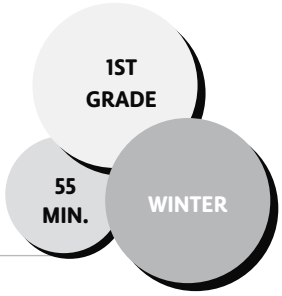
Root-View Cups

THEME: GROWING AND ACCESSING NOURISHING FOOD



ESSENTIAL QUESTION

What can we learn by observing roots growing?

LEARNING OBJECTIVES

✓Students will be able to sow seeds.

✓Students will be able to make predictions about root growth.

CONCEPTS

observe root seed sow sprout

ENGAGING THE CLASSROOM TEACHER

- Prior to the lesson, coordinate with the teacher about your strategy for caring for the seedlings, whether the class will do it independently or with you in subsequent weeks. See the After Class action step below.
- Discuss whether you will have a follow-up lesson to transplant seedlings, whether they'll eventually be sent home with students, or whether this will be an observation activity.
- During Action Steps 4 and 5, suggest that the teacher support students in sharing materials and drawing their paper shields while you work with small groups to sow seeds.

LESSON DESCRIPTION

In this lesson, students learn about the function of roots by setting up their own root-view cups to make observations. Consider teaching this lesson about one month prior to when you would be able to transplant the seedlings outdoors in your region. You can then incorporate these transplants into a planting lesson such as Plant a Go, Grow, Glow Bed or Plant a Tops and Bottoms Bed. Otherwise, frame this as an observation activity.

MATERIALS

- ☐ "My Roots Go Down" song by Sarah Pirtle
- ☐ 12-quart bag of organic seed starting potting mix in a tub for easy cleanup
- ☐ 4–6 spoons or small scoops
- ☐ 2–3 spray bottles (or small watering cans, if outdoors)
- ☐ Fava bean seed packet
- ☐ Rainbow chard seed packet (or other culturally appropriate seeds)
- ☐ Cordless drill, or nail and hammer
- ☐ Tape
- ☐ Tray for demonstration
- ☐ Tray to hold finished root-view cups
- ☐ Plant Care Schedule (p. 175)

For each student:

- ☐ 18-oz. soft clear plastic cup
- ☐ Photocopy of Paper Shield template (more information below in Preparation section)
- ☐ Scissors

- [ ] 1 sheet of dark-colored drawing paper (e.g., dark blue or green)
- [ ] Markers or crayons (and any other art supplies for decorating shields)
- [ ] Observation Log (p. 176)

PREPARATION

- Moisten your seed starting mix so that it's about as damp as a wrung-out sponge.
- Draw a template for the paper shield: take one of your clear plastic cups, and cut a straight line from top (lip) to bottom (base). Next, cut out the entire bottom of the cup. Now, unroll the cup, and lay it as flat as possible on a piece of paper. Trace it, adding about one inch to each short end. This is your template for the shield.
- Photocopy the shield template for each student.
- Drill three to four holes in the bottoms of the plastic cups for drainage.
- Create your own root-view cup beforehand to troubleshoot any unforeseen snags and to have a model to show students (see below in Action Step 3 for how to do this).
- Learn the song, "My Roots Go Down" by Sarah Pirtle.
- Set up a tray with supplies you'll need for a demonstration.
- Set up a station where students will sow their seeds. Have a table with the soil and scoops on one end, then the seeds in the middle, and the spray bottles of water at the other end.

ACTION STEPS

1. Engage: Gather in a circle and ask students, *Do you know the super important part of the plant that stays hidden and works in secret to help the plant?* Once students guess that you're talking about roots, explain, *Today, we're going to make special cups that are going to let us peek at this part of the plant we usually don't get to see!* ***(5 min.)***

2. Singing: Have students stand. Teach them the song, "My Roots Go Down," using hand gestures for showing roots growing down. Teach them a few verses, then take suggestions from students for new verses and movements. Alternatively, to get out some wiggles before making root-view cups, have students role-play a seed sprouting roots. Ask students if they remember what the job of roots is. Discuss how the roots hold the plant in place and gather nutrients and water from the soil. ***(5 min.)***

3. Model: Have your tray of supplies on hand, and walk through how to make a root-view cup. Fill your clear cup with soil, showing students the holes and asking why you made them. Take a couple seeds and place them up against the side of the cup, explaining that putting them there will let us see the roots grow. Show students your completed model cup and ask, *If I want my seeds to sprout and*

roots to grow, what do I need to do? Discuss watering and keeping cups in a dark, warm place. Explain that you'll use paper as a shield or curtain that will cover the cup and let the roots grow hidden in the dark. ***(5 min.)***

4. Decorating Paper Shields: With students back at their desks, provide art supplies for decorating paper shields. You can give students the option of drawing what they think the roots or plants will look like once they grow. You might also want to display the names of the plants for students to practice writing. ***(5 min.)***

5. Sowing Seeds: As students are decorating their paper shields, call four to six students up at a time to set up their cups with you. Have students show you their pointer fingers and point to their first knuckle and then their second knuckle on that finger. Explain that if they choose to plant the smaller chard seed, they'll push their seed in just as deep as their first knuckle. If they choose the bean seed, they'll push it in a little deeper, to their second knuckle. Encourage students to help each other (i.e., once you've shown one student how to set up their cup, ask them to show someone else how to do it). Guide students in watering so that cups are not oversaturated. ***(15 min.)***

6. Finishing Root-View Cups: Once all students have set up their cups, have them clean up their spaces. Pass out tape. To build anticipation, have a countdown as a whole class before you tape the shield closed. Say, *We're going to count down from five, and when we get to one we're going to hide away our seeds so they can do their work in secret. Ready? Five, four, three, two, one!* ***(5 min.)***

7. Hand-Washing Break *(5 min.)*

8. Tasting: Explain, *Some roots of plants we eat. Turn and talk to your neighbor to see if you can name a root that we eat. Here's a hint: What vegetables grow underground?* To have students make the connection between the roots they're observing and edible roots, pass a sample of one or two root vegetables for them to taste, such as sliced carrots, radishes, or cooked beets. ***(5 min.)***

(After Class): Determine how you will care for the seedlings in the root-view cups as they germinate and grow. Ask the classroom teacher ahead of time if you can set up a care schedule with students, rotating the job of watering them every day with a spray bottle to keep the soil moist (but not soggy). Because you planted two seeds in each cup, many will grow two plants. In those cups, once plants are about four inches tall, cut off the smaller of the two to let the other one grow. They'll need to be transplanted soon after, either as a second session with the class, or by sending them home with students.

REFLECTION

Have students discuss the following questions in small groups, then share with the class: ***(5 min.)***

Social and emotional learning

- *Ask yourself: How did I help a classmate today?*

Check for understanding

- *What are the steps we took to make our root-view cups?*
- *In how many days do you predict we'll see roots growing?*
- *What do you predict the bean roots will look like? What do you predict the rainbow chard seeds will look like?*
- *How often should we water our cups?*

ADAPTATIONS

Observation Extension: Have students set up a log where they'll record observations with pictures of the progress of their plants' growth.

ACADEMIC CONNECTIONS

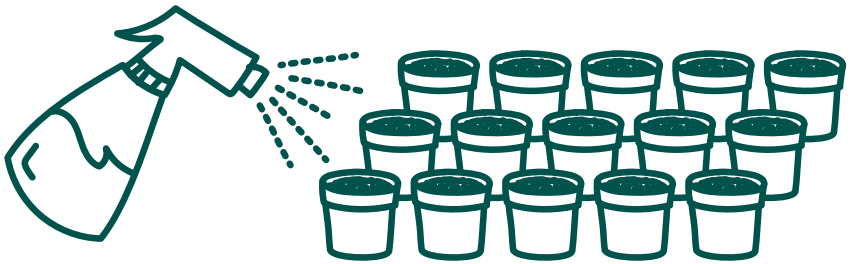
Next Generation Science Standards, Life Science Disciplinary Core Idea

NGSS 1.LS1.A Structure and Function – All organisms have external parts . . . Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

PLANT CARE SCHEDULE

STEP 1: Feel the soil

STEP 2: Spray plants with water



STEP 3: Rotate plants / check they have enough light

Day	Your Name

Observation Log

Name: _____

Project: _____

Today

On _____
date

My Prediction

On _____
date