Planting Popcorn and Plant Needs

Objective
In this lesson students will gain a basic understanding the life cycle of a plant from germination, growth, reproduction, and death. Using popcorn and lima bean seeds as an example, students will experiment with sprouting these edible seeds in the classroom to observe the first stages of the plants life cycle and record the similarities and differences. Students will predict changes in each stage of development. As a lesson extension, students can then plant popcorn seeds in the school garden for harvesting and eating in the fall. If your school is in session during summer month, students can observe the popcorn plant during pollination.

KEY TOPICS
- Plant Life Cycles
- Prediction and Observation
- Fractions and Graphing

Handouts
Plant Yoga instructions
Plant Life Cycle worksheet
Prediction and Observation worksheets
Scientist Oath worksheet

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

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.

Spring Popcorn Lesson- 3rd Grade

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)**. Repeat 2 or 3 times.

b. When students return to their seats hand out the **Plant Life Cycles Worksheet**. Review the plant life cycle stages from Plant Yoga. Ask students to draw a seed *germinating* in the first box; a seed growing roots, *stem and leaves* in the second box; the plant *flowering* in the third box; and the *fruit* emerging from the flower in the fourth box. Tell the students that inside the fruit are the *seeds*. When the fruit rots, the seeds fall out onto the ground and may grow again into a plant! This is the full life cycle of an annual plant.

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. How about beans? YES! Beans are seeds too.

2. Germination Experiment

a. Tell students that they are plant scientists and are going to plan and conduct an investigation to observe the life cycle of a plant in the first two stages- *germination* and *leaf growth.*

b. Distribute materials for experiment: **popcorn seeds, lima bean seeds, plastic sealable bags, paper towels, water bowl, and sharpie/marker.** With the materials at hand students will sprout both lima bean seeds and popcorn seeds and observe the similarities and differences in their growth.

c. Students can work solo or in pairs.

Experiment 1: place 4 seeds popcorn seeds in each sealed bag with a wet paper towel.
Experiment 2: place 4 seeds lima bean seeds in another sealed bag with a wet paper towel.
Label all bags will seed type and date and tape them to a window to receive sunlight.

d. **Prediction and Observation worksheet:** Ask students to make a prediction of what will happen to each seed. Using the worksheet they will write their *predictions* in the spaces provided. In the adjacent box, they will draw and write their *observations* for each seed group. Review and complete the worksheet again every week for two more weeks (or when you notice sprouting and further development). Which seeds germinated first? Did any of the seeds make leaves of roots? Record observations on the worksheet.

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 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. 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 A Fruit is A Suitcase for Seeds, by Jean Richards

b. Remember to revisit observation worksheet as popcorn seeds grow- add more water if needed.

c. compete the **Scientist Oath worksheet**

d. Make a Pie Chart. Observe how many seeds germinated and how many did not in each. Did ¾ of the seeds germinate or ½ of the seeds?

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.