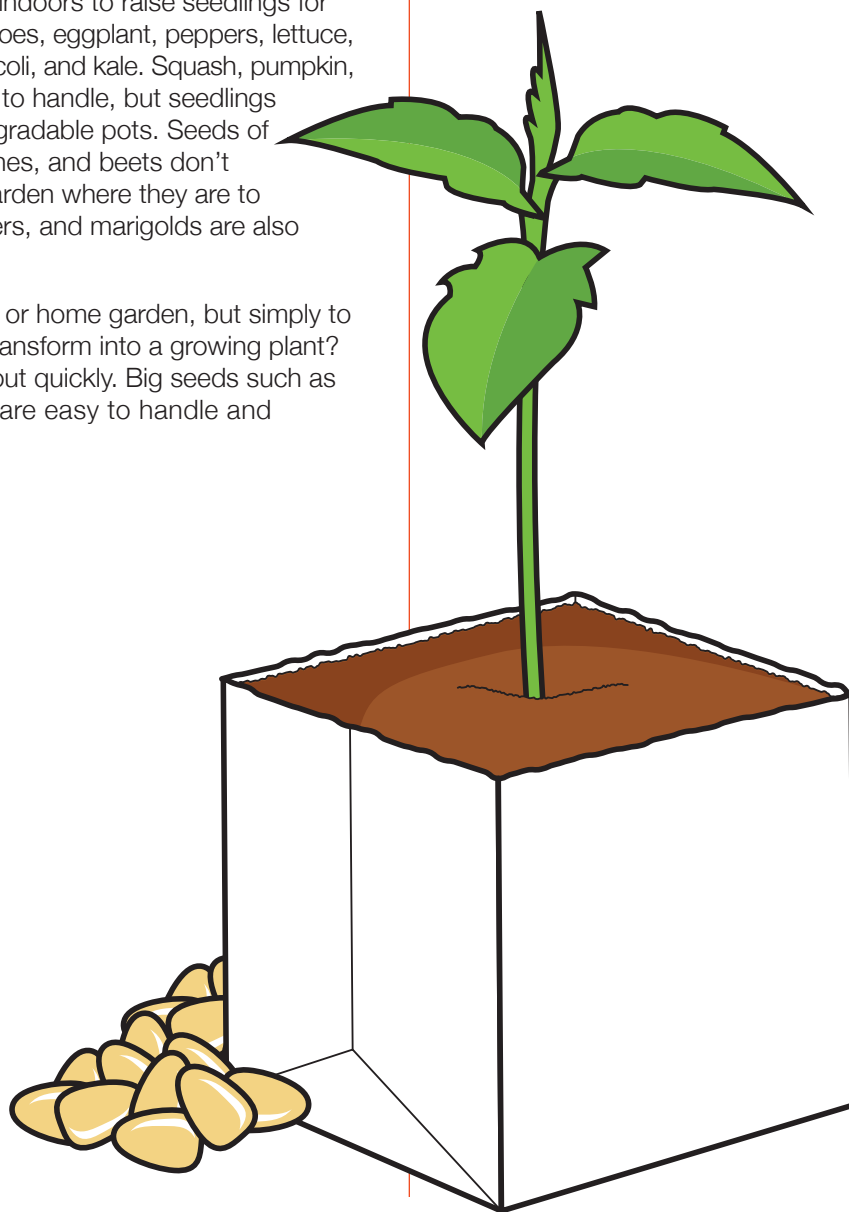
Indoor Seed Starting 101

Do you remember planting your first seed? Or perhaps that magical moment when you first observed seedlings emerge from the ground in early spring? Starting seeds indoors with children is a wonderful opportunity to provide hands-on experiences with the life cycle of plants and a great way to add greenery to the classroom. Seed starting is a relatively inexpensive activity that can yield great science and math lessons, while providing a wide variety of plants for a school or home garden! Even if you have never started a seed or planted a garden before, we have developed a series of steps to make sure your seed starting venture is a success.

Choose Seeds

Many vegetable seeds are suitable for planting early indoors to raise seedlings for later transplanting to the garden. These include tomatoes, eggplant, peppers, lettuce, and cabbage family members such as cabbage, broccoli, and kale. Squash, pumpkin, and cucumber seeds are large and easy for children to handle, but seedlings transplant best if they are started in plantable, biodegradable pots. Seeds of peas, beans, corn, and root crops like carrots, radishes, and beets don't transplant well and are best planted directly in the garden where they are to grow. Many annual flowers such as zinnias, sunflowers, and marigolds are also good candidates for indoor sowing.

What if you're not growing plants to go into a school or home garden, but simply to let kids experience the wonder of watching a seed transform into a growing plant? Then the main consideration is using seeds that sprout quickly. Big seeds such as beans, corn, squash, cucumbers, and sunflowers are easy to handle and germinate rapidly.



Indoor Seed Starting 101

Gather Supplies

Essential Supplies:

- Containers
- Potting Mix – Use a commercial seed-starting mix, which is sterile and provides proper drainage. Avoid using garden soil, as it can introduce disease-causing organisms and won't provide adequate drainage.
- Plastic Bags or Plastic Wrap
- Labels and Waterproof Marker
- Watering Tools – spray bottle; watering can; large, shallow pan
- Liquid Fertilizer

Nice to have but not essential:

- Plant lights – Full-spectrum plant lights work well, but less expensive shop lights are also suitable. Use one cool white and one warm white bulb in the fixture for best results.
- Heat mats – These waterproof, plug-in mats provide bottom heat to speed seed germination. Most seeds germinate best when soil is around 75 degrees.
- Fan – A small fan keeps air circulating around seedlings, reducing the likelihood of disease problems and helping them develop sturdy stems.

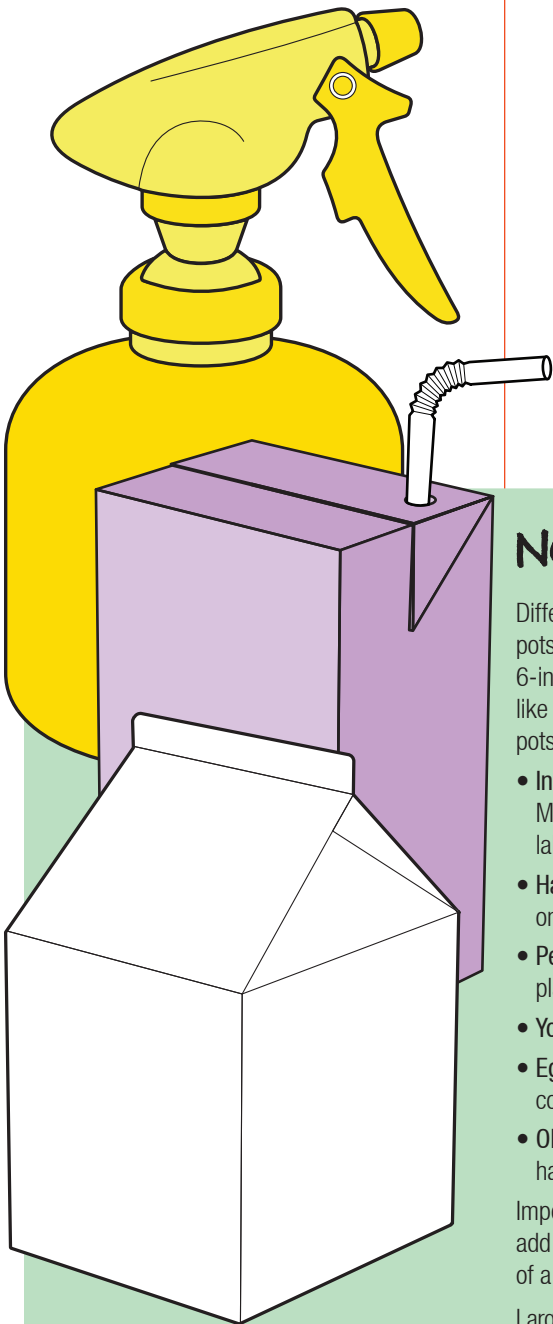
NOTES: Containers for Seed Starting

Different plants need different-sized containers, but most do well in 6-inch pots. You can use smaller pots to germinate seeds, but you'll need to transplant the seedlings later. To keep it simple, use the same 6-inch container for germinating and growing. Seeds can be started in recycled milk and juice containers like the ones found in your cafeteria. Milk and juice containers can also serve as holders for paper or peat pots, to allow for drainage. Here are a few container ideas:

- **Individual milk and juice cartons** – Collect single serve cartons, which are plentiful in school cafeterias. Make sure to properly clean the container and cut holes for drainage. The outside of containers can be labeled with plant information, student's name, and planting date
- **Half gallon-size milk and juice cartons** – Great as holders for smaller cartons or cups. Lay the container on its side for a ready-made lettuce growing tray.
- **Peat pots or coconut fiber pots** – These biodegradable pots drain well, allow for aeration and can be planted directly in the ground. Try using these inside of milk or juice containers.
- **Yogurt cups** – The six- or eight-ounce cups are ready-made seed-starting pots.
- **Egg cartons** – Egg cartons work well for starting seeds, but you'll have to transplant them to larger containers as soon as they've sprouted.
- **Old shoes, hats, baskets, etc.** – Get creative! You can use anything that can hold soil, as long as it has drainage.

Important: No matter what your homemade container originally was, you must first clean it thoroughly and add a drainage hole in the bottom to avoid waterlogged plants. Drainage holes are usually about the size of a dime.

Large juice or milk cartons cut lengthwise to make great waterproof trays for holding smaller planting containers.



Make a Seed Starting and Planting Calendar

If you're growing seedlings to transplant to your school garden or for kids to take home to plant, you'll need to figure when to start seeds so that the young plants will be at the best size for transplanting when the weather in your area is suitable. Some kinds of plants are tolerant of some frost and cool temperatures and can go in the garden early in the season, while others can't take the cold and need to go into the garden after all danger of frost is past. Some are slow growers and need a longer time indoors, while others grow quickly and only transplant well when small. These are started inside just a few weeks before they go outside.

Making a seed starting and planting calendar can be a fun classroom activity. Start by figuring out the average last spring frost date for your area. Your local Extension Service office or Master Gardeners program can provide this information. Next, use the table below to figure out the number of weeks before the last frost date to plant various kinds of seeds, as well as the time relative to the frost date for planting seedlings in the outdoor garden.

Type of plant	Number of weeks before last spring frost date to start seeds indoors	Earliest date to transplant hardened off seedlings outside relative to last spring frost date
Broccoli	6 – 8 weeks before	2 weeks before
Cabbage	8 – 10 weeks before	4 weeks before
Cauliflower	6 – 8 weeks before	2 weeks before
Cucumber	2 – 3 weeks before	1 – 2 weeks after
Eggplant	6 – 8 weeks before	2 – 3 weeks after
Kale	8 – 10 weeks before	4 weeks before
Lettuce	7 – 8 weeks before	4 weeks
Melon	1 – 2 weeks before	2 weeks after
Onion	10 – 12 weeks before	4 weeks before
Pepper	6 weeks before	2 weeks after
Pumpkin	1 – 2 weeks before	2 weeks after
Spinach	8 – 10 weeks before	4 weeks before
Squash	1 – 2 weeks before	2 weeks after
Swiss Chard	6 – 8 weeks before	2 weeks before
Tomato	6 – 8 weeks before	1 week after
Marigold	6 – 8 weeks before	1 week after
Sunflower	3 – 4 weeks before	On last frost date
Zinnia	3 weeks before	1 week after

sponsored by



with support from



Indoor Seed Starting 101

Seed Starting Step-by-Step

1. Moisten Potting Mix

First, put enough potting mix in a bucket to fill all your containers. (If you have lots of containers, you may need to do this in batches.) Stir potting mix with your hands or a long-handled spoon, adding water until the mix is evenly moist, not soggy.

2. Fill Containers

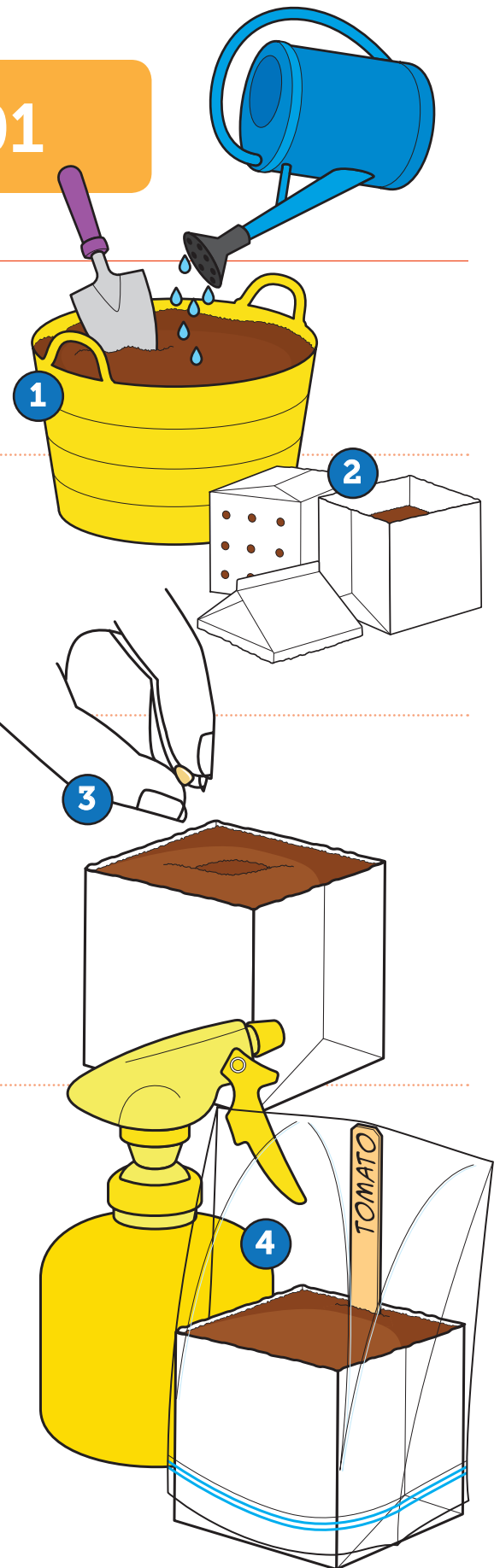
Make sure all containers have drainage holes. If possible, use containers that are all the same size. This will help standardize seeding, watering and transplanting. Fill the containers with the same amount of the soil mixture. Tamp down the soil mix firmly but gently to level the surface. You can use smaller pots or flats to germinate seeds, but you'll need to transplant the seedlings when they grow larger.

3. Plant Seeds

Use just one type of seed per planting station or per session so that different plants do not get combined in any one pot. Follow the recommended planting depth on the seed packet when sowing seeds. This is generally 1-1/2 to 2 times the width of the seed, though some seeds must be "surface sown," meaning they should not be covered at all. Make holes or furrows for larger seeds with a pencil or finger. Scatter small seeds evenly over the potting mix surface. Show children how to hold a pinch of seeds between their thumb and forefinger and then rub fingers together gently to distribute seeds. Cover seeds as recommended on the seed packet.

4. Label and Cover Containers

Once seeds are planted, label them clearly with the name and planting date so you know what went where. You can do this with store-bought labels, popsicle sticks or good-quality masking tape stuck to the outside of the containers. Be sure to write on labels with a waterproof marker. Give the surface of the potting mix a light spray from the water bottle. Then cover containers loosely with plastic wrap or slip them inside a partially closed plastic bag to keep humidity high. Don't close bags completely as this might cause seeds to rot. Place the containers in a warm spot (70 to 75 degrees F) or on top of a heat mat if you have one.



5. Watch for Germination

Seeds must stay moist in order to germinate properly so check potting mix daily and spray with room temperature water if needed. Do not let the soil mix dry out. Once you see signs of germination, remove coverings and move containers to a spot with bright light. If you used heat mats to speed germination, move containers off as soon as seeds germinate, as seedlings do best with cooler growing temperatures. Seedlings need full sun from a south- or west-facing window or fluorescent lights positioned 2 to 3 inches above the foliage. Use a timer to keep fluorescent lights on for 12 to 16 hours a day.

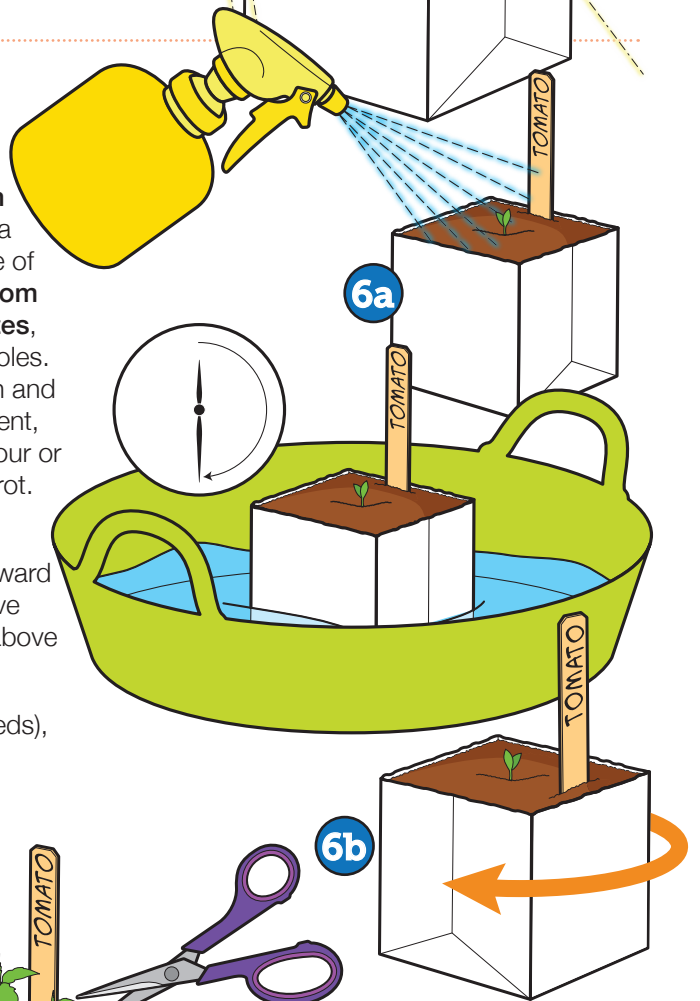
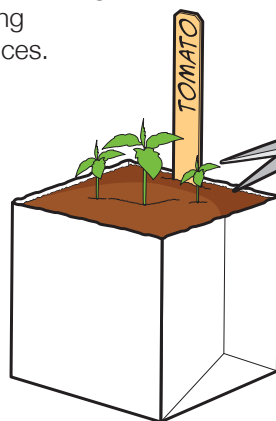
6. Care for Seedlings

a. Keep seedlings moist but not soggy. Check daily and do not let the soil mix dry out. Water carefully to avoid washing out the tiny young plants. When seedlings are very small, you can **water with a sprayer**. As they get bigger, you can water them carefully with a watering can with a rose at the end of its spout to break the force of water coming out. You can also **water containers from the bottom by placing them in a shallow pan of water for about 30 minutes**, allowing the potting mix to soak up water through the drainage holes. Once the soil is evenly moist, remove the containers from the pan and let them drain. Bottom watering encourages deep root development, but you need to remember to remove the containers after a half-hour or so. Letting the containers sit in the water longer can lead to root rot.

b. If you're growing plants on a windowsill, **rotate containers one-quarter turn every few days** to keep seedlings from bending toward the light. If you're growing seedlings under fluorescent lights, move the lights up as seedlings grow, keeping them just a few inches above the tops of the plants.

c. If seeds were sown too thickly (as is often the case with small seeds), you'll need to thin plants to give each seedling enough room to grow. This is best done when seedlings are small. **Snip out extra plants with a small pair of scissors** rather than pulling them out to avoid damaging the roots of the remaining seedlings. Check the seed packet for thinning distances.

6c



sponsored by

evergreen
packaging

with support from

kidsgardening
helping young minds grow

Indoor Seed Starting 101

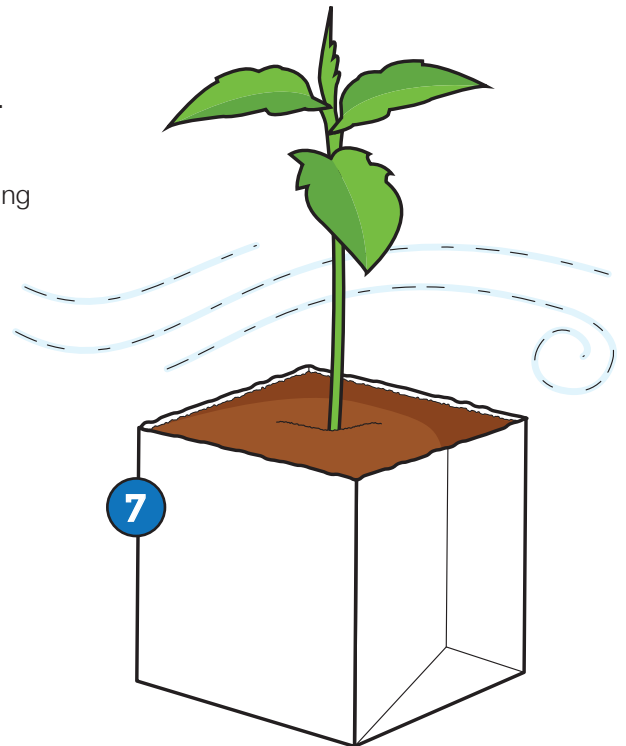
d. If you started many seeds in a relatively small container, you'll need to move the seedlings to bigger containers as they grow. When the seedlings have two or more sets of true leaves (don't count the first set of leaves, called "seed leaves") and before their leaves begin to overlap, it's time to move them to larger containers. Lift a clump of little seedlings out of the soil – a small spoon makes a good tool for this task—and gently pull the little plants apart, untangling the roots, and taking care to hold a seedling by one of its leaves, never by its stem. Poke a hole in the potting mix in the new container, hold the seedling so its roots extend into the hole, and carefully fill in with potting mix so the seedling is growing at the same depth as before. If you're growing plants in individual containers, like tomatoes or peppers, plant two or three seeds in each container, then thin to the one strongest plant when seedlings are an inch or two high.

e. Wait until the seedlings have developed a set of true leaves to begin fertilizing. Then feed with a dilute solution (quarter strength) of a soluble fertilizer high in phosphorus (e.g., 5-10-5) every 7 days, which will help them develop a strong root system.



7. Harden Off Seedlings

To get your young plants ready for planting outdoors, they need to be toughened up, or "hardened off," to be ready for the more intense sunlight, cooler temperatures, and wind they'll encounter outdoors. To do this, starting about 7-10 days before outdoor planting time, set seedlings outside in a partially shaded spot for a few hours. Then gradually move them to more and more exposed locations for increasing periods of time. When planting time arrives, these hardened off seedlings will weather transplanting with ease.



Troubleshooting

Q: The seeds we planted never sprouted. What went wrong?

A: Poor germination can be the result of keeping the potting mix too wet, when seeds rot before they sprout. Make sure the mix stays consistently moist but never soggy. Promptly empty any water that drains out of the containers after watering and collects in the waterproof tray holding them; don't let the containers sit in water. Seeds that are planted too deep may not sprout. Some seeds need light to germinate and should be sown on the soil surface. Be sure to check the seed packet for correct planting depth. Old seeds may not germinate well. Check the date on the seed packet to make sure seeds are fresh. What if you've saved seeds from previous years? Most vegetable seeds will retain their viability for at least two to three years if they are stored in a cool and dry spot. But the seeds of sweet corn, onion, leeks, parsley, and parsnips may lose viability after a year's storage so it's best to purchase fresh seeds of these crops each year.

Q: Our seeds sprouted, but then one day the baby plants all fell over and died. What happened?

A: Your seedlings were struck by damping off, a fungus disease that can decimate young plants almost overnight. To prevent this problem, use a sterile commercial seed-starting mix and clean any containers and tools used in previous seasons before reusing by scrubbing with soap and water, then dipping in a solution of 1 part household bleach and 9 parts water and rinsing in clear water to sanitize them.

Q: Our seedlings were weak, spindly, and light green in color. Why?

A: These are signs that your seedlings were not getting adequate light. Move seedlings to a sunnier window or grow them under fluorescent lights suspended just a few inches above the tops of plants.

Q: When we planted our seedlings out in the garden, the leaves wilted and developed large, light brown patches.

A: It sounds like your seedlings were not hardened off before they were planted outside. Sudden exposure to the more intense sunlight outdoors gave the plants a "sunburn" in the form of bleached out, damaged leaf tissues. Seedlings need to be toughened up gradually over a week to 10 days to prepare them for outdoor conditions of increased sunlight, wind, and lower temperatures.

Digging Deeper

Once your seedlings are up there are a host of lessons and activities you can do to engage your class. Taking care of the seedlings is the first step in ensuring strong plants for spring planting or simply having good specimens to examine under a microscope or note in a science journal. Make sure to document what you found to be successful as well as the challenges you encountered; these notes will help you the next time you are looking to start seeds and will help your students learn to take notes and document their growing experience in their own way.

While seeds may have common characteristics, plants have a seemingly infinite number of variations. Try starting a wide selection of seeds and examining the resulting seedlings. Challenge your students to note differences as seedlings emerge. These observations can be recorded in science journals or documented through a classroom garden journal.

Begin introducing botanical concepts, such as alternate and opposite leaves, so you can compare and contrast the plants easily. See if the children can predict an unknown plant's ultimate identity and size based on the seedlings' growth at various stages. See if they can match the seed to the fruit or flower from which it came. Look at the seedlings in terms of leaf texture, shade of green, overall form, and growth rate. Can children recognize plants that are related?

For more information on caring for your seedlings and for growing a successful school garden, along with seed-related lesson plans and activities, please visit Carton2Garden.com.

sponsored by



with support from

