



## Harvesting and Eating Garden-Grown Popcorn

### OBJECTIVES

Students will be able to *identify* plant parts by name and make connections between their food and the plants' biological functions. Students will make connections between their food and the garden, and be able to *connect* the ideas of seeds as food for baby plants and seeds as a part of a balanced human diet. Students will be able to *write* clear and coherent procedural text.

### HANDOUTS

- Popcorn Trail Mix Challenge

### MATERIALS

- Fully mature popcorn plants (or store-bought corn plants and popcorn seeds)
- Corn kernels to pop
- Oil
- Butter
- Salt
- Pot for popping popcorn (or air popper)
- Plug-in stove
- Small folding table
- Napkins/cups for popcorn
- Stapler

### KEY TOPICS

- Plant Parts
- Food as Energy
- Recipe Instructions
- Scientific Procedures

### BACKGROUND INFORMATION

Like all plants, popcorn (*Zea mays everta*) has parts that serve very important biological functions for the plant and provide a source of food for people. The roots anchor the plant and take in water; the stem provides support and channel for plant-food and water; the leaves are the plant's sugar factories, turning light into food for the plant through photosynthesis; the flower reproduces new plants through a variety of ways, often utilizing living animals in pollination; and the seeds carry the embryo and the nutrients it needs to grow into another plant. While people categorize and use these plant parts in many ways, ultimately the purpose for these plant parts is to create more plants.

## Fall Popcorn Lesson – 5<sup>th</sup> Grade

Biological processes aside, people have a variety of medicinal and cultural uses for plants and their parts. On a farm or in a garden, the majority of plants grown are eaten. Just 15 plants provide 90% of the world's food energy intake. Energy is transferred from the sun into chemical bonds in plants through photosynthesis. The direct product of photosynthesis is simple sugar, a type of carbohydrate. However, through other plant and animal processes, that energy can also be stored in molecules known as proteins, fats and carbohydrates. Humans should eat a variety of these molecules to provide appropriate energy; they also need the accompanying vitamins, minerals and fiber to stay healthy, although these molecules do not provide energy.

### **VOCABULARY**

Energy – The ability of an object to create change (work) in another object or environment

Calorie – A measurement of stored energy in food that animals can use to survive and grow

Embryo – baby plant contained within the seed

Photosynthesis – the process plants use to transform light energy from the sun into stored energy (sugar) for plant growth and reproduction

Carbohydrate – compounds of carbon, hydrogen, and oxygen (such as sugars, starches, and celluloses) that provide energy

Protein – chains of amino acids that build, maintain, and replace the tissues in your body.

Fat – compounds of carbon, hydrogen, and oxygen that do not dissolve in water and are very high in energy

Whole food – a food that came directly from a plant or animal

Processed food – food that was created through many steps, usually adding salt, sugar, fat and artificial ingredients

Vitamins – a group of organic compounds that are essential for normal growth and nutrition and are required in small quantities in the diet

Minerals – a group of inorganic compounds that are essential for normal growth and nutrition and are required in small quantities in the diet

Fiber – The parts of grains, fruits, and vegetables that contain cellulose and are not digested by the body. Fiber helps the intestines absorb water and move food through the intestines.

### **LESSON PLAN**

#### **1. Looking at Popcorn Plants (20 mins)**

- a. Remind students that seeds and fruit come in all shapes and sizes. Some seeds are little and many, some are big and alone, some are on the inside, others on the outside.
- a. Prior to looking at the popcorn plants, review the basic needs of all plants. Ask students to point out the roots, stems, and leaves. Then ask students to point out the flowers, fruit, and seeds; brainstorming other types of these parts will be helpful to understand why the popcorn flowers, fruit, and seeds look so different. Tell students, while some flowers have petals, corn has two types of flowers: the tassels and the silk. Like a green bean, the corn carries its seed in a pod-like fruit. Instead of a hard-shelled pod, it has husks!

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- i. When talking about each plant part, connect the role it plays to the needs of the plant and humans. For example, when discussing the roots. The root takes up water, which the plant needs to survive. Do humans need water to survive?
- b. Ask students which plant part of popcorn we eat. The answer: the seeds! Ask students for some examples of other seeds we eat. How about the other 5 parts?
- b. Explain that you've left the fruit (cob) on the plants to dry, so that they will be ready to pop. Harvest one cob, and peel it open by letting students pull one husk-leaf at a time.
- c. Have any of the kernels been eaten? Ask students who they think ate the kernels. Explain that all animals need food, just like people. The food they've grown in the garden might have been shared with other animals and insects that live around their school. What sorts of animals do they think like popcorn? Some examples are squirrels, caterpillars, and maybe some birds.
- d. Harvest cobs and pull entire plant out of the ground.
- e. Show the students the roots and examine their role.

### 2. Popcorn! (15 min)

- a. As you set up, introduce the activity. What part of the plant is popcorn? The seed! In order to eat the seeds, we have to separate it from the rest of the plant. Demonstrate how to separate kernels from the cob and have each student separate kernels from a corncob. Rotating a metal bowl around the class.
- b. Collect the harvested popcorn seeds.
- c. Tell students that they have three options for the seeds they harvested: 1) grind them into cornmeal, 2) plant them, or 3) eat them.
- d. As you set up, introduce the activity. What part of the plant is popcorn? The seed! (Review the 3 parts of a seed?) Explain why pop-corn pops. *A reaction occurs in the kernel when heated. Moisture, combined with the structure of the popcorn kernel, makes the way corn pops unique. Other grains, like quinoa and millet will pop when heated, but not quite like popcorn. As the kernel heats up, the moisture inside the kernel turns to steam, but can't escape! As the pressure builds, the steam softens the outer layer of the kernel (the pericarp). When the steam finally bursts out the pericarp explodes with a "pop!" The starchy endosperm bursts out and it looks like the popcorn we all know and love!*

### 3. Popcorn Trail Mix Challenge (20 mins)

- a. Hand out the ***Ultimate Trail Mix Challenge Worksheet***. You may choose to do this individually or in partners. Tell students that this is a self-guided activity designed to evaluate how good they are at following a procedure (a very important part of being a scientist!).
- b. Briefly overview the four ingredients going to be used and what part of the plant they are.

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- c. Leader passes out trail mix challenge, nutrition facts, baggies and paper towels. Measuring devices are in the center of the table with bowls of the different ingredients.
  - d. Everyone writes their names on their bags and then washes their hands with antibacterial gel.
  - e. Students complete the challenge on their own. The leader can facilitate and answer questions when necessary.
  - f. Collect the recipes and check for understanding (or do this as they are completing the activity).
  - g. Set aside the bags of trail mix until the end of class.
  - a. Remind them that good procedures need to contain specific instructions, including precise language and exact quantities.
  - b. Slowly go through all of the pop-corn making procedure and help students write down each step and quantity. Have a helper write them on the board if there are learning disabilities.
  - c. Hand out paper towels, antibacterial gel and popcorn samples!
4. **Conclusion (5 min)** – Hand out envelopes or bags of un-popped corn and staple them to students' procedures. They may take these envelopes home to make their own popcorn!

### AFTER THE LESSON

- Save popcorn seeds to plant in classroom or in garden during spring
- Compost the remaining parts of the popcorn plants using Soil and Compost curriculum

### STANDARDS

**5-PS3-1:** Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun. [Clarification Statement: Examples of models could include diagrams, and flow charts.]

- **PS3.D:** Energy in Chemical Processes and Everyday Life. The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water).

- **LS1.C:** Organization for Matter and Energy Flow in

Organisms. Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion.

- Literacy.W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
- Literacy.RI.5.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
- Literacy.W.5.4 Produce clear and coherent writing in which the development and organization are appropriate to task, purpose, and audience.