

# Finally Fall: The Root of it All

Before you buy a carrot or potato or onion from the supermarket, it begins as just one part of a complex plant – a plant that exists as part of an even more complex ecosystem, full of organisms just as hungry for nutrients as you are!

It may not be a surprise, but plants don't just magically appear on supermarket shelves - this packet is full of materials created to introduce students to the world in which their food grows, both domestically and out in the wild that surrounds them! The following activities and lessons were created to allow formal and informal educators to teach students about plant anatomy, to investigate interactions with surrounding habitats, and to explore their relationship with these plants in a human-centric setting, like the supermarket. For formal educators, these materials align with all current Next Generation Science Standards and offer a guide for explorations in and out of the classroom. For informal educators, caregivers, and families, this packet has been designed to lead learning in whatever environment where you live and work!

These activities were created as part of the *I Spy a...* virtual program series conducted by Kate Reilly, Manager of Education at Duke Farms, and Duke Farms Educator Von Scully. These short classes include information about various ecological topics and allow audience members to see live examples of the subject matter on camera! This was just one installment of the *I Spy a...* class series, so be sure to check out the <u>Duke Farms</u> classes page to keep up to date on out all our upcoming programs.

This packet includes:

- Above & Below: Root Types Ecology of root structures (Page 2-3)
- Identifying Root Types Above & Below Activity Scientific observation activity (Page 4) with printable templates and cutouts (Pages 5-9)
- Parts of a Plant Anatomy of plants (Page 10)
- Parts of a Plant Flipbook Scientific observation activity (Page 11) with printable templates (Pages 12-15)
- Supermarket Scavenger Hunt Printable self-guided exploration activity (Pages 16-17)

We thank you for taking part in our virtual programing and wish you happy explorations!

If you have any questions, please do not hesitate to contact Kate Reilly at <u>kreilly@dukefarms.org</u>.



#### Above & Below: Root Types

In this activity, participants are introduced to the basics of plant root types and then encouraged to explore on their own by creating a collection of drawings and/or collages of different root systems. This introduction is meant to be read to/ with the participants to provide background information before they can continue the learning on their own!

Roots are fascinating and important parts of the natural world; they are literally the base of so much life on our planet and they are just as complex and varied as any other living thing. Just like different bird species or flower structures, different types of roots play different vital roles in their environment. To begin understanding roots, let's talk about the 3 major types of roots (of which there are MANY more specialized ones): **taproots**, **fibrous roots**, and **adventitious roots**. All of these types of roots have the same functions but do them in different ways; they all make sure the plants stay anchored in place in the soil and help feed the plant by absorbing water and nutrients from their surroundings. Taproots consist of one central thick root from which smaller



*lateral roots* branch off to the side. Taproots may be the most recognizable because carrots are a great example! A carrot IS a taproot, but when you find them in the grocery store, they have been cleaned and all of the lateral roots have been removed. Other types of taproots include turnips, beets, dandelions, and many more!

Fibrous roots are quite the opposite of taproots, because instead of consisting mainly of one thick central root, they are a network of thin, branching roots of about equal size and they all grow from the base of the plant's stem. Instead of going down deep like taproots tend to, fibrous roots are usually fairly close to the surface of the soil; good examples of this system are grasses (such as corn and field grasses), pea plants, rice, etc. But what about plants such as potatoes and onions? Neither of these are roots! Potatoes are an example of *tubers*, which are actually a special kind of stem that has *evolved* to be able to store nutrients for the plants. Onions are *bulbs*, and though they are also a type of special stem their job is to be the source of new growth for the onion plant. Both potatoes and onions have fibrous roots that grow directly from them!



Very different from the first two major types of roots are the adventitious roots, which basically means any roots that grow from the plant anywhere other than at the base of the stem underground, such as from where leaves join the stem or from other parts of the stem itself. These roots are used for stability and making the most of the plant's environment! Good examples of these types of roots are corn, tomato plants, and



pepper plants! Corn does have fibrous roots below ground, but they also have adventitious roots that grow above the ground from the stem and act like kickstands to keep the tall corn upright!

Roots aren't just super important for the plants that they are a part of, they also play a vital role in the entire ecosystem by providing food and shelter for the animals that live with them! Taproots serve as food storage for the plant, so they are perfect sources of nutrients for small animals of all kinds as well; small rodents such as voles will nibble on turnips and dandelion roots, while insects will burrow their way in to have a snack as well. Fibrous roots provide a great opportunity for shelter for these small creatures as well and are sometimes used to help stabilize the walls of mole



tunnels or small animal dens. In the following activity, you can learn more by exploring for yourself some real-life examples of these root systems that you can find wherever you live!



Want to see potato tubers and roots in action? Check out this fun video from SciShow Kids about growing your own potato plants at home!



## Activity: Identifying Root Types Above & Below

**Objective:** Participants will gain an understanding of the variety of root system structures that exist in their local environment and create a collection of artistic scientific depictions of these plants.

#### Materials:

- Printed habitat worksheets and cut outs included in the following pages
- Drawing and coloring utensils
- Scissors
- Glue

Background Information: See introduction to this packet.

**Procedure:** This activity is meant to be flexible and tailored to the interests of the participants, and to be revisited as often as desired to add to the collection of observations and drawings. A variety of cutouts been provided, but it is encouraged that participants draw their own plants from real-life observations to allow for as much self-expression and education as possible!

Begin by reading the introduction to this lesson with the participant and then provide them with the two different backgrounds (a wild scene and a domestic garden) for their collection. Explain that the cutouts consist of plants and root systems, animals that may interact with the roots somehow, and depictions of different animal holes and burrows. The participant should think critically about how all these pieces may fit together and then can cut and paste them to create artistic expressions of the real-life ecology of root systems and their environments. It is optional to also use simple blank paper so that the participant may create their own habitat as well! These pages can be compiled into a nature journal or collection.



## Be creative and have fun!

**Discussion:** What other animals would interact with root systems other than the cutouts provided? How many types of root systems can you find growing in your environment? Would they be different if you lived in a different type of habitat? How many animals can you find that are living around and within the roots that you find in real life? How many plants with taproots do you find versus fibrous roots?

















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![](_page_8_Picture_1.jpeg)

![](_page_9_Picture_0.jpeg)

# **Activity: Parts of a Plant**

In this lesson and activity, participants are introduced to the basics of plant anatomy and then encouraged to explore for themselves by observing and drawing or cutting and pasting images into worksheets. This introduction is meant to be read to or with the participants to provide background information before the hands-on activity begins.

When we talk about plants and how they are built, it's a good idea to start with their **roots**! Roots are usually underground, they come in many shapes and sizes, and their main jobs are to anchor the plant in the ground and to absorb all the water and *nutrients* that the plant needs. After the roots absorb the water and nutrients from the soil, they draw them upwards into the plant's **stem**, which acts like the backbone of the plant to help it stay upright to access as much sunlight as possible. Some stems are somewhat flexible, while others are really stiff: when you explore later, feel the difference between the stem of a tall grass or flower and the trunk of a tree, which you may be surprised to learn is a stem! Growing from the stem, you should find some **leaves**, which are responsible for absorbing sunlight and carbon dioxide (CO2) from the air; the plant uses these materials and the water it absorbed through its roots to make its own food through a process called *photosynthesis*. These leaves come in so many different shapes, sizes, and colors! Most

![](_page_9_Picture_4.jpeg)

plants (but not all) have **flowers** during certain times of the year, which are used to help the plant *reproduce*. If a plant's flower successfully reproduces that season, it turns into a **fruit**, which has the plant's seeds inside; these fruits either fall to the ground or are eaten by animals and then spread far and wide to plant themselves in the soil and grow into a new plant! Flowers are specific for each plant and vary in size, color, shape, amount on the plant, and where they grow from on the plant.

Before you head out to explore, check out more information plant parts in <u>this fun</u> <u>video</u> from Peekaboo Kidz, then get outside and see for yourself!

![](_page_9_Figure_7.jpeg)

![](_page_10_Picture_0.jpeg)

## **Activity: Parts of a Plant Flipbook**

**Objective:** Participants will understand basic plant anatomy and create a collection of drawings/collage images of plants broken down into their basic structures.

#### Materials:

- Printed flipbook templates included in this packet
- Writing, drawing, and coloring utensils
- Magazines/printed images of flowers, plants, roots, etc
- Glue
- Scissors
- Optional digging tools

**Procedure:** This activity is meant to be flexible and tailored to the interests of the participants, and to be revisited as often as desired to add to the collection of observations and drawings. A variety of flipbook templates has been provided, including those with backgrounds and blank, to allow for as much self-expression as possible! Begin by reading the information provided in the introduction to this packet, and exploring videos or articles related to this subject before providing the student with the templates. These can be printed and joined together to create a collection. Go outside wherever you are and search for a plant to observe. Begin by looking at the structures above the ground: count the number of leaves and observe how they attach to the stem, see if there are any flowers or fruit present, see how tall or short the plant is, etc. Then, if it is in an area where this is permissible, gently begin to dig around the plant, with care to not damage the roots below the surface. How far away from the stem do you have to dig in order not to damage the roots? How deep do you have to dig to reach the bottom of the roots? Can you remove the plant and root system to see it entirely?

Using the template, draw the plant in its entirety, taking care to try and separate the drawing above and below the ground.

**Discussion:** Do you use all 3 sections of the template? Do you see all the possible plant structures on that single plant? How many different kinds of plants can you record in your collection? How would these drawings look if you did this in different seasons but using the same plant? How would this be different in another location? Would you always find the same types of plants and plant structures if you were in a forest versus a desert versus a swamp? Can you look for pictures of plants on the internet that you can study and compare to what you find in your area?

![](_page_10_Figure_13.jpeg)

Example wild plant template

![](_page_10_Figure_15.jpeg)

Example garden plant template

![](_page_11_Picture_0.jpeg)

![](_page_11_Picture_1.jpeg)

![](_page_12_Picture_0.jpeg)

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# Activity: Supermarket Scavenger Hunt

Print this sheet out and bring it to the supermarket with you. See how many "plant parts" you can find on your adventure! Draw or write the name of each item you find. Can you find more than one of each category?

ROOT	STEM
LEAF	FLOWER
FRUIT (Hint: if it has seeds, it's a fruit!)	SEED

![](_page_16_Picture_0.jpeg)

# Supermarket Scavenger Hunt Answer Ideas

**Roots:** Carrot, onion, garlic, potato, sweet potato, turnip, beet **Stems:** Asparagus, celery, scallion

Leaf: Cabbage, lettuce, kale, spinach, collard greens

Flower: Cauliflower, broccoli

Fruit: Tomato, cucumber, eggplant, pepper, zucchini, squash, pumpkin

Seed: Pumpkin seed, sunflower seed, peas, corn, popcorn

Created by Melissa Almendinger, Duke Farms Community Garden Coordinator.