

SEEDS of LEARNING

Seeds are the magical beginnings to the plants and trees we need and love. Although each type of plant or tree has its own unique seed design, all seeds have the same two jobs: (1) travel to a new location that will support the growth of a new plant and (2) feed the baby plant until it is big enough to produce its own food. Students explore how seeds accomplish these jobs with two activities: (1) Seeds-The Inside Story and (2) About Sprouts.

Activity #1: Seeds-The Inside Story

Objective: Students will know the basic parts of all seeds: seed coat, embryo and cotyledon(s). They will know that seeds are either monocots (single cotyledon) or dicots (two cotyledons).

Activity: Students will dissect a lima or pinto bean seed.

Grades: K-8

Materials:

- One pre-soaked lima bean or pinto bean seed per student
- Several bean seeds that have not been soaked
- Magnifying glasses—one per student or pair of students
- Paper and pencils for sketching dissected seeds and labeling parts
- Optional: provide other seeds such as peas, pumpkins, sunflower, corn or nuts for students to investigate. They will be more difficult to dissect and view, but it will help students understand that all seeds share these characteristics. Pre-soak any seeds to be dissected.

Location: Inside, or outside if you have work table space for all students.

Before Activity: You must pre-soak the seeds for 24 hours prior to the activity.

Lesson: A seed contains all that is needed to grow a new plant and feed the baby plant until it is able to produce its own food. All seeds contain the following basic parts:

1. Seed coat: protects the seed until it is time for it to grow the baby plant.
2. Plant embryo: the baby plant. Each plant embryo has leaf(s), stem and embryonic root.
3. Cotyledon: the seed leaves that will produce food for the plant until it can produce its own. Grasses, corn and many other plants with single, skinny leaves are called monocots because their seeds just contain a single cotyledon. Dicots have two cotyledon and represent most other vegetables that have broad leaves.

Some seeds also contain endosperm, which is tissue that contains food reserves that nourish the young plant until it is producing food. When we eat seeds alone as food, we are often eating the endosperm tissue, such as with the lima bean or any nuts. The endosperm is also the source for most vegetable oils.

Directions:

1. Pass around the seeds that have not been soaked so the students can feel how hard the seed and its coating are if not soaked. Discuss how this would be useful to the seed.
2. Pass out the soaked seeds and magnifying glasses to each student. Note and discuss the different feel and appearance of the soaked seeds. Have some already lost or popped their seed coat? How did this happen? (Seed expanded when it absorbed water).
3. Have students take off the seed coating from the seed by rubbing the seed gently between their fingers.
4. Have students open up the seed by running their finger nail along the back rounded edge of the bean seed. Seed should split in half, with embryo with visible.
5. Using magnifying glasses, students will investigate their seeds identifying the seed parts.
6. Direct students to draw and label their dissected seed.
7. Repeat for other seeds.

Activity #2: About Sprouts

Objective: Students will learn that seeds only need water and proper temperature to begin to grow. They will observe the initial growth from seed to sprout and also taste sprouts.

Activity: Students grow sprouts in a container and eat them.

Grades: K-8

Materials:

- 4-5 1-quart glass mason jars for sprouting seeds, enough to grow enough seeds for your class to sample plus one additional if you want to test sprouting in cold temperatures.
- Alfalfa or mung bean seeds—these must be seeds produced for consumption (available at many health food stores or online). You will need 3 tablespoons of alfalfa seeds or 5 tablespoons of mung beans for each jar. You can also do some jars of alfalfa and some jars of mung beans to compare both the germination of growth of different sprouts as well as for taste testing. If you do this, be sure to label each jar so that you keep track for comparison.
- Cheesecloth or panty hose to use to cover the tops of jars
- Rubber bands or lid rings to secure cheesecloth/hose to top of jar
- Water
- A location where jars can sit safely on sides—either in dark or at least away from direct sunlight

Location: Inside

Lesson: People have eaten sprouts as a food source for hundreds of years. There are a wide range of commonly eaten sprouts, including alfalfa, mung bean, radish, sunflower, peas, wheat and broccoli.

Seeds do not need soil or sunlight to germinate and grow. They will sprout with water alone. The only other thing they require is proper temperature. Although some hardy seeds will germinate in colder temperatures, the warm temperatures of an indoor classroom will suit the edible sprout seeds well.

To test the temperature sensitivity of seeds, keep one jar of seeds in the refrigerator and compare its germination to the jars maintained at room temperature.

Directions:

1. Divide students into groups of 4-6 and give each group a jar.
2. Students fill each jar with 3 tablespoons of seeds.
3. Students cover seeds with water, filling jar about 2 inches over the level of the seeds.
4. Students cover jars with cheesecloth secured tightly with either rubber bands or the lid rings.
5. Let jars of seeds in water sit overnight.
6. The following day **WITHOUT REMOVING CHEESCLOTH LIDS**, students turn the jar over in the sink and drain water from jars through the cheesecloth. Be sure jars are well-drained as remaining water can cause seeds to rot.
7. Students place jar on side on flat surface and roll it gently to disperse seeds around inside of jar.
8. Set jar on its side in dark or away from direct sunlight. If you are testing temperature sensitivity, place one jar inside a refrigerator (or outside if you live in a chilly climate!)
9. Twice a day, students will need to rinse seeds with cool and clean fresh tap water and drain jar well, roll it on side gently and then place it back on its side.
10. Each day have students discuss and/or draw the visible changes. Also have each group compare the growth in their jar with the growth of the chilled jar. Are they seeing significantly less germination right from the start or slower growth after germination or both? *Younger students can draw the changes daily (you can provide handouts with a diagram of the jar that the students fill in). Older students can create written descriptive journals of the changes they observe.
11. Sprouts are ready to harvest when they are 1-2 inches long, usually after 4-5 days. If they are being kept in the dark, you can bring them out into indirect sunlight for the last day or two so that they begin photosynthesis and start to turn green.
12. When you are ready to eat the sprouts, rinse and drain them a final time in the jar.
13. Serve! Sprouts can be sampled plain, with a little vinaigrette dressing, or included in a salad with additional vegetables. Sprouts can also be served on a cracker spread with a little cream cheese or hummus. Spend time letting students share their experiences/observations of the sprout project as well as tasting the sprouts. *Older students can complete their journals by writing about their taste test, describing the taste of the sprouts and whether or not they liked them.