



## Planting Popcorn and Plant Needs

### Objective

In this lesson, students will learn what plants need to grow and survive. Using popcorn as an example, students will understand that plants need water, light, soil and air to grow into mature plants. All living things need air, water, a place to live, and use resources from the land. Students will plan and conduct an investigation to test whether plants need light and water by sprouting popcorn seeds in the classroom with and without water and light. Students will be able to predict outcomes and make observations. Students can then plant popcorn seeds in the school garden for harvesting and eating in the fall. Using careful sensory detail students will describe the planting process.

### Handouts

Plant Yoga instruction  
Prediction and Observation worksheets x2  
Plant Needs worksheet

### Materials

Organic popcorn seeds  
Plastic bags that zip close  
Paper towels  
Water bowls  
Masking tape  
Sharpie/marker for labeling seed bags

### KEY TOPICS

- Plant Needs
- Conduct Experiment
- Record Observations
- Graphing

### Background Information

Popcorn is a plant and the mature dried kernels are the seeds of the plant that can either be popped to eat or saved to plant in the garden to grow more popcorn. Popcorn grows like sweet corn but it is a different variety that is more resistant to pests (like squirrels and raccoons), has harder and smaller kernels, and needs to dry before popping or storing until the spring planting season.

Most organic popcorn seeds will sprout (germinate) in bags with a wet paper towel after 5 days, however some may not. Add at least 4 seeds to each bag to ensure that some do germinate in the experiment. Typically, only about 75% of the seeds germinate.

## Lesson Plan

### 1. From Seed to Plant

a. Plant yoga: Introduce the concept of a seed growing into a tall plant with a stem, leaves, flowers, and seeds by leading students in a movement exercise where they act out the process of being a seed to growing into a plant and dropping back into a seed again. Make sure to have space for everyone to move in their own space without running into each other (**see Plant Yoga handout**).

b. When students return to their seats, go over what plants need to survive. Have students complete the **Plant Needs Worksheet**. Use PLANTS as an acronym to remember what plants need: **P**- place to live, **L**- liquid (water), **A**- air, **N**- nutrients (from soil), **T**- temperature (warm, popcorn needs above 60 degrees F to germinate), **S**- sun.

c. Ask students if they like to eat plants. Can they think of any plants that they eat at home or at school? Sometimes it's difficult to tell that a lot of the food we eat actually grows from a seed into plants that we eat! Examples: potatoes (french fries), carrots, and corn are all plants! Do they think popcorn comes from a plant? YES! Each corn kernel is a seed from the popcorn plant.

### 2. Popcorn Sprouting Experiment

a. Tell students that they are plant scientists and are going to plan and conduct an investigation to test the theory that plants need water and light to grow by growing seeds in the classroom. Facilitate a conversation and record student ideas on how to conduct the experiment.

b. Distribute materials for experiment: **popcorn seeds, plastic sealable bags, paper towels, water bowl, and sharpie/marker**. With the materials at hand, what are two experiments the students can perform that test the theory that plants need water and light to grow?

c. Students can work solo or in pairs.

*Experiment 1:* place 4 seeds in each sealed bag with a paper towel. One bag will have a wet paper towel (soaked with water) and the other will have a dry paper towel. All bags will be kept in a dark drawer or dark cubby away from the light.

*Experiment 2:* place 4 seeds in each sealed bag with a paper towel. Again, one bag will have a wet paper towel (soaked with water) and the other will have a dry paper towel. All bags will be taped to a window to receive sunlight.

d. Instructions: Instruct students to take 4 bags per individual or group. Put 4 seeds in each bag. In two bags add wet paper towel by folding the paper towel and submerging it in the bowl of water before placing in the bags and sealing. The other two bags of 4 seeds should be sealed with a folded dry paper towel inside.

e. Label each seed bags with date and one of the following titles: "dry- light," "dry-dark," "wet-light," "wet-dark"

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f. Tape one group of wet and dry seed bags onto a window with **masking tape**. Put the other half of wet and dry bags in a dark place, like a cubby, closet or drawer. Make sure each category is clearly delineated and has its own section of the classroom. There are 4 categories.

g. **Prediction and Observation worksheet:** Based on their knowledge of plant needs, ask students to make a prediction of what will happen to each seed group. Using the worksheet they will draw and write their *predictions* in the space provided. In the adjacent box, they will draw and write their *observations* for each seed group. Review and complete the worksheet seeds again every week for two more weeks (or when you notice sprouting and further development). By then end of the two weeks students will be able to determine that plants need sunlight and water to grow.

h. *Note:* Once the leaves develop the bags will need to be opened for air and further growth through the opening of the bag. You may need to add more water at this point too. You can choose continue the experiment by opening half the sprouting bags and leaving the other half sealed to see if air is a necessary element for plant growth.

### 3. Extension Lesson: Planting Popcorn in the Garden

*Note- plant seeds in garden only after all danger of frost has passed. Anytime between early May and mid June, in the DC area. Do not plant two varieties of corn in the same garden due to cross pollination.*

a. Exploring soil, light, air and water: bring students out to the school garden. In an empty bed have students explore the soil independently. Using hand shovels (trowels) or hands, they can dig in the soil and observe dryness, moisture, air, and look for worms and other insects.

b. Ask students to use their senses to describe how the soil feels, smells, and looks? Use careful sensory detail to provide descriptions? Is the soil soft or crumbly, moist or dry, cool or hot? Does it smell sweet or sour, light or pungent? Does it look dark or light? Does it remind them of anything?

c. Collect all tools and have students smooth out soil and fill in any holes they made during exploration before planting.

d. Demonstrate how to plant the popcorn seeds. Popcorn plants should be planted about a 1/2 inch below the surface of the soil. To make the most of a single 6 by 4 foot raised bed, plant four rows set 12 inches apart. Seeds can be spaced 8 inches apart in each row. You can plant about 24 corn plants in a 6 by 4 foot bed. You can plant new seeds or try to plant the seeds the students sprouted in the classroom. If you're planting the pre-sprouted seeds, plant them closer to the surface with the leaves and half the stem sticking out of the ground. Keep the soil moist but not soggy so the non-sprouted seeds germinates quickly without rotting.

e. You can make the holes and then have each student put one seed in each hole. If you have more than 24 students you can have them double up and put two seeds in each hole. Then once they sprout you will have to cut or "thin" the plants so there is only one plant growing in each hole. This is the best practice just in case one seed doesn't germinate! Typically, only about 75% of the seeds germinate.

f. Corn will take about 90 days form mature cobs. You can then leave the cobs on the plant to dry or harvest and dry them in the classroom. They should be at 13% humidity to pop.

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You can test kernels a few at a time. If they explode instead of popping into puffy kernels then they need more drying time.

### **Conclusion:**

- a. Read book about what plants need to survive: From Seed to Plant, by Gail Gibbons
- b. Remember to revisit observation worksheet as popcorn seeds grow- add more water if needed. Answer the question: Is water and light necessary for plants to grow?
- c. Graph it! Using dry popcorn seeds and glue, make a bar graph to chart results of the experiment. How many seeds grew with water and light? How many seeds grew with water but without light? How many seeds grew without water but with light? How many seed grew without water and without light?

### **After the Lesson/Extension**

Continue to complete observation worksheets each week for 3 weeks or as long as the experiment remains relevant. Open the seed bags when leaves begin to form so the plants get the needed air and can grow through the openings. You can then transplant these plants in the garden or put them in pots with soil until its warm enough to plant them in the garden.

### **Standards**

- 2-LS2-1.** Plan and conduct an investigation to determine if plants need sunlight and water to grow.
- 2.W.8** Recall information from experiences or gather information from provided sources to answer a question.
- 2.MD.D.10** Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems.
- 2.ID.Q.3** Provide descriptions with careful attention to sensory detail.
- 2.MD.4** Measure and estimate lengths in standard units. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.