

Do something COOL

Teacher-Led Educational Activity

WATCH ME SPROUT

In a hands-on inquiry activity, students observe and document the first two stages in the life cycle of a soybean plant: germination and the development of a seedling.

Time

Initial set-up: 30 minutes

Observations: over the period of two to six days

Materials

- 8-oz. or larger glass tumblers or pint Mason jars
- Jar lids or plastic wrap
- Paper towels, coffee filters, or cotton balls
- Edamame soybean or other bean seeds (available in most garden centers or online seed suppliers)
- Small plant pot with a drain hole
- Potting soil
- Large spoon or small trowel
- Notebook, pencils, and colored pencils or crayons for recording observations

Vocabulary

Cotyledons: a plant's first leaves that are the remains of the seed

Dormant seed: seed before it is planted and has started to grow

Hypocotyl: a plant's first stem

Embryo: the beginning of a plant inside its seed

Germinate: to start to grow, the first growth of a seed

Life cycle: different stages of growth a plant or animal passes through

Radicle: a plant's first root

Seed: the part of a plant that can grow into another plant

Seedling: a young plant

Sprout: the part of a plant that has just poked above the soil

Objectives

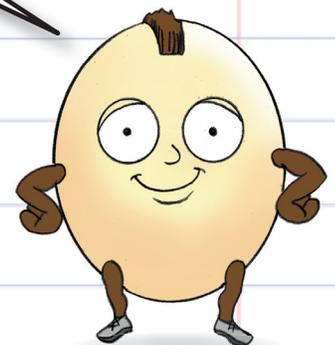
Students will be able to:

- Describe the steps in the germination of a bean seed.
- Name and define the parts of a new plant (seedling).
- Make a labeled drawing of a:
 - dormant soybean seed
 - germinating soybean seed
 - soybean seedling
- Write a descriptive summary of their observations.

We can do this!

Background

All organisms pass through different stages of growth: *their life cycle*. When planted, soybeans, as flowering plants, change from a dormant seed to a germinating seed to a seedling. The seed contains the beginning of a new plant, the embryo. As the seed germinates, the first root (radicle) develops, followed by the first stem (hypocotyl), and the first leaves (cotyledons). Typically, seeds germinate in soil, but they can germinate in a moist environment, such as a clear glass or jar, where germination can be observed.



Teacher-Led Educational Activity

WATCH ME SPROUT

Procedure

- 1. Guided reading:** Ask students to locate and read the section in *COOLBEAN the Soybean* in which Coolbean is planted, germinates, and becomes a seedling. (Pages 8 and 9)
 - a. Review vocabulary
 - b. Discuss the concept of the "life cycle." Ask students to relate the concept to their own lives. What stages of life do people go through?
- 2. As homework:** Ask each student to bring to class a glass container labeled with his or her name. (Students could do this in partners or small groups.)
- 3. In class,** each student (or small group of students) plants a soybean seed.
 - a. Fill the glass containers with cotton balls or line them with paper towels or coffee filters. (The material needs to be able to absorb water.)
 - b. Place a bean seed midway up the side of the container between the paper or cotton and wall of the container so that the seed is visible and the absorbent material holds the seed in place against the glass.
 - c. Add one ounce of water to the container so that the absorbent material is completely moistened (add more water if necessary).
 - d. Cover the container lightly with a jar lid or with a piece of plastic.
 - e. Place the containers on a desk or counter out of direct sunlight.
- 4. What to expect as the seed germinates:** Within a few days, the seeds should swell and begin to germinate. Students should be able to see the parts of the sprout as they form—the radicle (first root), then the hypocotyl (first stem), and the first leaves (cotyledons), then the true leaves (will have three instead of two parts.)
- 5. Documentation:** Students observe their jar each day, take notes about their daily observations, and sketch what they observe, labeling the parts of the plant as each forms and changes.
- 6. Final report:** Each student organizes his/her notes and drawings into a narrative summary that describes their observations and what they learned from their observations.
- 7. Optional next step:** Once the first leaves have formed, the seedling can be planted in soil.

Extension

While waiting for the seeds to germinate, students can study the plant embryo inside a bean seed.

1. Soak some bean seeds in water for 12 hours or overnight, until they are softened. Gently remove the loosened, membranous seed coat.
2. Carefully open the seed into two pieces along its outer curved edge. The embryonic plant is visible inside the two halves of the seed.

Cool observations, people!

