



Science Essential Standards:

- 3.L.2.1, 3.L.2.2, 3.L.2.3 (plants)
- 5.L.2.1, 5.L.2.2, 5.L.2.3 (ecosystems)

Time:

45-60 minutes

Audience:

3rd or 5th grade

Learning Objective:

Describe plant adaptations and how they connect to a plant life cycle (3rd) or environmental conditions (5th).

Materials:

- seeded grapes, if desired for intro activity
- copies of the plant adaptations worksheet, 1 per student
- plant samples
- names of plant samples
- leaf necklaces, 1 per student

Vocabulary:

adaptation, dispersal, pollination

Preparation:

- ✓ Familiarize yourself with the area in which you will be teaching. Check for poison ivy, jagged rocks, & other safety concerns.
- ✓ Gather the materials needed for the lesson.
- ✓ Set up samples of plants on a table for the *Plant Adaptations Matching Activity*. The *Instructor's Answer Key* lists the plant parts you need and alternate ideas if those cannot be found. *Note: This activity is correlated with what is found in the fall. If alternates are used, a revised graphic organizer will need to be created.*
- ✓ Know how many students are in your group.

Background:

Unlike animals, plants can't run away from danger. They can't migrate south for the winter either. Still, plants have many amazing characteristics that help them survive in their environment. We'll observe plant adaptations for growth, reproduction, and survival.

An **adaptation** is a variation that gives a living thing an advantage to survive in its environment. These traits and characteristics are inherited and passed down through generations. North Carolina is home to many amazing plants that have special adaptations that help them grow, survive, and reproduce.

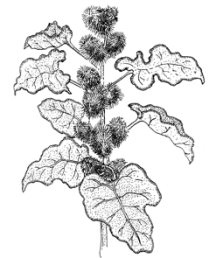
Carnivorous plants, such as the endemic Venus flytrap, have adaptations that allow them to capture and digest insects and small animals to give them added nutrition that is missing from the soils in which they grow. The leaves of Venus flytraps have sensitive hairs that can detect when they are being touched. The leaves will snap shut and trap whatever is inside to be digested.

Longleaf pine trees require fire to grow and survive. The trees disperse their seeds in cones that build up in leaf litter. **Dispersal** is when seeds spread out to a new location. During forest fires, the leaf litter is removed so that seeds can germinate in the soil. Longleaf pines are reliant on forest fires to be able to reproduce. Human efforts to prevent forest fires have harmed the Longleaf pine's life cycle.

The pawpaw tree is an understory tree native to many of our lowland forests. It produces a fruit that is similar to a banana, but has the appearance of a green potato. Pawpaws rely on pollinators such as flies, beetles and butterflies to reproduce. **Pollination** is the transfer of pollen from the male anther of a plant to the female stigma of a plant. Pawpaw flowers smell like a bit like rotting meat to attract their beetle and fly pollinators, without whom the tree would not be able to make its delicious fruit!

Instructions:

1. Greet the students and explain that they are going to be exploring the amazing adaptations of plants in this program.
2. Ask the students to give you a thumbs up if they have ever walked through thorns and wondered why the plants wanted to hurt them? Have they ever had to pick tiny seeds off their clothes and wondered why the seeds seemed to have Velcro?
3. Explain that the thorns and the seeds' ability to attach themselves to passersby are adaptations. An **adaptation** is a characteristic that helps living things survive. It can be something you can see, like a thorn. It can also be a chemical - something you can smell or taste but can't see - like sweet smelling flowers or sweet tasting grapes.



Cocklebur

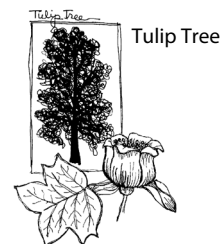
- a. **Note:** If the group is **5th graders**, make connections between adaptations and the type of ecosystem as well as with the interconnectedness of ecosystems, ex. buttressing of cypress and gum trees in a wetland or longleaf pines being dependent on fire to open their cones and spread seeds.
4. **Hook Activity.** Hand out seeded grapes for students to try, but don't tell them they are seeded! What happens when they bite in?
 - a. Ask students why they think grapes in nature have seeds.
 - b. Call on a few students to answer before explaining that fruit is a type of adaptation that is like a "**suitcase for seeds**". Lots of plants depend on animals to eat the fruit.
 - c. Ask students what happens to the seed when an animal eats the fruit.
 - d. Explain that animals move seeds to new locations when they drop the seeds or poop the seeds out. When seeds spread out to a new location, it is called **dispersal**.
 - e. Ask students to then explain how fruit is like a "**suitcase for seeds**".
 - f. Blowing dandelion seed-heads is a great **alternate hook activity** if available.
 5. **Reasons for Adaptations.** Ask students why plants need these adaptations.
 - a. Remind students that all plants need **air, sunlight, water, and nutrients** (soil) from their environment to survive. Then have them **turn and talk to a partner** about why plants need adaptations. Ask for a few volunteers to answer. Explain that plants adapt to **grow, survive, and reproduce**.



Bumblebee

- b. Explain that **pollination** is a special plant adaptation that depends on animals, usually insects but sometimes birds, mice, or bats. Ask students, how do bees pollinate flowers? Explain that when bees visit a flower, they drink the nectar and gather the pollen. As they visit different flowers, some pollen from other flowers gets left behind.
 - c. Ask students what happens to deciduous trees in the fall. Ask them how they think having leaves fall off trees is an adaptation. It allows the trees to rest during a time when they might not get enough water or sunlight to be healthy.
6. **Activity 1. Leaf Necklaces.** Tell students to look up at all the **trees** around them for 10 seconds. Ask if the leaves of the different trees look the same. No, each type of tree has unique leaves. Each leaf shape is a different adaptation to help it survive. **Adaptation creates diversity!**

- a. Explain that some leaves, like the tulip poplar, may be shaped to help protect the tree from the wind. In other cases, scientists don't even know why many leaves are shaped certain ways.
- b. Tell students that they will each get a **leaf necklace**.
- c. Then they should try to find their **team** by finding the students with **matching** leaves.



Tulip Tree

- d. Once they find their team, they should discuss their leaves and its possible adaptations. Tell students to stay together with their teams for the next activity.
 - e. **Note:** Create leaf necklaces from a variety of different trees but with 3-5 from each type of tree in order to create teams.
7. **Activity 2. Plant Adaptation Matching.** As a team, students use the plant adaptation matching graphic organizer to match each adaptation with the example plant part on the table.
 8. **Activity 3. 7-Minute Nature Hike.** Hike a short distance into the woods on the trail.
 - a. Give students clear **boundaries**, such as stay between this boulder and that large pine tree. Have students **point** to each boundary. If possible, have a **chaperone** at each boundary. **Remind** students to stay on the trail.
 - b. Have each student **choose** a plant to **observe** within the boundaries.
 - c. Ask them to observe two characteristics of the plant (example: bark texture, leaf shape, overall shape), and to think how those characteristics could help the plant. Tell students they have 2 minutes to make their observations before sharing.
 - d. Ask students to share their observations with a person near them.
 - e. Ask for a few volunteers to share their observations with the group.
 9. **Conclusion:** North Carolina State Parks **protects** special places where **unique** plants and animals live.
 - a. Give a couple of examples of unique **plants** such as the spruce-fir forest at Mount Mitchell and Venus flytraps at Carolina Beach.
 - b. Share an **animal** example, such as the Eno River State Park protects habitat for rare animals like the Panhandle Pebblesnail and the Neuse River Waterdog.
 - c. These plants and animals have **adapted** to live only in **special habitats** and probably would not be able to live in a town or schoolyard. We protect these special places for the plants and animals, and so that people can visit and enjoy them forever!

Opportunities for Extended Learning:



Black Chokeberry

- Students could use the questions from their nature hike as a **Nature Journal** prompt:
 - Observe two characteristics of a plant, such as bark texture, leaf shape, overall shape. Draw and describe your observations. Describe how these characteristics could help the plant.
- Have students respond to one or both **Nature Journal** prompts:
 - Draw and describe the leaf that was on your leaf necklace. How do you think this leaf shape helps the tree survive, grow, or reproduce?
 - Draw and describe a leaf from a tree that you see. How do you think this leaf shape helps the tree survive, grow, or reproduce?

Behavior & Materials Management Tips:

- ◆ Assign each student **a role**, so they will be on task.
- ◆ When teams are created, give them a minute **to connect**.
 - Provide a clear, brief time limit for this connection. For instance, ask students to take 45 seconds give each team member and their chaperone a high five.
- ◆ **Model** to the students exactly how you expect them to behave.
 - Students are more likely to meet expectations if have clearly been demonstrated.
 - Having the students then model the behavior for you reinforces the behavior.

References & More Information:

Botany Society of America. (n.d.). The Mysterious Venus Flytrap. Retrieved from <https://www.botany.org/bsa/misc/carn.html>

Conservatory of Flowers. (2016). Plant Adaptations. Retrieved from [https://www.conservatoryofflowers.org/sites/default/files/Plant Adaptations.pdf](https://www.conservatoryofflowers.org/sites/default/files/Plant%20Adaptations.pdf)

Matthews, E. (2017). Pawpaw: Small Tree, Big Impact (U.S. National Park Service). Retrieved from <https://www.nps.gov/articles/pawpaw.htm>

National Wildlife Federation. (n.d.). Longleaf Pine. Retrieved from <https://www.nwf.org/Educational-Resources/Wildlife-Guide/Plants-and-Fungi/Longleaf-Pine>

Credits:

Illustrations by Cindie Brunner.

Header photo of Paddy's Creek by Lauren Greene at Lake James State Park on May 30, 2019.

Original *Incredible Plant Adaptations* created by Sean Higgins, Interpretation and Education Manager, North Carolina State Parks.

Adapted for the Schools in Parks Teacher Collaborative by the Center for Public Engagement with Science in the UNC Institute for the Environment, in partnership with North Carolina State Parks.

Names: _____

Plant Adaptation Matching



Plants have **adaptations** to help them **reproduce, grow,** and **survive** in their **environment**.

1. Match each plant with its adaptation. Record the plant name.
2. Then circle what you think is the purpose of the adaptation.

Trumpet Creeper

Plant Adaptation	Name of Plant	What is the purpose for the adaptation?
Leaves have spines to keep animals from eating them.		Grow Survive Reproduce
Plump fruits are a favorite food of opossums. The seeds germinate after they come out in opossum poop.		Grow Survive Reproduce
Pointy thorns on stems keep animals from eating them.		Grow Survive Reproduce
Special stems wrap around other plants to help them grow towards the sun.		Grow Survive Reproduce
Tiny plants with no roots. They need to grow near the ground on rocks and stumps so they can get water.		Grow Survive Reproduce
Lots of small flowers make a special sugar liquid called nectar. Bees pollinate the flowers when they come to eat the nectar.		Grow Survive Reproduce
Oval-shaped leaves are evergreen. They have a thick waxy coating that keeps them from drying out.		Grow Survive Reproduce
Seeds have small wings on both sides to help them blow in the wind.		Grow Survive Reproduce

Instructor's Answer Key

- Print out the names of each specimen and tape them on the table next to the plant.
- Have students work in groups to match as many as possible.
- Other simple fall possibilities are sweet gum balls, dandelion seed-heads, pokeweed berries, acorns, pine needles, and jewel-weed seed pods.

Plant Adaptation	Name of Plant	What is the purpose for the adaptation? <i>*all three may be correct answers</i>
Leaves have spines to keep animals from eating them.	Holly Tree	Grow Survive Reproduce
Plump fruits are a favorite food of opossums. The seeds germinate after they come out in opossum poop.	Persimmon Tree	Grow Survive Reproduce
Pointy thorns on stems keep animals from eating them.	Greenbrier Plant	Grow Survive Reproduce
Special stems wrap around other plants to help them grow towards the sun.	Wild Grape Vine	Grow Survive Reproduce
Tiny plants with no roots. They need to grow near the ground on rocks and stumps so they can get water.	Moss	Grow Survive Reproduce
Lots of small flowers make a special sugar liquid called nectar. Bees pollinate the flowers when they come to eat the nectar.	Goldenrod	Grow Survive Reproduce
Oval-shaped leaves are evergreen. They have a thick waxy coating that keeps them from drying out.	Rhododendron	Grow Survive Reproduce
Seeds have small wings on both sides to help them blow in the wind.	Trumpet Creeper	Grow Survive Reproduce