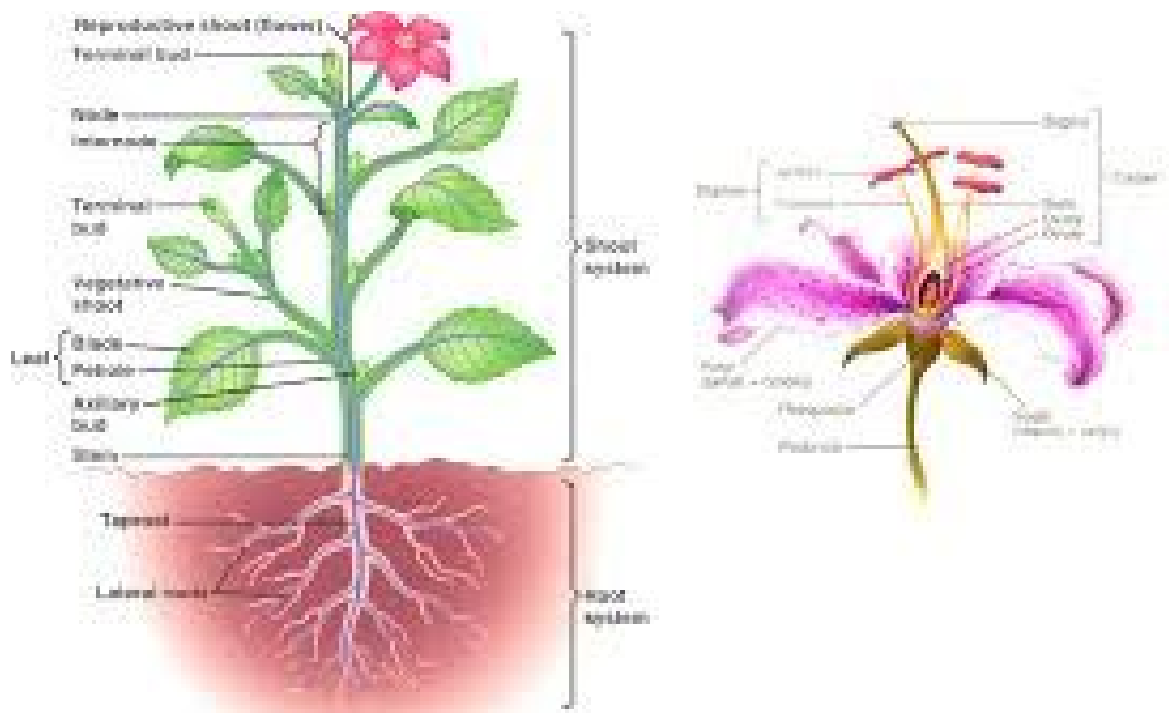


# Plants Unit

## Fourth Grade Earth Science



**Unit Summary:**

During this unit fourth grade students will be able to learn more about the plants around them and how they grow. Students will hopefully have more knowledge about plants after this unit. The students will be involved in hands on experiences and handling plants during the unit. Students will be able to plant their own flowers and see how the seed forms into a flower.

### **Minnesota Standards:**

Social Studies Standards and Benchmarks:

0.2.1.1.1 Distinguish between individual needs and individual wants.

0.2.1.1.2 Identify goods and services that could satisfy a specific need or want.

1.2.1.1.1 Describe some costs and benefits of alternative choices made by families.

2.4.2.4.2 Describe how the culture of a community reflects the history, daily life or beliefs of its people.

6.4.4.16.1 Compare and contrast the Dakota and Anishinaabe nations prior to 1800; describe their interactions with each other and other indigenous peoples.

Science Standards and Benchmarks:

0.4.1.1.2 Identify the external parts of a variety of plants and animals including humans

1.1.1.1.1 When asked “How do you Know?” students support their answer with observations.

2.4.2.1.1 Recognize that plants need space, water, nutrients and air and that they fulfill these needs in different ways.

2.4.3.1.1 Describe the characteristic of plants at different states of their life cycles

3.1.3.2.1 Understand that everybody can use evidence to learn about the natural world, identify patterns in nature and develop tools.

#### Language Arts Standards and Benchmarks

0.1.1.1 With prompting and support, ask and answer questions about key details in a text

0.1.1.2 With prompting and support, retell familiar stories, including key details.

0.1.1.3 With prompting and support, identify characters, settings and major events in a story.

#### Health Standards and Benchmarks

1.1 The student will describe how individual behavior affects individual health.

### **Overall Objectives:**

Students will identify and describe the parts of a flowering plant. Differentiate between types of plants.

Students will be able to create a list of plants that we eat in our daily lives.

Students will be able to distinguish different groupings of vegetables such as: stem vegetables, fruit, root vegetables and leafy vegetables.

Procedure:

### **Vocabulary:**

**germination:** process of a seed sprouting and growing into a plant

**micronutrient:** a substance required in relatively small amounts by a living organism such as iron in plants

**macronutrient:** a substance required in relatively large amounts by a living organism such as nitrogen, phosphorus, and potassium in plants

**nutrient:** substance that provides nourishment essential for growth and life

**ovule:** plant part that contains embryo

**petal:** the colored segments of a flower

**anther:** male part of flower that holds the pollen

**carpel:** the female reproductive part of a flower

**cotyledon:** the part of the seed that stores food for the young plant

**dicot:** type of flowering plant that has two cotyledons to store food for the young plant, leaves with netted veins and tap roots

**filament:** the thin stalk that supports the anther

**flower:** the part of the plant that contains reproductive parts and attracts pollinators

**fruit:** the part of the plant that holds seeds

**leaf:** the flat or needlelike part of a plant where photosynthesis happens

**monocot:** type of flowering plant that has one cotyledon to store food for the young plant and have leaves with parallel veins and fibrous roots

**phloem:** specialized structures that transport water throughout a plant

**pollen:** fine powdery material produced by anthers of flowers containing male sex cells of plants

**root:** the part of the plant that grows into the soil to anchor the plant and collect water and nutrients

**root hairs:** tiny hair-like structures that are on the ends of roots and aid in nutrient and water absorption; they increase the surface area of root systems.

**seed:** the small object that will grow into another plant

**sepal:** an individual leaf that makes up the calyx of a flower

**stamen:** the male part of the plant containing the pollen, anther, and filament

**stem:** the part of the plant that supports the upper part of the plant and transports nutrients and water

**stigma:** female part of the flower that receives the pollen

**xylem:** the specialized cells of plants that transport water and nutrients from the roots to the leaves

**fruit:** hold the seeds of a plant; examples include eggplant, tomatoes, pumpkins, squash, cucumbers

**flowers:** allow the plant to reproduce by producing seeds; edible examples include broccoli, cauliflower

**leaves:** soak up the sun's energy and produce food for the plant; examples include lettuce, cabbage, spinach, mustard greens, kale

**stems:** transport water and food throughout the plant; examples include asparagus, celery

**roots:** absorb water and anchor the plant; examples include radishes, beets, carrots, parsnips  
seed, root, stem, leaves, and flower (the location on a plant)

## **Materials:**

[\*All About Plants\*](#) video and VCR, or DVD and DVD player Crayons, colored pencils, or markers

Paper and pencils

Encyclopedias, botany or gardening books, or magazines with images and descriptions of plants

Clear plastic gloves

Permanent markers

Five different types of seeds such as alfalfa, radish, soybean, lettuce, squash, cucumber

Cotton balls

Small paper plates

Minnesota AgMag Vol 24, Issue 1, page 7

*People and Plants Need Nutrients* worksheet & answer key

*People and Plants Need Nutrients* chart

**Essential Files (maps, charts, pictures, or documents)**

- ["People and Plants Need Nutrients" chart](#)
- ["People and Plants Need Nutrients" Key](#)
- ["People and Plants Need Nutrients" worksheet](#)

**For teacher demonstration:**

- Celery or white carnation flowers
- Red or blue food coloring
- Two glass jars filled with water
- Potted plant
- Clear plastic bag
- Twist tie

**For each group:**

- 2-3 different types of leaves
- Clear nail polish
- Clear tape
- Microscope
- Elodea leaves
- 4 slides and coverslips

**For each student:**

- *Plant Parts and Functions* handout
- *Plant Parts and Functions Lab* handout

**Essential Files (maps, charts, pictures, or documents)**

- [Plant Parts and Functions Lab handout](#)
- [Answer Key- Plant Parts and Functions Lab](#)
- [Plant Parts and Functions handout](#)

Variety of produce items (asparagus, strawberries, carrots, cabbage)

USDA's MyPlate Diagram

Picture of a plant (the [Dry Edible Bean Card](#) would be a good example)

Variety of vegetable and fruits that are roots, stems, leaves, flowers, and fruits. If actual vegetables and fruits are not available use pictures.

**Activity Two**

- *Tops and Bottoms* by Janet Stevens
- *Plant Parts We Eat* worksheet

**Essential Files (maps, charts, pictures, or documents)**

- [Plant Parts We Eat](#)

**Daily Overview**

**Day One-**

Objectives:

Students will:

Identify and describe the parts of a flowering plant. Differentiate between types of plants.

Describe the needs of plants.

Define the term photosynthesis.

Procedure:

1. Discuss plants and what they need. Ask students if all plants are alike, and what they require to grow. Show All About Plants to give students an understanding of plants and their needs.
2. After watching the video, talk about the types of plants featured. Do all plants look alike? What needs do plants have? How do they get their food? Discuss the parts of flowering plants and the process of photosynthesis, the process by which plants make food. Talk about plants that are familiar to the students. What do they look like? Where do they grow? What are their needs?
1. Have students choose a familiar flowering plant they would like to learn more about; tell them they will research and write a paragraph about it. Each paragraph should include the plant's common and scientific names; a description of the parts (seed, root, stem, leaves, and flower); its needs; and at least three interesting facts. Also have students draw a picture with each plant part labeled. Students may use encyclopedias, botany or gardening books, or magazines for research. The following Web sites also have useful information:
2. <http://plants.usda.gov>



- <http://www.botany.com>
  - <http://www.plantkingdom.com/plntlist.htm>
1. Allow time in class for students to research and complete their paragraphs and drawings.  
Then divide the class into groups of three or four so they can share their work. Ask them to discuss within their groups the differences and similarities of the plants.
  2. Ask for volunteers to share what they learned from their research and group discussions.  
Review what students have learned about the needs of plants, the parts of flowering plants, and photosynthesis.

Vocabulary: seed, root, stem, leaves, and flower

Materials:

[\*All About Plants\*](#) video and VCR, or DVD and DVD player Crayons, colored pencils, or markers

Paper and pencils

Encyclopedias, botany or gardening books, or magazines with images and descriptions of plants

## **Day Two/Three (need two 60 minute periods)-**

Objectives:

Students will be able to create a list of different plants that we eat in our lives.

Procedure:

### **Interest Approach or Motivator**

1. Ask students to brainstorm plants that we eat, or products that came from plants. Students can name any fruit, vegetable, or grain. Make a list on the board in a single column.
2. Choose some of the food items from the list and ask the students how they were produced. For example, if the students listed an apple, ask them how apples are grown. If they do not know, explain that apples grow on trees and develop from a flower. Explain that a farmer must understand biology to be successful in producing apples. Give other examples reinforcing the fact that understanding basic biology and plant anatomy is crucial to the successful growth of the plants we use for food. Today, students will be learning about the parts and functions of plants.

### **Background Agricultural Connections**

This lesson is part of a series called, *Too Much? Too Little?* created to introduce middle school students to the connection between soil nutrients and the food they eat. The lessons consist of a series of demonstrations and hands-on experiments that show that plants require nutrients in certain quantities. The lesson series allows students to investigate soil properties, learn how to properly prepare fertilizer nutrient solutions, identify deficiencies in plant nutrients using a key, and much more. Other related lessons include:

- **Plant Parts and Functions:** Anatomy and physiology of a plant.
- [Digging Into Nutrients](#): How plants obtain nutrients from the soil.
- [The Right Solution](#): How fertilizer solution is properly calculated and applied.

- [Can We Have Too Much of a Good Thing?](#) Effects of applying too much or too little fertilizer.
- [The Right Diet for Your Plants:](#) Read fertilizer labels and choose the best fertilizer.
- [Let's Vote On It:](#) How soil nutrients effect local communities and economies.
- [It's a Dirty Job:](#) How earthworms benefit soil.

Plants are vital to life on Earth. Plants are known as producers because they use energy from the sun to make their own food and are the main source of energy entering food chains. Sunlight energy is transferred by plants into chemical energy through the process of photosynthesis. Consumers like deer, humans, and mice eat plants and that energy gets transferred from one organism to another through the food chain.

Plants come in all shapes and sizes and can be found on mountain tops, in valleys, deserts, fresh and saltwater—almost everywhere on Earth. Some plants, like the Giant Sequoia tree, are enormous while other plants, like the weeds growing in between sidewalk cracks, are tiny. There are carnivorous plants that trap and digest insects and animals as large as rats. The largest **flower** in the world, the Corpse Flower, *Amorhophallus titanum*, is also one of the smelliest. This flower can grow up to 20 feet tall and 16 feet wide, and it attracts flies, which are its pollinators, with an aroma of rotting meat.

Plants provide us with food, clothing, medicine, shelter, and oxygen. Everything we eat comes directly or indirectly from plants. Each part of the plant plays a specific role. Plants hold soil in place with their roots, and **roots** anchor the plant in the soil and absorb nutrients. **Leaves** act as food factories by capturing sunlight energy and transforming it into food for the plant through

photosynthesis. Flowers are involved in plant reproduction. This lesson provides activities for students to explore the structure and function of plant parts.

## Procedures

1. Set up the following class demonstrations to introduce plant parts and functions.
  - Bring a potted plant to class and have the class observe the plant. Next, cover one branch and its leaves with a clear plastic bag and make a tight seal around the branch. Ask students to look at the branch, leaves, and plastic bag as soon as it has been attached. Water the plant as needed and observe the bag over the next couple of days. Condensation should develop inside the bag. Ask students to tell you why this is happening. This is an easy way to demonstrate transpiration from the leaves.
  - To demonstrate the function of xylem, put cut stalks of celery in clear jars with water. Make a fresh cut at the bottom of the celery stalk prior to adding them to the water. Add red or blue food coloring to one jar. Have students observe the celery over the next day. Ask them why the leaves of one stalk of celery are turning the color of the food coloring. White carnation flowers may also be used for this demonstration.
  - Both of these demonstrations lead into the student handout, *Plant Parts and Functions*. Go over this informational handout together as a class.
2. Review *Plant Parts and Functions Lab*.
  - Lead students in a demonstration of set up for the "Stomata Observation" activity and facilitate a discussion of the questions to be answered in the activity.

- Lead students in a demonstration of set up for the Chloroplast Observation activity and facilitate a discussion of the questions to be answered in the activity.
3. After students have completed the Stomata and Chloroplast Observations, have a class discussion about what students observed. Draw labeled diagrams on the board to reinforce specific plant structures and functions.
4. As a conclusion to your discussion, ask students the following riddles about plants they eat.
- My taproot gathers nutrients from the surrounding soil. I am orange and I have feathery green leaves with veins in a netted pattern. Rabbits and people like to eat me.
    - What am I? carrot
    - What plant part am I? root
  - I transport water, nutrients, and food the plant makes for itself. I have tubes that act as roadways for water, nutrients, and the food I make. I have green shoots which are harvested after about 2 years when they are about 9" tall. I am often steamed or boiled for a healthy side dish.
    - What am I? asparagus
    - What plant part am I? stem
  - I attract insects so that I can become pollinated and produce seeds. I am white and a member of the cabbage family. Some people say I look like clouds.
    - What am I? cauliflower
    - What part of the plant am I? flower

- I have lots of iron. I use sunlight, carbon dioxide, nutrients, and water to make food for myself and the rest of my plant parts. I go well with salads. Popeye is a big fan.
  - What am I? spinach
  - What plant part am I? leaf
- If planted and the conditions are right, I will grow into a tree. I have a light tan shell that easily splits in two and greenish colored nut. I grow on trees and have become a popular nut to grow in California. I start with a “P.”
  - What am I? pistachio
  - What plant part am I? seed
- I am the yellowish-orange fleshy substance around a large seed. I protect the seed and encourage insects or larger animals to eat me so that my seeds can be dispersed. I have fuzzy skin.
  - What am I? peach
  - What plant part am I? fruit

Vocabulary:

**ovule:** plant part that contains embryo

**petal:** the colored segments of a flower

**anther:** male part of flower that holds the pollen

**carpel:** the female reproductive part of a flower

**cotyledon:** the part of the seed that stores food for the young plant

**dicot:** type of flowering plant that has two cotyledons to store food for the young plant, leaves with netted veins and tap roots

**filament:** the thin stalk that supports the anther

**flower:** the part of the plant that contains reproductive parts and attracts pollinators

**fruit:** the part of the plant that holds seeds

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**monocot:** type of flowering plant that has one cotyledon to store food for the young plant and have leaves with parallel veins and fibrous roots

**phloem:** specialized structures that transport water throughout a plant

**pollen:** fine powdery material produced by anthers of flowers containing male sex cells of plants

**root:** the part of the plant that grows into the soil to anchor the plant and collect water and nutrients

**root hairs:** tiny hair-like structures that are on the ends of roots and aid in nutrient and water absorption; they increase the surface area of root systems.

**seed:** the small object that will grow into another plant

**sepal:** an individual leaf that makes up the calyx of a flower

**stamen:** the male part of the plant containing the pollen, anther, and filament

**stem:** the part of the plant that supports the upper part of the plant and transports nutrients and water

**stigma:** female part of the flower that receives the pollen

**xylem:** the specialized cells of plants that transport water and nutrients from the roots to the leaves

Materials:

**For teacher demonstration:**

- Celery or white carnation flowers
- Red or blue food coloring
- Two glass jars filled with water
- Potted plant
- Clear plastic bag
- Twist tie

**For each group:**

- 2-3 different types of leaves
- Clear nail polish
- Clear tape
- Microscope
- Elodea leaves
- 4 slides and coverslips

**For each student:**

- *Plant Parts and Functions* handout
- *Plant Parts and Functions Lab* handout

**Essential Files (maps, charts, pictures, or documents)**

- [Plant Parts and Functions Lab handout](#)
- [Answer Key- Plant Parts and Functions Lab](#)



- [Plant Parts and Functions handout](#)

Assessment:

### **Concept Elaboration and Evaluation:**

After conducting these activities, review and summarize the following key concepts:

- Farmers must have use their knowledge of biology to be successful in growing crops that provide our food.
- Plants provide food for humans in the form of vegetables, fruits, and grains.
- Plants also provide feed for animals such as grains and forages. In turn, these animals provide food for humans such as milk, meat, and eggs.

### **Day Four-**

Objectives:

Students will understand and be able to list places that they can get plants or vegetables at.

Procedure: Ask students:

1. "If you wanted to eat one or more of these items at your home, where would you go to get it?" (*grocery store, farmers market, garden*)
- "Let's imagine that you want to grow one of these items in a garden. How would you start this growing process?" (*plant a seed*)
1. Explain to the students that many people have their own personal gardens; however farmers all over the United States and the world grow a very large amount of food to feed the people on earth.

1. Ask Students:
2. "What do farmers need to provide in order to get the seeds to grow into the plants that provide animals and humans food?" (*Water – from rain or irrigation; Air – plants need to breathe in order to grow; Light – the bright summer sun provides solar energy for the plant; Soil – once the plant is growing it needs nutrients (minerals, vitamins from the soil)*)
  - "What kinds of resources are needed to get the seed to grow and provide food?" (*Natural resources – water, sun, soil; Capital resources – tractors, planters, irrigation methods, harvesters (combines) etc.; Human resources – farmers, plant scientists*)
1. Tell students that they are going to provide a variety of food plant seeds with everything they need to sprout. The scientific name for sprouting is germination.
2. Ask students:
  - "What do you need to give the seeds so they will germinate?" (*Water, air, light; Soil is not necessary to get the seed to germinate but once the seed gets past germination and starts to grow it will need nutrients from the soil.*)
3. Demonstrate the process of making a garden in a glove:
4. Write your name on the palm section of a clear plastic glove with a permanent marker. Also label each finger with a different type of seed (see *Materials List* for seed suggestions).
5. Dip five cotton balls in water. Give each cotton ball 3 flat squeezes to wring out excess water.

6. Place 3-5 seeds on a small paper plate or paper towel and pick up the seeds with a moistened cotton ball.
7. Put the cotton ball with the seeds attached into the matching labeled finger in your glove.
  - **Teacher Tip:** You may need to use a pencil to get the cotton ball all the way to the tips of the glove fingers. For large seeds like pumpkins, use only two seeds.
8. Repeat the seed pick-up and depositing in the glove with the additional cotton balls and seeds.
9. Tape the glove to a window, chalkboard, or wall. A clothesline can also be used with clothespins holding the gloves on the line.
10. Assist students in creating their Garden in a Glove.
11. Read the article [“Our Bountiful Land: The story of Food”](#) found on page 7 in the *Agriculture is Everywhere!* AgMag.
12. Discuss as a group:
  - What connections do the “Three Sisters” have to science and history? Additional information on the three sisters can be found at the [Cornell University Website](#).
13. Depending on what seeds are used, germination will take place in 3-5 days. The cotton balls should stay moist through germination. If one or more appear dry you can add a little water with an eyedropper or spray bottle.
14. Germinated seeds can be transplanted in 1-2 weeks. Cut the bottom off each finger and pull out the germinated seeds (cotton ball and all), and transplant into a container with soil.

Vocabulary: **germination:** process of a seed sprouting and growing into a plant

Materials:

Clear plastic gloves

Permanent markers

Five different types of seeds such as alfalfa, radish, soybean, lettuce, squash, cucumber

Cotton balls

Small paper plates

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Assessment:

After conducting these activities, review and summarize the following key concepts:

- Many plants provide the fruits, vegetables, and grains that we eat.
  - Most plants begin their life as a seed.
  - Seeds germinate or begin to grow when they are watered and kept in a warm place to grow.

## **Day Five**

Objectives:

Students will understand more about how plants need nutrients to grow and be healthy.

Procedure: **Interest Approach or Motivator**

1. Ask students, "Did you know that people and plants BOTH need nutrients to grow and be healthy?"

2. Ask students, "Where do people obtain nutrients?" (*Food*) "Where do plants get nutrients?" (*From the soil, air, and water*)
3. Inform your students that they will be learning about the nutrients that plants need in order to grow and provide healthy food for our diet.

### **Did you know? (Ag Facts)**

- Potassium protects our plants!
- Nitrogen is present in all living things including the human body and plants.
- Phosphorus is used to make matches. In Greek, the word means, "bearer of light."

### **Background Agricultural Connections**



**Fun With the  
Plant Nutrient Team**

This lesson is part of the *Fun with the Plant Nutrient Team* series which were written to help children better understand what the soil needs to be healthy in order to provide us with healthy foods. The lessons encourage students to think for themselves, ask questions, and learn problem-solving skills while learning the specific content needed to better understand the world in which they live. The lessons include:

- *People and Plants Need Nutrients*
- [\*The Soil We Grow In\*](#)
- [\*Photosynthesis and You\*](#)
- [\*Weather on the Farm\*](#)
- [\*Where Did Your Hamburger Come From?\*](#)





Plants depend on the soil for the **nutrients** they need to grow and be healthy. If the soil does not contain the right amount of nutrients, the farmer or gardener will need to add one or more nutrients to the soil. Plants obtain three of these essential nutrients—carbon, hydrogen and oxygen—from the atmosphere and water. Nitrogen, phosphorus, and potassium are classified as primary **macronutrients** because plants consume large amounts of these nutrients and therefore, they may be lacking in the soil. Secondary macronutrients include calcium, magnesium, and sulfur and are often present in the soil in amounts that are sufficient for plant growth.

The remaining essential nutrients are called micronutrients. **Micronutrients** are just as important for plant health as the macronutrients, but are required in much smaller amounts.

Micro and macronutrients are obtained when plant roots take up water from the soil that contains the dissolved nutrients. Altogether, there are 17 nutrients that plants require for healthy growth and development. The chemical symbol for each of these nutrients is shown on the last page of your *Fun With the Plant Nutrient Team* activity book.

Both plants and people need nutrients to grow strong and be healthy. While plants use their roots to absorb nutrients from soil through water, people must get their nutrients by eating a balanced diet of nutritious foods.

The *People and Plants Need Nutrients* chart shows a list of the nutrients that are highly important for plant growth and why those nutrients are also important for people.

## **Procedures**

1. Ask students if they know why it is important to eat healthy foods. Explain that healthy foods supply our bodies with the nutrients they need for energy, growth, and repair. Ask students to help make a list of some healthy foods they can include in a meal or snack.

Give an example of foods that are good sources of certain nutrients. For example, milk is a good source of calcium, oranges are a good source of vitamin C, and bananas are a good source of potassium.

2. Ask students if plants need food. Explain that plants, just like people, need food for energy, growth, and repair, but they do not eat food like people do. Instead, plants make their own food by capturing energy from sunlight to carry out a process called photosynthesis. Chlorophyll is the pigment inside leaves that gives them their green color and makes grass stains on your clothes. It helps plants absorb energy from the sun to make their own food.
3. Ask students to help you make a list on the board of what plants need in order to make their own food. Write the words and draw the symbols for sun, water, and soil on the board. Next, draw a simple plant on the board and show its roots growing down into the soil. Explain that most of the nutrients a plant needs come from the soil. Plants get these soil nutrients when their roots absorb them along with water. Distribute the *People and Plants Need Nutrients chart* to each student. As a class, review the chart to discuss what nutrients are important to plants and people. Use the questions that follow as group work or individual assignments for each student.

**Note:** The plant nutrients shown in the chart are called macronutrients because plants use large amounts of these nutrients. Micronutrients are nutrients that are just as important for plant growth but are needed in much smaller amounts. These are iron, manganese, chlorine, zinc, boron, molybdenum, copper, nickel, hydrogen, carbon, and oxygen.

Vocabulary:

**micronutrient:** a substance required in relatively small amounts by a living organism such as iron in plants

**macronutrient:** a substance required in relatively large amounts by a living organism such as nitrogen, phosphorus, and potassium in plants

**nutrient:** substance that provides nourishment essential for growth and life

Materials:

*People and Plants Need Nutrients* worksheet & answer key

*People and Plants Need Nutrients* chart

### **Essential Files (maps, charts, pictures, or documents)**

- ["People and Plants Need Nutrients" chart](#)
- ["People and Plants Need Nutrients" Key](#)
- ["People and Plants Need Nutrients" worksheet](#)

Assessment:

After conducting these activities, review and summarize the following key concepts:

- Plants require specific nutrients for healthy growth.
- Nutrients for plants are acquired through natural resources such as the sun, water, and soil.
- Farmers grow and produce our food. They use science to grow healthy plants and preserve natural resources for continued use.

## **Day Six-**

Students will be able to distinguish different groupings of vegetables such as: stem vegetables, fruit, root vegetables and leafy vegetables.

Procedure:

### **Interest Approach or Motivator**

1. Collect a variety of produce that represents different parts of the plant. Items could include asparagus (stem), strawberries (fruit), carrots (root), and cabbage (leaves). More food items are listed in the *Background Agriculture Connections*.
2. Display these vegetables and fruits and ask the following questions.
  - "Where have you seen these items before?" (grocery store, farmers market, gardens, fields)
  - "What fruits and vegetables are your favorite to eat?" (answers will vary)

### **Did you know? (Ag Facts)**

- A good diet and regular physical activity can build strong bones and a strong body. Completing chores such as taking out the trash, walking the dog, and raking leaves can count as physical activity to help strengthen your bones.
- Replacing sodas and sugary drinks with water will help you reduce calories and become fuller to create a healthier diet. Cans of 12-ounce sodas can contain as much as 10 teaspoons of sugar.

- Selecting vegetables that are bright in color such as red, orange, or dark green provide more essential vitamins and minerals. Eating foods such as spinach, acorn squash, cherry tomatoes, and sweet potatoes will brighten up your plate with these vivid colors.

## **Background Agricultural Connections**

Many foods we eat are plants. Plant-based foods provide essential nutrients including many vitamins and minerals. These plant foods can be an excellent teaching tool for understanding the external parts of a plant – roots, stems, leaves, fruits, and flowers. Farmers grow and harvest many plant-based foods such as carrots, green beans, kale, sweet potatoes, and strawberries which are part of a healthy diet.

Each of these food items are grown from a plant either above or below the surface of the soil. For this lesson student's experience for eating fruits and vegetables that live and grow above ground or underground would be required for helping them gain an understanding for identifying where they belong on the USDA's MyPlate diagram. Teachers should be familiar with the MyPlate graphic organizer, including food categories. If not, please review the information at [www.choosemyplate.gov](http://www.choosemyplate.gov).

**Roots** are usually found underground with the functions of anchoring the plant and absorbing water and nutrients from the soil. In some plants they also serve as a storage area for food for the plant. For some plants, such as rutabagas, radishes, carrots, and sugar beets, the root is the crop.

**Stems** are the main stalk of a plant. Usually stems grow above ground and transport water and nutrients from the roots to the leaves and flower. The leaves produce food (glucose) which is also transported throughout the plant by the stem. You can think of the stem as a passage way for water and food. In addition, the stem serves as a backbone, offering the plant support and

structure. Edible stems that grow above ground include asparagus, broccoli, cauliflower, and celery.

The **leaves** of a plant serve as solar panels. They collect sunlight and use this solar energy to power photosynthesis. Photosynthesis occurs in the leaf. The plant takes in water and carbon dioxide. The sun's energy causes a chemical reaction which converts the water and carbon dioxide into glucose (food for the plant) and oxygen. The plant uses the glucose to grow and the oxygen is given off into the environment. Humans eat several plant-based foods with edible leaves such as cabbage, kale, lettuce, and spinach.

The **flower** of a plant is designed for reproduction. The petals, or modified leaves, attract pollinators that transfer pollen so seeds can be produced in the flower. Broccoli and cauliflower flowers can be eaten known as the flowerets.

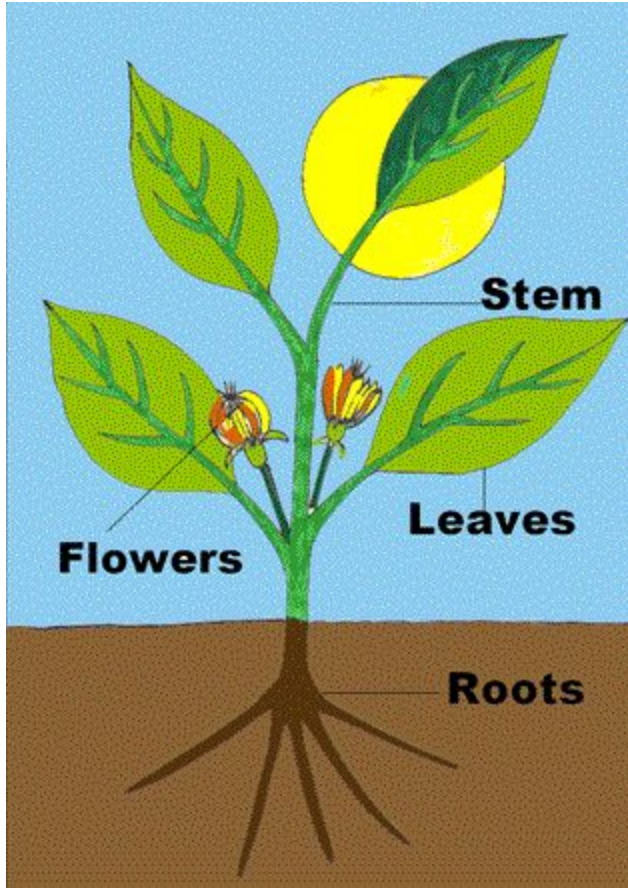
The **fruit** is the ripened ovary of the flower of a plant. Seeds are contained inside of the fruit. Many seeds can be eaten or also used to grow new plants. Humans enjoy eating the following fruits such as apples, strawberries, watermelons, and grapes, just to name a few.

Vegetables and fruits make up two of the five categories found on the USDA's MyPlate diagram. Each section is color coded and properly sized to help consumers quickly identify where each food item is categorized onto a plate setting. The vegetable section is green and is slightly larger than the red colored fruit section. The MyPlate graphic organizer can be found on the website [www.choosemyplate.gov](http://www.choosemyplate.gov) that was developed and maintained by USDA Center for Nutrition Policy and Promotion. In addition to vegetables and fruits, the MyPlate image also includes dairy, grains, and protein. Before sitting down to a meal at home or school, the MyPlate campaign can aid students in making better decisions about the foods they choose to eat.

## Procedures

### Activity 1: Plants = fruits and vegetables

1. Display the vegetables and fruits used in the *Motivator*. Emphasize that these fruits and vegetables are grown and harvested by farmers.
2. Display the [USDA's MyPlate diagram](#). Ask the following questions
  - "Where do these food items fit on the MyPlate diagram?" (*vegetables and fruits*)
  - "Why should we eat vegetables and fruits instead of candy bars or ice cream?"  
(*vegetables provide nutrients that help keep us healthy and keep the systems in our body working well. Vegetables can also help us fight disease and illness*)



3. Inform students that vegetables and

fruits are plants. Draw or show a picture of the common parts of a plant

- Note: The dry edible bean card that is part of the [Minnesota Agriculture in the Classroom commodity cards](#) is also a good sample.)

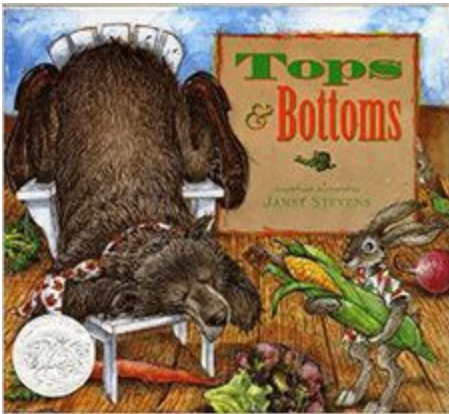
4. Help students understand the major purpose of each part:

- Roots – absorbs water and nutrients, anchors plant, transports nutrients, & stores food
- Stem – transports water and food
- Leaves – soaks up the sun's energy, makes food
- Flower – produces seeds
- Fruit – holds seeds



5. Go back to your display of vegetables and fruits. Ask for student volunteers or call on students to identify which part of the plant each vegetable or fruit represents. (Example: lettuce is a leaf, beets are roots, etc). Sort the vegetables and fruits into the five clear containers labeled with the major plant parts.
6. Ask the students how we get all of these different plant parts to eat. (*Farmers plant seeds, provide the seeds with water and sunlight, and the plants grow. Once the plants are fully grown they are picked or harvested. We can buy these plant parts at grocery stores, farmers markets or we can have a garden where we grow them ourselves.*)

### Activity 2: Plant Tops and Bottoms



1. Show students the book *Tops and Bottoms* by Janet Stevens. Tell students that this book is about a rabbit and a bear who decided to grow some plants to eat. The title is *Tops and Bottoms*. Ask the students:
  - "Which vegetables would be tops?" (*stems, leaves, flowers*)
  - "Which vegetables would be bottoms?" (*roots*)
2. Read the book *Tops and Bottoms*. At the conclusion of the book, ask the students:
  - "What are some plants that have good "bottoms" to eat?"
  - "What are some plants that have good "tops" to eat?"

- "What are some plants that have good “middles” to eat?"
  - "How is the Hare similar to farmers who grow plants that we eat?" (*The hare knows about the different parts of a plant and which ones we eat. He also knows how they should be grown and harvested.*)
  - "What lessons can we learn from the Bear?" (*He is not knowledgeable about plant parts so he does not get as much healthy and tasty food as the Hare. He is also lazy. The story suggests that laziness will harvest little.*)
  - "How do the decisions that the Hare and Bear make impact their lives?" (Listen to students observations!)
3. Have students complete the *Plant Parts We Eat worksheet*. This can serve as an assessment to determine the level of understanding the students gained on plant parts.

Vocabulary:

**fruit:** hold the seeds of a plant; examples include eggplant, tomatoes, pumpkins, squash, cucumbers

**flowers:** allow the plant to reproduce by producing seeds; edible examples include broccoli, cauliflower

**leaves:** soak up the sun's energy and produce food for the plant; examples include lettuce, cabbage, spinach, mustard greens, kale

**stems:** transport water and food throughout the plant; examples include asparagus, celery

**roots:** absorb water and anchor the plant; examples include radishes, beets, carrots, parsnips

Materials:

Variety of produce items (asparagus, strawberries, carrots, cabbage)

USDA's MyPlate Diagram

Picture of a plant (the [Dry Edible Bean Card](#) would be a good example)

Variety of vegetable and fruits that are roots, stems, leaves, flowers, and fruits. If actual vegetables and fruits are not available use pictures.

### **Activity Two**

- *Tops and Bottoms* by Janet Stevens
- *Plant Parts We Eat* worksheet

### **Essential Files (maps, charts, pictures, or documents)**

[Plant Parts We Eat](#)

Assessment:

At the conclusion of this activity, review and summarize the following key concepts:

- Roots, stems, leaves, flowers, and fruits of some plants are edible. These plant-based foods need soil, water, and sunlight to produce their delicious and healthy food items.
- Farmers grow and harvest vegetables and fruits for us to eat.
- Eating vegetables and fruits provide a healthy diet labeled on the MyPlate diagram.
- Some plants have edible tops, middles, and bottoms.

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