

TOWER HILL

BOTANIC GARDEN



BE A BOTANIST

Teacher Guide

OVERVIEW

Thank you for registering for the *Be a Botanist* field trip. During this guided program your students will get up close and personal with plants of all shapes and sizes. Students will explore the lifecycle of plants and learn the role that each part plays in the growth and development of the plant. We recommend you complete the pre- and post-visit activities on the following pages to enhance your visit and support the PreK to 2nd grade classroom integration of the concepts addressed during this program. Please note all programs are 90 minutes in length and will take place outdoors in rain or shine over areas of rough, uneven terrain. Please ensure students are dressed appropriately.

LEARNING OBJECTIVES

- Students will understand that most plants start out as a seed and need soil, water, air, nutrients, and sunlight to survive and grow.
- Students will be able to identify the parts of a plant and will understand the role each plays in the lifecycle.
- Students will practice basic observational skills and will be able to notice similarities and differences between plant species.

NARRATIVE

Plants are living things that require, soil, water, air, nutrients, and sunlight to survive. Plants are able to meet these needs within their habitats, but not all plants can survive in the same habitat. Most plants start out as a seed but seeds differ across species and not all living things have the same lifecycle. Plants have roots, a stem, leaves, flowers and fruit and each of these parts plays an important role in the plants' lifecycle. Plants are able to make their own food through a process called *photosynthesis*.

During the trip Teacher Naturalists will guide small working groups of 10 to 15 students to two to three different plant habitats; cultivated garden, aquatic, forest, and meadow. Students will be encouraged to make observations, explore, investigate, and ask questions throughout. Each student will be provided with a hand lens, clipboard, and data sheet to use during their visit. Teacher Naturalists will challenge students to become botanists by using scientific instruments, collecting data, and exploring the world of horticulture. During the field trip Teacher Naturalists will engage students in the following teaching points using a combination of stories, investigations, experiments, and games.

- Plants have unique and diverse life cycles. Many plants start out as a seed and need soil, water, air, nutrients, and sunlight to survive and grow.
- Each part of the plant plays an important role in its lifecycle. Plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.
- Plants have observable similarities and differences across species.

STANDARDS

Grade PreK

- PreK-LS1-1 (MA). Compare, using descriptions and drawings, the external parts of plants and explain functions of some of the observable parts
- PreK-LS2-2 (MA). Using evidence from the local environment, explain how familiar plants and animals meet their needs where they live.

Grade K

- K-LS1-1. Observe and communicate that plants need food, water, and air to survive. Plants make their own food and need light to live and grow.
- K-LS1-2 (MA). Recognize that all plants and animals grow and change over time.

Grade 1

- 1-LS1-1. Use evidence to explain that plants have roots, stems, leaves, flowers, and fruits that are used to take in water, air, and other nutrients, and produce food for the plant.
- 1-LS3-1. Use information from observations (first-hand and from media) to identify similarities and differences among individual plants or animals of the same kind.

Grade 2

- 2-LS2-3 (MA). Develop and use models to compare how plants and animals depend on their surroundings and other living things to meet their needs in the places they live.
- 2-LS4-1. Use texts, media, or local environments to observe and compare (a) different kinds of living things in an area, and (b) differences in the kinds of living things living in different types of areas.

VOCABULARY

Students will be introduced to the following vocabulary words during the program. Reviewing these terms beforehand will serve to enhance the group's experience during your visit.

- **Seed:** The first part in the lifecycle of a plant
 - **Stem:** Part of a plant that gives support, and moves water, nutrients and sugars through the plant
 - **Leaf:** Part of the plant that contains chlorophyll and makes food for the plant
 - **Root:** Part of a plant that grows underground, holds the plant in place and takes in water and nutrients
 - **Flower:** Part of the plant that is often colorful and makes seeds so new plants can grow
 - **Fruit:** Part of the plant that contains the seeds
 - **Carbon Dioxide:** A gas in the air we breathe that plants take in
 - **Oxygen:** A gas in the air we breathe that plants give off
 - **Nutrients:** Something that provides food or vitamins to a living organism
 - **Survive:** To be alive and healthy
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Pre & Post Activity Guide

The following pre- and post-visit activity ideas and recommended resources are designed to support the PreK to 2nd grade classroom integration of the concepts addressed in the *Be a Botanist* program. In order to complete the post-activities we recommend you collect students' Botanist Handbooks upon departure from the site. We love to see your students' work and continued learning experiences. Please send any drawings, photos, poems and other examples of student work to the Manager of Youth Education at 11 French Drive, P.O. Box 598, Boylston MA, 01505.

PRE-VISIT ACTIVITIES

What is a Plant?

Students will practice comparing and contrasting to understand the characteristics that scientists use to classify plants.

Materials:

- Magazines
- Construction paper
- Glue

Begin by creating a KWL chart based on prior student knowledge about plants and discuss as a class some characteristics that make plants unique. Potential discussion questions include:

- *What are some plants you know?*
- *What makes plants different from animals or people?*
- *Do all plants live in the same place?*
- *Do all plants have the same color and shape?*
- *What parts do all plants share?*

Record common themes and revisit distribute a selection of magazines to the class. Instruct students to flip through and search for pictures of plants. Have students cut out and paste onto a piece of construction paper. Hang collages throughout the room and have students observe the work of their peers. Lead students in making observations about the different plants in their

collages. Share observations and use them to formulate a class definition of what makes a plant a plant (i.e. they are green, they have leaves, etc.).

***Extension:** Have students practice making scientific drawings by sketching a plant from the schoolyard, local green space or from their collage. Introduce the different parts common to all plants and have students label their drawings appropriately.

Seed Safari

Students will practice their classification skills and be introduced to the wide variety of seeds.

Materials:

- Assorted seeds
- Small cups
- Lima beans
- Plastic knives

Begin by discussing what students already know about seeds. Potential discussion questions include:

- *What is a seed?*
- *Where do seeds come from?*
- *What do seeds look like?*
- *Do all seeds look the same?*

Split the class into small groups and provide each group with a bowl of seeds and small yogurt cups to sort with. Challenge students to sort their seeds by color, shape, and size. Discuss what seeds need to germinate and take students on a seed safari in your

schoolyard or local greenspace. Challenge students to search for seeds of different shapes and sizes. Discuss similarities and differences between the seeds they observed in the classroom.

***Extension:** Soak additional beans overnight and provide each student with a bean to dissect. Lead the dissection and challenge students to find the seed coat, baby leaf, baby root and food storage area. Have students draw and label each part.

POST-VISIT ACTIVITIES

Fantastic Fruits!

Students will reinforce their understanding that a fruit is the seed containing part of a plant through art.

Materials:

- Assorted fruits
- Plastic knife
- Paint
- Cardstock
- Paint brushes
- Hand lenses

Begin by reviewing the parts of a plant from students' Botany Notebooks from the *Be a Botanist* program. Lead a discussion about fruits and vegetables and introduce the concept that botanists (plant scientists) classify a fruit as anything that contains seeds. Some of the plants we call vegetables are actually the fruit of the plant. Things like cucumbers, tomatoes, peas and eggplant all contain seeds! Set out a selection of fruits and cut in half so students are able to see the seeds inside. Have students use hand lenses to practice making observations of the fruits and seeds inside. Next have students take turns printing with fruits of their choice by brushing an even layer of paint on the printing surface, and pressing the painted slice down firmly onto a piece of cardstock.

Plant Growth Journal

Students will practice math and literacy skills to reinforce their understand of the lifecycle of a plant

Materials:

- Lima beans
- Ziploc bags
- Paper towels
- Halved paper
- Stapler
- Sharpie

Provide each student with 5-10 pieces of halved paper. Have students staple together to create a journal and allow a few minutes to decorate. Review and have students draw and label the lifecycle of a lima bean on the inside cover of their journals.

Provide each student with a Ziploc bag, a lima bean and a paper towel square. Have students loosely fold the paper towel around their bean and use a spray bottle to moisten the towel. Place inside the Ziploc bag and hang student's beans in a sunny window. Lead a class discussion about what will happen to the bean and have students record their hypotheses in their journals. Check back on the experiment daily or weekly. Encourage students to become scientists by recording observations, creating scientific drawings, and taking measurements as their plants grow.

EDUCATOR RESOURCES

- *Project Learning Tree* by The American Forest Foundation
- *Garden Adventures: Exploring Plants With Young Children* by Sarah Pounders
- *Sowing the Seeds of Wonder: Discovering the Garden in Early Childhood Education* by Erika Perloff, Amy Carlson & Jill Begin

RECOMMENDED BOOKS

- *The Tiny Seed* by Eric Carle
 - *From Seed to Plant* by Gail Gibbons
 - *Plantzilla* by Jerdine Nolan
 - *Wacky Plant Cycles* by Valerie Wyatt
 - *The Magic School Bus Plants Seeds: A Book About How Living Things Grow* by Joanna Cole
 - *Plant Secrets* by Emily Goodman
 - *A Fruit is a Suitcase for Seeds* by Jean Richards
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For more information, contact the Youth Education Manager at 508.869.6111 or youtheducation@towerhillbg.org