

**Grade Levels:** 1<sup>st</sup> – 3<sup>rd</sup> grade

**Description:**

Students will explore the lifecycle of plants. Using plants growing in the Garden, students will learn the parts and importance of flowers, discover the many ways seeds travel, and discuss the process of photosynthesis.

**Objectives:**

Upon completion of this lesson, students will be able to

- Identify the parts of a flower: sepal, petal, stamen, anther, pistil, stigma
- Explain the process of photosynthesis
- Describe the lifecycle of a plant
- Identify seeds and explain how they travel in nature including by wind, water, animals, and explosions

# Seeds, Stems, and Students

## Pre-Visit Activities



*Please use the following materials as an aid to help prepare your students for their visit to Green Bay Botanical Garden. The vocabulary list consists of terms that may be used during your visit and the activities listed below are designed to familiarize your students with the topics that will be covered during their visit. They are listed as options – it is not necessary to complete them all or do them in any particular order. Please feel free to modify the vocabulary definition or activities in any way to better suit your students. Keep in mind, their experience will be enhanced if they are familiar with the concepts before their visit, or if the learning that took place in the Garden is reviewed and reinforced back in the classroom.*

### **Vocabulary**

**Anther:** the end portion of the stamen, the anther is where the pollen is located

**Buds:** buds are immature flowers or leaves that are covered and protected by sepals

**Carbon dioxide:** the gas in the air that is breathed out by animals and taken in by plants

**Oxygen:** the gas in the air that is released by green plants and breathed in by animals

**Petals:** the colorful part of the flower, they protect the inside parts of the flower and the colors attract insects and birds

**Photosynthesis:** the conversion of carbon dioxide and water into sugars and oxygen within a green plant

**Pistil:** the female part of the flower, the tube-like structure that contains the ovules which produce seeds once pollinated

**Samara:** a winged fruit, found on trees in the maple family

**Scat:** animal droppings

**Seeds:** the beginning of the plant lifecycle, seeds contain a tiny plant embryo and food storage tissue, covered by an outer coat

**Sepals:** petal like outer coverings of a flower, they help protect the inner parts of the flower

**Stamen:** the male flower part, the stalks that surround the pistil

**Stigma:** the end of the pistil, it is sticky to catch the pollen

# Seeds, Stems, and Students

## Pre-Visit Activities

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### **Activity 1:**

Bring a variety of plant seeds into the classroom to observe. (Some familiar seeds include beans, sunflowers, pumpkins, watermelon, apples, corn, and peas.) Ask students what they are and what they all have in common. Allow students to guess what they will turn into and what plant they are from. What do people use seeds for? (To eat, plant, etc.). In the fall, you can go on a seed hunt in the school yard in search of familiar seeds (dandelion, acorns, maple seeds, etc).

### **Activity 2:**

Grow plants in your classroom. Collect seeds from your school yard, the students' homes, or from fruit. Identify the seed if you are able. Plant them in small cups of soil and place them in a sunny window. Compare the plants as they grow. Which seeds sprouted the quickest? What do the leaves look like? Do some seeds not grow? Discuss with students why they think the plants and seeds are so different.

### **Activity 3:**

Discuss with students that each seed has everything needed to start a new plant. Discuss with them the different parts of the seed.

- Seed coat – protects the seed from weather and animals

- Cotyledon – provides food for the embryo

- Embryo – the baby plant, look carefully for a tiny root and tiny leaves

Soak lima beans in water overnight, and give each child a pre-soaked bean. Have students carefully take their bean apart, trying to find the different parts. As students find the different parts, have them give the name and explain what it does. Students can even paste the parts to a piece of paper and label the parts.

### Activity 1:

Using small plants, or plants that have sprouted from Pre-Visit Activity 2, try some simple experiments. Ask students what the new plants will need to grow? (water, sunlight, soil, air).

Need for Light Experiment – Find several large cardboard boxes that have a lid or can be closed (the kind that the copier paper comes in works well). On one side of the lid or cover cut a circular hole with a diameter of about 3 inches. Place several plants in the box and cover so the hole in the lid is on the opposite end of the box from where the plants are. Leave some plants outside the box to use as the control. Place the box into an area where there is natural light, remembering to water them as needed. Have students predict what they think will happen. Observe and compare the growth of the plants for 1-2 weeks. Students should observe that the stem of the plants in the box bend toward the light. (This response is called phototropism. Growth hormones in the plant stem move to the side that receives the least light. This causes that side of the plant stem to grow faster than the other side, bending it toward the light.)

Need for Water Experiment – Use plastic wrap to cover the soil of several of the plants. Make sure that the plastic wrap is fitted tightly around the stem of the bean plant and around the rim of the container it's growing in (so it does not allow any water to get onto the soil). Leave several plants uncovered to act as the control. With a spray bottle, spray each group of plants with the same amount of water. Spray the water for the control group right onto the soil and spray water for the experimental plant onto the leaves. Make sure that the plants remain in the same area with natural light and are only watered as described above. Maintain the experiment for five days. In about 3 to 5 days, the plants that have their soil covered with plastic wrap should begin to wilt. The other plant should continue to grow. Students should conclude that plants need water to live. They should also conclude that the roots are the part of the plant that takes in water and not the leaves.

Try other simple experiments to see what the plants need. What happens if a plant cannot get any air? What happens if just one leaf is covered and can't get sunlight? How do the same plants compare when one is grown in the shade and one in the sun? Have students design an experiment, make a guess as to what will happen, and test their hypothesis.

### Activity 2:

Have students brainstorm a list of plant parts. Challenge them to come up with as many specific parts as they can. Once you have a list, discuss why the plant needs each part and the job it does for the plant. (Examples: roots hold the plant into the ground, the leaves collect sunlight so it can make food, the petals attract the pollinators, the anthers hold the pollen, etc). Have students research different types of plants and try to identify the parts of each plant. Several plants have very specialized parts. For example, tree trunks are specialized stems, pine needles are special leaves, cactuses have specialized stems, duckweed roots take nutrients directly from the water it floats in and doesn't need soil, and many flowers are designed to attract specific pollinators.

## Teacher Resources:

Burnie, David. 1992. *Flowers: Investigate the Colorful World of Flowers, Fruits, and Seeds*. New York: Dorling Kindersley, Inc.\*

Jurenka, Nancy Allen and Blass, Fosanne J. 1996. *Beyond the Bean Seed: Gardening Activities for Grades K-6*. Englewood, CO: Libraries Unlimited, Inc.\*

Nagro, Anne. 2009. *Our Generous Garden, Nuestra Huerta Generosa*. Wilmette, IL: Dancing Rhinoceros Press.

Ocone, Lynn. 1983. *Guide to Kids' Gardening*. New York: John Wiley & Sons, Inc.\*

## Student Books:

Cherry, Lynne. 2003. *How Groundhog's Garden Grew*. New York: Scholastic Inc.\*

Dorros, Arthur. 1997. *A Tree is Growing*. New York: Scholastic Inc.\*

Doyle, Malachy. 1999. *Jody's Beans*. Cambridge, MA: Candlewick Press.\*

Gibbons, Gail. 1991. *From Seed to Plant*. New York: Holiday House.\*

Grazzini, Francesca. 1996. *Flower, Why Do You Smell so Nice?*. Brooklyn, New York: Kane/Miller Book Publishers.\*

Heller, Ruth. *The Reason For a Flower*. New York: Grosset & Dunlap.\*

Hickman, Pamela and Collins, Heather. 1997. *A Seed Grows*. Toronto: Kids Can Press Ltd.\*

Levenson, George. 1999. *Pumpkin Circle: The Story of a Garden*. Toronto: Tricycle Press.\*

Selsam, Millicent E. 1959. *Seeds and More Seeds*. New York: Harper & Row Publishers.\*

Stevens, Janet. 1995. *Tops & Bottoms*. New York: Harcourt Brace & Company.\*

*\* Books available for checkout in Green Bay Botanical Garden's Children's Library*

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## **Environmental Education Standards:**

- A.4.2 Collect information, make predictions, and offer explanations about questions asked.
- A.4.4 Communicate their understanding to others in simple terms.
- B.4.1 Describe the flow of energy in natural systems, citing the sun as the source of energy on the earth; e.g., a food chain.
- B.4.4 List the components of an ecosystem, including the qualities of a healthy habitat.

## **Next Generation Science Standards:**

### Second Grade:

- 2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.
- 2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
- 2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats.

### Third Grade:

- 3-LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.