LESSONS TO GROW BY

Plant Parts

This month we are investigating important botany basics by studying plant parts. Take a look around your yard or a nearby green space and you will most likely notice a great diversity of plants. From tall trees with woody stems to the soft, creeping grass along the ground, plants can be found in a wide variety of colors, shapes, and sizes. Despite their differences in appearance, plants share a common set of parts. Learning about how the different parts function is essential to exploring plant growth and development. This foundational knowledge also contributes to our understanding of how to care for the plants in our gardens and environment.

Week 5: Fruits

Learning Objectives:
This week focuses on an important (and often tasty) plant part: fruits. Kids will:

- Learn about the purpose of fruits and how they help with seed dispersal.
- Explore the great variations of different types of fruits.
- Discover that fruits provide many important vitamins and nutrients we need and that we should "Eat a Rainbow" every day.

Materials Needed for the Week

Activity 1: Traveling Fruit

- Traveling Fruit Cards
- A berry, a burdock bur, a dandelion seed head, and a coconut (optional)

Activity 2: Inside a Fruit

- What is a Fruit? Reading Page
- A variety of fruits, including some that are commonly classified as vegetables. These may include, although are not limited to: apples, oranges, peaches, tomatoes, peppers, avocados, squash, cucumbers, green beans, peas (in their pods), and zucchini.
- Plate or cutting board
- Knife
- Sketching paper (or journal) and pencils, crayons, or markers

Activity 3: Eat a Rainbow

- Eat a Rainbow Coloring Page
- Crayons or markers
- Old seed catalogs or magazines (optional)
- Assorted fruits in a rainbow of colors (optional)
- Garnishes such as yogurt (optional)

Introduction: Fruit

Because plants are rooted in the ground, they encounter a dilemma when it comes to their offspring. They need to produce new plants to replace them when they die; however, if all of their seeds fall to ground at their feet, then their offspring will be competing with them — and each other — for the exact same resources. The solution? Find ways for seeds to travel away from the parent plant. Fruit is one of the ways plants help make this happen.

An estimated 80% of the world's plants are flowering plants. Flowering plants produce seeds inside of ovaries which develop into fruits. Fruits serve to protect the seeds and also to help with seed dispersal. Although an apple or orange might be the first thing to pop into your mind when you hear the word fruit, the structure itself can be very diverse. Fruits range in appearance, from a juicy watermelon to a hard pecan nut. Some fruits are considered "fleshy," and this includes many of the fruits we eat, like a peach. Others are classified as "dry;" these may not always be recognized as being fruit, like elm and maple samaras (the "helicopters" or lightweight, winged fruits that spiral through the air). Sometimes each fruit will contain lots of seeds (apple), and other times it will just contain one seed (peach). It can have a hard outer shell (pumpkin) or be soft (tomato). The range of what fruits look like and how they function is quite remarkable.

Fruits Help with Seed Dispersal

There are three primary ways that the fruit helps seeds disperse:

Wind. Many fruits are designed to help seeds be picked up in the wind and moved to another location. Often, these fruits do not have the traditional appearance that we associated with being a fruit. Commonly seen examples include a maple tree samara, a dandelion cypsela (the small brown

end on the white tuft is actually a seed surrounded by a dry fruit) and a cattail follicle (similar to a dandelion cypsela). They are lightweight so the wind can scoop them up and deposit them away from the parent plant.

Water. Some fruits will float in water, allowing them to be moved in bodies of water to new locations. Coconut trees and mangrove plants produce fruits that take advantage of the ability to float to find new homes. Lotus plants live in water and produce fruit pods held upright above the water surface. When the seeds inside are mature the stems bend and release the seeds, which float away. There are many more fruits that are capable of floating even if that is not their primary means of dispersal (think of the old game of bobbing for apples).

Animal/Aided. A final major method of relocation is with the help of animals. The fruits can have an inside or outside seat for their journey. Many fruits and their seeds attract hungry animals. After the fruit is eaten, the seeds travel intact through that animal's digestive system and will eventually be deposited in their waste in a new location. In addition to the ride, the animal's poop also serves as the seeds' own little pile of compost and nutrients.

Animals can help in other ways, too. Some fruits, such as burdock burs (which inspired the creation of Velcro®) have adapted tiny hooks that latch onto the fur of animals and hitch a ride to a new location. Squirrels and other animals bury seeds, such as acorns, as a source of food for the winter. Seeds left behind are pre-planted and ready to grow. Also, many plants receive the intentional help of humans who collect and replant seeds of plants that we deem worthy for our fields and landscapes.

Fruits Nourish Seedlings — and Us!

In addition to helping with dispersal, fruits serve as a covering to protect seeds from the elements as they develop and mature. The ripe fruits of many plants contain a wealth of nutrients. If they're left to decompose on the ground around the seeds, they nourish the newly sprouted seeds.

Fortunately for us, animals also benefit from this nutrient-filled packaging. Fruits contain common vitamins such as Vitamin A, B, C, and E, along with additional health-promoting nutrients that scientist are just now exploring, such as lycopene, anthocyanins, beta-carotene, and flavonoids. These chemicals, also known as phytochemicals ("phyto" means plant) are substances the plants need to grow and protect itself from environmental factors. We can also use them in similar ways, too.

The color of a fruit is often an indicator of some of the nutrients that can be found inside. (Many phytonutrients are also pigments and are responsible for the color presented.) Rather than trying to remember lots of different chemical names, nutritionists have come up with a simple message: "Eat a Rainbow." This directive reminds us to eat fruits and vegetables in variety of colors each day to ensure we are getting the nutrients we need to be healthy.

Activity 1: Traveling Fruit

1. Use the background information above to explain to kids that one of the roles of fruits is to help the plants move their seeds. Ask and discuss, *Why is it important for seeds to move away from their parent?* Share that the three main methods of dispersal include wind, water, and with the help of animals. A great additional resource to check out is the book A Fruit is a Suitcase for Seeds by Jean Richards. See also this KidsGardening video about a lesson in our curriculum book *Books In Bloom* featuring A Fruit is Suitcase for Seeds:
https://www.youtube.com/watch?v=j59AoR5EQ14&feature=youtu.be

2. Cut out the **Traveling Fruit Cards** and sort them by travel method (wind, water, or with the help of animals). Answers include:

Wind: Dandelion, maple samara, cattail
Water: Coconut, mangrove seed, lotus
Animal-aided: Raspberry, burdock bur, acorn

3. After sorting, talk about the characteristics of each one that helps with transport.

4. Take a nature walk and see if you can find additional examples of fruits and ask kids to predict how they might move away from the parent plant based on their characteristics. Optionally, you obtain examples to share indoors, such as a berry, a burdock bur, a dandelion seed head, and a coconut (make sure to test out its ability to float).

Activity 2: Inside a Fruit

1. Together or independently, read the "What is a Fruit?" Reading Page. Have your kids complete the reading comprehension questions and then discuss your answers together.

2. Cut open a variety of common fruits, including at least one example of a fruit that is often referred to as a vegetable (such as a tomato, cucumber, or squash). If you do not have a selection available, you may also be able to find photo examples online to supplement.

3. On sketch paper or in a journal, have kids draw a picture of what the inside of each fruit looks like. You can also have them add additional observations obtained through sensory exploration such as, Is the outside hard or soft? Is the inside hard or soft? Does it have smell? Is it wet or dry? Ask them to draw a close-up picture of one of the seeds. Include as much detail as possible. Additional exploration can include counting the seeds.

4. Once they have drawn all the samples, have them compare their findings. Talk about the similarities and the differences.

5. Depending on the state of your samples after your exploration, you can end the activity by having kids taste the samples and add those observations to their notes. If you plan to eat your samples, make sure you use clean plates and knives, clean hands, and also that you wash the fruits before examining them (they will be harder to clean once they have been cut open).

Activity 3: Eat a Rainbow

1. Use the background information in the introduction to talk about all of the many important nutrients found in fruits. Older students may want to explore the health benefits of their favorite fruits on the Produce for Better Health Foundation website at: https://fruitsandveggies.org/fruits-and-veggies/.

2. Explain to kids that many of the health benefits are associated with the colors of the fruits, and that the best (and easiest!) way to make sure they're getting all the nutrients they need is to "Eat a Rainbow" every day.

3. Use the Eat a Rainbow coloring page to help kids brainstorm fruits (and veggies too if they want) that represent the different colors of the rainbow. They can either draw pictures using crayons or markers, or create a collage using pictures from old seed catalogs or magazines.

If they are having trouble getting started, here are some ideas for them:

Red: cherries, cranberries, raspberries, red apples, red peppers, strawberries, tomatoes, watermelons

Orange: apricots, cantaloupes, mangoes, oranges, peaches, pumpkins

Yellow: Bananas, pineapples, yellow pears, yellow peppers, yellow squash

Green: Green apples, green grapes, green pears, green peppers, honeydews, kiwis

Blue/Purple: blackberries, blueberries, eggplants, plums, purple grapes, raisins

4. At the end of the activity, let the kids share their favorites. Do they have a favorite color? Select a couple of examples that they have never tried and do a taste test. Plan out a few menus for the week that would allow you to incorporate each color each day.

5. As an extension, make and eat a rainbow fruit salad or a Fruit and Vegetable Art plate (check out the KidsGardening activity at: https://kidsgardening.org/garden-activities-fruit-and-vegetable-art/). You can top with yogurt or other garnish.

Digging Deeper

You can use the following resources to dig deeper into this week's lessons.

Books and Additional Resources:

A Fruit is a Suitcase for Seeds by Jean Richards

The Donkey Egg by Janet Stevens

The Reason for a Flower by Ruth Heller

What's in the Garden? by Marianne Berkes

Videos:

SciShow Kids What's the Difference Between Fruits and Vegetable?
https://www.youtube.com/watch?v=DTK-uWx_VQo

Big Green Video Library: Fruits We Eat and Just Past Perfect Strawberry Smoothies
https://biggreen.org/edresources/video-library/

Eat a Rainbow Rap:
https://www.youtube.com/watch?v=CkP-sewWCeE

Life Lab's Eat a Rainbow Lesson:
https://www.youtube.com/watch?v=i9RNkIbyyz0&t=20s

Enrich LA – Eat a Rainbow:
https://www.youtube.com/watch?v=p5MMq7hH7YM

KidsGardening In The Weeds: Seeds on the Move:
https://www.youtube.com/watch?v=j59AoR5EQ14&feature=youtu.be

Additional Related KidsGardening Lessons and Activities to Try:

Fruit and Vegetable Art: https://kidsgardening.org/garden-activities-fruit-and-vegetable-art/

Kitchen Scrap Gardening: https://kidsgardening.org/garden-activities-kitchen-scrap-gardening/

Plant Parts Salad: https://kidsgardening.org/garden-activities-plant-parts-salad/

Celebrating Apples: https://kidsgardening.org/garden-activities-celebrating-apples/

Pollinator Celebration Meal: https://kidsgardening.org/garden-activities-pollinator-celebration-meal/

Eat a Rainbow: https://kidsgardening.org/lesson-plans-eat-a-rainbow/

Fruit vs. Vegetable: https://kidsgardening.org/lesson-plan-fruit-vs-vegetable/

Rainbow Vegetable Kebabs: https://kidsgardening.org/garden-activities-rainbow-vegetable-kabobs/

What is a Fruit?

Week 5 Reading Page

Apples, oranges, strawberries, bananas, grapes, and watermelon — yum! What do we call all these things? We call them fruit. They are sweet, tasty treats that are good for us too, because they are full of vitamins and nutrients we need to grow healthy and strong. What else do they have in common?

Inside of each piece of fruit, you will find another important plant part — seeds. From a plant's point of view, the job description of fruit is to provide protection for seeds and also to help the seeds get moved to new locations. For example, a hungry deer might eat an apple off of a tree, seeds and all. With seeds tucked safely inside its stomach, the deer then moves on to a new location. Eventually, it will drop the seeds into a new location along with their own supply of compost to help them grow (in other words, they are surrounded by the deer's poop).

Even if the apple had not been eaten, the apple would have eventually fallen off the tree, hopefully rolled some distance away from the tree, and then the fruit itself would have slowly rotted and provided nutrients for the new plants. Fruits are the plant's way of packaging its seeds to help them survive in the world.

Do all plants have fruits? Fruit is a really cool way to package seeds, but some plants make their seeds in other ways. For example, conifers like pine trees make their seeds in cones. Plants like ferns do not even make seeds, but instead make baby plants from spores in parts called sporangia. However a majority of plants in our world – an estimated 80% of all plants- do make seeds inside of fruit.

So if fruits contain the plant's seeds, you might be thinking, but I have seen seeds in vegetables too, like cucumbers, tomatoes, squash, and peppers. Guess what? Some of the things we call vegetables are actually fruits!

The use of the word vegetable to describe some plant parts that are actually fruit can be traced back to the tomato and the United States Supreme Court. Way back in 1883, the United States government wanted to make money by charging people a special tax called a tariff to bring certain vegetables into the country from other countries. A tariff is a fee you have to pay the government when you bring products into and out of the country to sell. One of these vegetables people had to pay a tariff on was tomatoes.

A very smart person who was bringing in tomatoes from other countries to sell decided that it was not fair to have to pay the tariff because he knew that since they contained seeds, tomatoes were fruits. Many people argued about this and eventually the case went to the United States Supreme Court to decide who was right.

The Supreme Court ruled that even though the tomato is scientifically a fruit, in every day life, we eat it as part of meal like other vegetables. They said that fruits are usually consumed individually or as a dessert. Therefore by ruling of the Supreme Court the tomato is a vegetable. So there are two ways to use the word fruit. In science, fruit is the part of the plant that contains the seeds. In everyday use, fruit is a sweet treat that we usually eat as a dessert or snack.

So in the future, if you're asked if a tomato (or cucumber, pepper, or squash) is a fruit or a vegetable, you can give them the answer, "Both!"

Reading Comprehension Questions:

1. True or false: All plants make fruit.

2. Why does a plant make fruit?
   A. Because it is pretty
   B. Because people like to eat them
   C. Because it helps protect and move the seeds
   D. Because it smells good

3. What is the difference between the scientific definition of a fruit and the common use definition of a fruit?

4. What are some vegetables we eat that are actually fruits?

5. What is your favorite fruit?

Traveling Fruit Cards

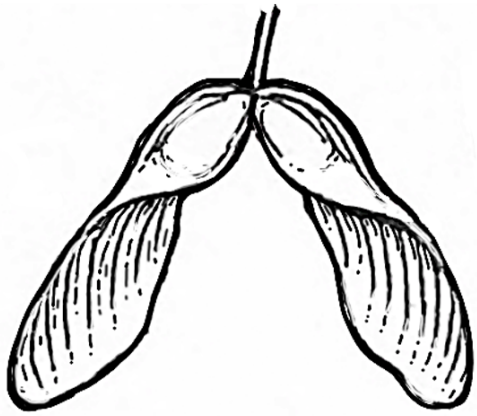
Raspberry

Burdock bur

Acorn

Traveling Fruit Cards

Dandelion

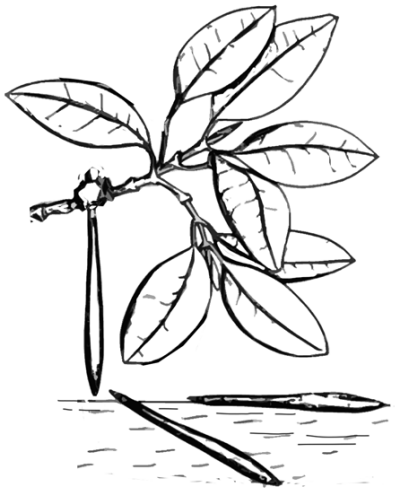


Maple samara

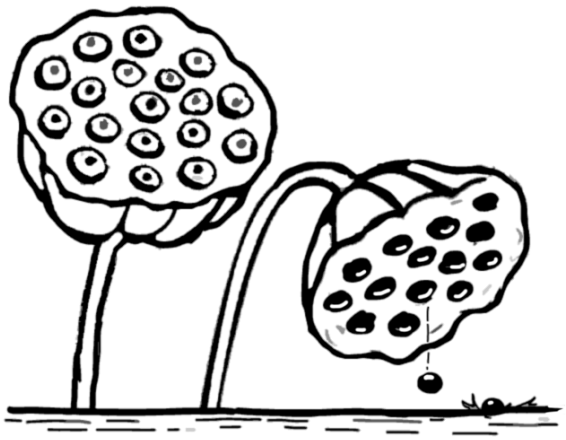
Cattail

Traveling Fruit Cards

Coconut



Mangrove



Lotus

Eat a Rainbow Coloring Page