

Directions for Optional Soil Experiment

There are a variety of ways you could set up this experiment. Since students have conducted experiments to answer other questions about what plants need to live and grow, it would be best to conduct an observation experiment, but you could also conduct a demonstration experiment in which students observe the plants you set up.

Materials for Starting Seeds with Soil

8- or 16-oz Styrofoam cups
Scissors or knife
Potting soil
Scoop or measuring cup
Small watering can
Radish or bean seeds (6 seeds per cup)
4 disposable, 9 × 12" rectangular pans to hold water and cups with soil

Materials for Starting Seeds without Soil

8- or 16-oz clear-plastic cups (Option 1)
Brown paper toweling (Option 1)
White paper toweling (Options 2 and 3)
Waterproof plate (Option 2)
Clear bowl or pie dish (Option 2)
Quart-sized, zip-seal plastic baggies (Option 3)
Stapler (Option 2)
Thumb tacks or heavy-duty tape (Option 3)

Experiment Setup

- Plant some radish or bean seeds in a cup **with soil**, using the same instructions you followed for the light and water experiments.
- Prepare some seeds to grow **without soil** by using paper toweling. Following are three ways you could start the seeds using paper towels. For each method, the seeds on the paper towels should be kept moist, but not dripping wet, throughout the experiment.
- **Note:** Radish seeds sprout and grow more quickly and easily than bean seeds, but bean seeds are bigger and easier for students to observe.

Options for Starting Seeds on Paper Towels

1. Start seeds in a cup using paper toweling instead of soil.

Option 1a: Start the bean seeds in a clear-plastic cup. Soak the bean seeds overnight or for several hours before “planting.” Wad up a handful of brown paper toweling and drench it with water. Squeeze out the excess water; then loosely wad up the toweling and push it firmly but not tightly into the cup. Repeat until the cup is filled with wet paper toweling. Place a bean seed about halfway down the side of the cup, between the cup and the paper toweling so students can observe the seeds easily. The paper toweling should be snug enough around the bean to hold it in place and keep it moist. With this method, students can watch the roots as they grow down and the shoots as they grow up into tall plants.

Option 1b: Place loosely wadded-up, damp brown paper toweling in a Styrofoam cup. Plant radish seeds on top of the paper toweling. Add a few drops of water each day to make sure the seeds stay moist. You can put an index card over the top of the cup if you find that the paper toweling is drying out too fast.

Option 1a:



Option 1b:



2. Start radish or bean seeds on a waterproof plate covered with moist, white paper toweling.

Place four or five layers of premoistened, white paper toweling on a waterproof plate. Keep the toweling from drying out by placing a clear bowl or pie dish over the plate. If you use bean seeds, soak them in water overnight or for several hours before “planting.”



3. Place radish or bean seeds and moist, white paper toweling in a quart-sized plastic baggie and hang it on a bulletin board.

This is a more dramatic setup that students can observe for a longer period of time. Lima beans are best to use because they’re bigger, but bush beans or pinto beans work well too. Soak the bean seeds overnight in water. Then place several layers of moist (but not dripping wet), white paper toweling inside a quart-sized, zip-seal plastic baggie. About halfway up the baggie, secure three staples side by side but spread apart. Then place one bean seed above each staple. Leave the top of the baggie open so the plants can grow up and out of the baggie. Thumb-tack the baggie to a bulletin board or tape it to a wall for observations. Make sure to keep the paper towels moist but not dripping wet. Mold will grow if they’re too wet. If you observe any mold, pour off excess water and open the top of the baggie more. After a few

days, the beans seeds will sprout, and plants will begin to grow. Students will observe roots growing downward from the staples and shoots growing upward and out of the baggie.

Option: Make one baggie for each student so they can have a personal bean plant growing without soil.

