

# 1

## Plant Connections

### PURPOSE:

- To become familiar with some basic principles of plants and the plant kingdom.

### OBJECTIVES:

For youth to:

- describe how agriculture affects their lives.
- state an interesting fact about the plant world.
- list ways of naming and classifying plants.
- describe a plant's life cycle.
- identify plant parts and their functions.

### LESSON TIME:

- Lesson time may vary based upon learning activities selected. Most activities are approximately 45 minutes.

### ADVANCE PREPARATION:

- Read the BACKGROUND BASICS on What is a Plant?
- Review activities and choose appropriate one(s) to use.
- Collect and prepare materials for appropriate activities.

# What is a Plant?

## LEARNING ACTIVITIES

1. AGRICULTURE TODAY
2. WHAT'S MY NAME?
3. MY LIFE
4. VEGGIE RELAY
5. PARTS IS PARTS
6. PLANT FACTS

## DO

The following are suggestions for using the activities in Lesson 1. The materials needed for each are listed within the activity.

- Describe the impact that agriculture has on our lives with AGRICULTURE TODAY.
- Learn new and interesting facts about plants in PLANT FACTS!
- Explain the importance of using scientific names with WHAT'S MY NAME?
- Distinguish between annuals, biennials, and perennials in MY LIFE.
- Get some exercise and learn how to classify plants in the VEGGIE RELAY.
- Identify six common plant parts or structures in PARTS IS PARTS.

## REFLECT

After completing the activities in this lesson, help youth reflect on what they have learned with these key questions:

- What is agriculture?  
**the production and associated science of plants and animals to meet basic human needs**
- What does a botanist study?  
**plants and plant life**
- What are some ways we classify plants?  
**scientific botanical names, life cycle, growing season**
- What are some of the advantages of using a plant's scientific name?  
**there can be many common names for a single plant, but only one scientific name people all over the world use this same system**
- What is the difference between annuals, biennials, and perennials?  
**the length of a plant's life**
- What are six common plant parts or structures?  
**leaves, roots, stems, fruits, flowers, seeds**

## APPLY

After completing these activities, help youth learn to apply what they have learned. Have youth choose one or more to demonstrate their new knowledge and skills.

- Have youth list products they use daily and the agricultural crops associated with them.
- Have youth describe their favorite kind of pizza, then list the plants needed to make the pizza.
- Collect tree samples in your neighborhood and identify them using a tree identification field guide.
- Discuss and compare the life cycle of plants to the life cycle of humans.
- Visit a local farmers market and discover what fruits and vegetables are grown in your area.

# BACKGROUND BASICS...What Is A Plant?

Covering the earth is a green mantle of life called vegetation. From this lush growth of plants we obtain the food we eat, the clothes we wear, the homes we build, and even the oxygen we breathe. **Agriculture** and its associate sciences is responsible for the production and cultivation of plants and animals to meet these basic human needs. The gradual improvement in agricultural techniques has resulted in a dependable surplus of food and enabled individuals to develop religion, industry, language, art, and so forth. However agriculture has been around for a relatively short period of time. Scientists estimate that people have been on earth for 2.5 million years. Yet, humans have only been farming for 12,000 years. Let's put agriculture's short history into perspective: if 2.5 million years were equal to 24 hours, humans have been farming for just seven minutes. Yet, agriculture has been instrumental in the development of civilizations.

## What is a plant?

It is difficult to precisely define what a plant is, there are so many types and variations that even simple definitions have many exceptions. No single criteria separates all plants from all animals. The more complex plants and animals are, the easier it is to discern them from one another, but simpler forms are not so readily distinguishable. The following characteristics refer primarily to more complex plants and animals:

1. **Manufacture food** - Most plants manufacture their own food through the process of **photosynthesis**. Green plants have the ability to synthesize complex food from simple substances such as carbon dioxide, water, and minerals in the presence of **chlorophyll** (a green pigment) utilizing light energy. In contrast, animals require ready-made food in the form of plants or other animals.
2. **Cell walls** - Most plants have cell walls made of **cellulose**. The rigid cell walls create a sturdy framework which results in the lack of mobility. Animal cells, in general, lack rigid cell walls and are typically flexible.
3. **Indeterminate growth** - Most plants have unlimited (or indeterminate) growth. The **meristematic tissue** (tissue containing actively dividing cells) remains active as long as the plant lives and the environment is suitable. While plants can continue to grow, most plants will have some expected mature size and form. The situation is very different in the case of animals, after an animal attains a certain characteristic size and form, growth often ceases.



## Classifying plants

One of the goals of naming or classifying organisms is to provide each species with a unique name, thereby permitting easy and effective communication about organisms. The two basic types of plant categorization are known as natural and artificial classification systems. Artificial systems are used for basic plant identification while natural systems attempt to classify organisms according to their genetic and evolutionary relationships.

The **natural** system of classification attempts to categorize organisms according to their evolutionary relationships. **Taxonomists**, scientists who specialize in natural classification systems, have described over 400,000 different species of plants. Taxonomic groupings are devices that enable one to identify a specific organism. The largest groupings are called kingdoms, and the smallest are species (or, in some cases, subspecies or varieties). As we proceed from kingdoms into smaller categories, the plants in each category have more and more traits in common until they are so much alike that they can interbreed (these are species). The taxonomic hierarchy or taxon for classifying plants is: kingdom; division; class; order; family; genus; and species.

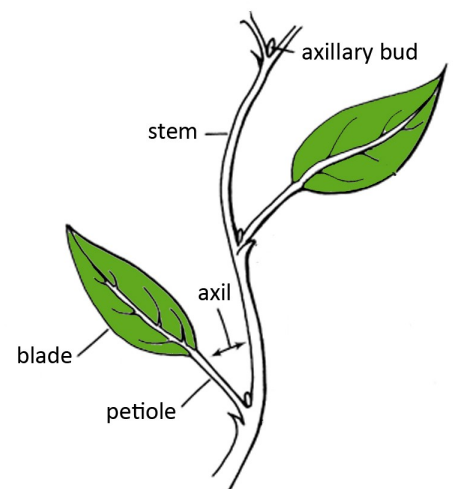
Another fundamental type of classification system is referred to as an **artificial** classification system. The goal of an artificial system is easy plant identification from observable plant characteristics such as flower color or plant habit. Artificial systems may also be used to group plants by economic or scientific features. From a practical standpoint, home gardeners may be more interested in grouping plants by their ability to tolerate shade or full sun rather than their evolution. Likewise, farmers classify crops according to their optimal growing temperature which can be broken down into warm and cool seasons plants. Examples of cool season crops are: asparagus, broccoli, cabbage, celery, garlic, leek, kale, onion, carrot, mustard, and white potato. Warm season crops include: cucumber, eggplant, melon, sweet potato, and tomato.

The classification of plants as annuals, biennials, or perennials is an example of an artificial system used by gardeners to identify plants. Gardeners know that once a seed germinates, its growth and development depends on its life cycle, as well as, surrounding environmental factors (temperature, nutrients, light, oxygen and carbon dioxide, and parasites or herbivores). In this system, plants are grouped into three kinds of life cycles: (1) **annuals** grow for one season only, producing seed then dying; (2) **biennials** grow vegetatively during the first season and do not produce seeds until the second year, after which they die; and (3) **perennials** have a life cycle of more than two years, with most producing seeds throughout their lifetime.

## The plant body

The principle structures of most plants are the leaves, stems, roots, flowers, and ultimately fruits and seeds. Identifying these structures and determining their function is important to maintaining and reproducing plants.

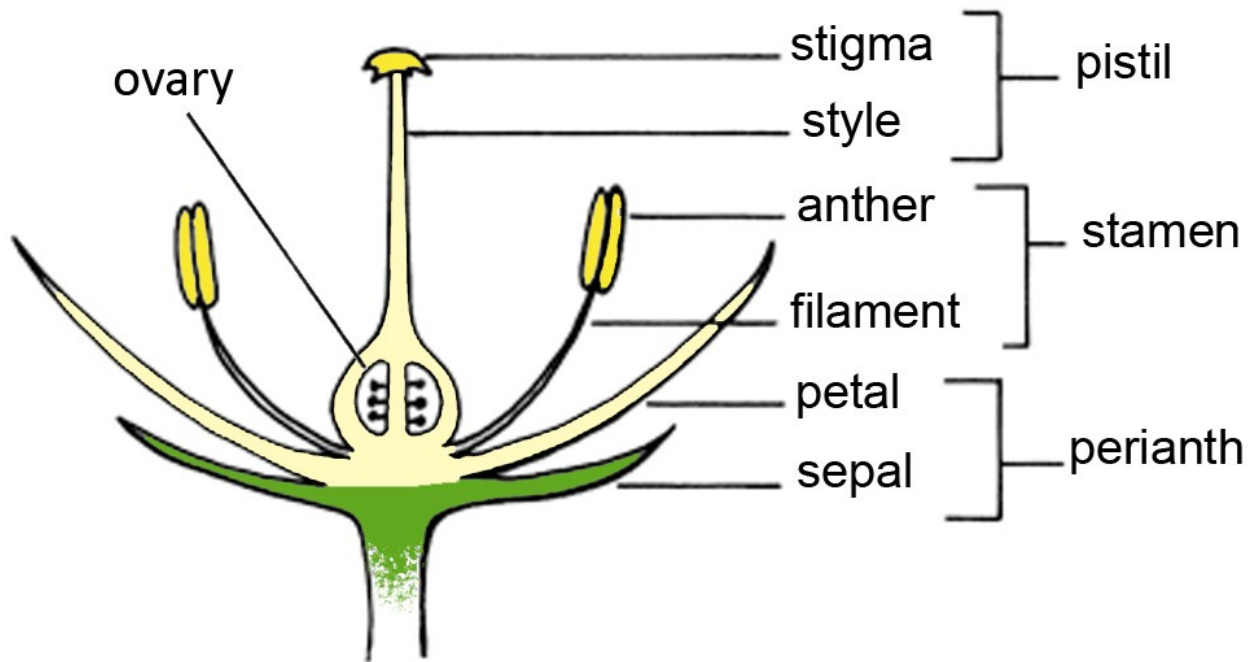
**Leaf** - Leaves are the most conspicuous part of the plant. A typical leaf is composed of a broad **blade** attached to a slender stalk or **petiole**, which attaches to the stem. At the base of the petiole, in the **axil** between the stem and the petiole is a bud called the **axillary bud**. Coursing through the petiole and extending into the leaf blade are veins which carry water and nutrients. The main function of a leaf is closely associated to the presence of **chlorophyll**, a green pigment which enables leaf cells to utilize light energy for the production of food in a process called **photosynthesis**.

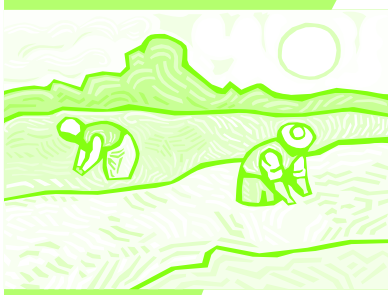


**Stem** - The stem is the continuation of the plant's axis typically found above the soil surface. Stems branch in a variety of ways resulting in a characteristic form. Stems function mainly in conducting water and minerals from the root to other parts of the plant and in conducting food materials from the leaves to the rest of the plant. Stems also serve as a support or frame for the plant and give rise to leaves.

**Root** - Roots are the underground portion of the plant. The two main functions of a root are anchorage for the plant and the absorption of water and minerals. They also serve as storage units for food used in future growth.

**Flower** - The flower is the reproductive structure of a plant. Flowers, like leaves, are quite variable. A flower containing both **stamens** (male reproductive structures) and **pistils** (female reproductive structures) are known as **perfect** flowers. A flower that lacks either stamens or pistils is called an **imperfect** flower. Fertilization occurs after pollen grains grow down the style (part of the pistil) and fuse with the egg located in the ovary. After fertilization of the egg, the ovary ripens into the **fruit** and the fertilized eggs develops into the **seed**.





# Activity 1: Agriculture Today

## OBJECTIVES:

For youth to:

- describe how agriculture affects their lives.
- identify local agriculturally related businesses and what they do.

## LIFE SKILL:

- Communicating and relating to others.
- Critical thinking

## MATERIALS:

- agriculturally related career opportunities in your community can be obtained from the County Extension Office or local farm service agency, (i.e. Farm Bureau)
- paper
- colored markers
- pens and pencils

## TIME:

- 30 minutes

## SETTING:

- A comfortable room with tables and chairs.

## INTRODUCTION

Agriculture is the production and associated science(s) of plants and animals to meet basic human needs. It is the largest industry in the United States. Many people think that agriculture means farming, but the majority of jobs related to agriculture have nothing to do with farming. For example, there are entomologists that study plant-insect relationships, scientists that develop new varieties of plants, and marketing specialists who design the packages that sell products. Here in Florida, agriculture is the second largest industry, next to tourism. Do you know what the number one single agricultural crop in Florida is? (Answer: Oranges) The largest agriculture industry, however, is horticulture ( includes nursery and greenhouse plants). Today, we're going to discuss how agriculture impacts our lives.

## DO

- Divide youth into six groups.
- Assign a 'crop to product' association to each group. The associations are: **1)** cotton to blue jeans; **2)** oranges to orange juice; **3)** apples to apple sauce; **4)** pine trees to lumber; **5)** cows to shoes; and **6)** wheat to bread.
- Have groups discuss and list the steps necessary for the crop to become the product.
- There are many possible scenarios for each 'crop to product' association. Encourage youth to be as detailed and creative as possible. For example, groups may choose to include the chemists who develop fertilizers used on crops to the store clerks that sell the products.
- Have each group draw a chart connecting the steps necessary for the crop to become the product and how they are connected.
- Have each group give a presentation on their 'crop to product' associations.

## REFLECT

What is agriculture?

**the production and associated science of plants and animals to meet basic human needs**

What is the largest agricultural crop in Florida?

**oranges**

What is the largest agricultural industry in Florida?

**horticulture—greenhouse and nursery production**

What is the largest industry in the United States?

**agriculture**

How many jobs were represented in your 'crop to product' associations?

**answers will vary**

Before doing this activity, had you ever thought about where we get the products that feed, clothe, and shelter us?

**answers will vary**

How did you like working in groups?

**answers will vary**

What were some of the advantages of working in groups? The disadvantages?

**answers will vary**

## APPLY

- Have youth list five products they use daily, and the agricultural crops (plants) associated with them.
- Can you name some agricultural crops that grow in your area?
- List examples of agriculture businesses in your community and discuss related career opportunities.
- Write to a local agriculturalist then visit their farm or business.



### Optional Activity

Have youth research current U.S. and Florida Ag Facts via the internet

**National Site:**

**<http://www.nass.usda.gov/>**

**Florida Web Resource:**

**<http://www.florida-agriculture.com/agfacts.htm>**



## Activity 2: Taxonomy

### OBJECTIVES:

For youth to:

- identify the different characteristics that are used for grouping and naming plants.
- determine common names of plants from their scientific names.
- explain the importance of using scientific names.

### LIFE SKILL:

- Acquiring, analyzing and using information.
- Critical thinking

### MATERIALS:

- copies of PLANT NAMES Activity sheet for each youth
- copies of TREE PUZZLER Activity sheet for each youth
- pens and pencils
- Tree identification field guides
- TREE SCRAMBLE activity,

### TIME:

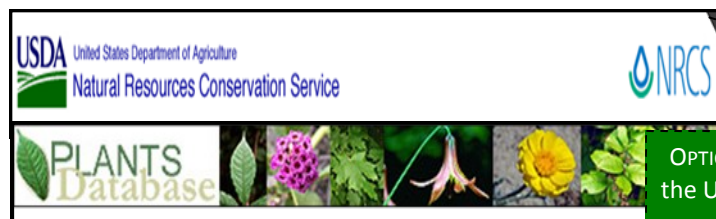
- 30 minutes

### SETTING:

- A comfortable room with tables and chairs.

### INTRODUCTION

We group plants into categories based on their characteristics and how we use them. For example: edible and non-edible; fruits and vegetables; poisonous and nonpoisonous; and terrestrial and aquatic plants. Can you think of some other ways plants are grouped? (Answers will vary, examples include: herbaceous and woody; deciduous and evergreen; and temperate and tropical plants.) Another way plants are grouped is by their scientific botanical name, which is based on the plant's structure and evolution. Taxonomists are responsible for naming species. Every kind (or species) of plant known to science has a scientific name consisting of two words. The first is the name of the genus to which a given species belongs, and the second is the species which describes the plant. Today, we'll learn more about this scientific classification system.



OPTIONAL ACTIVITY: Use the USDA Plant ID data base at: <http://plant.usda.gov>

### DO

- Give each youth a copy of the PLANT NAMES Activity sheet.
- Explain to the youth that the genus is capitalized, the species is not capitalized and the entire name is underlined or italicized.
- Have youth match the common plant names with the scientific name.
- When youth are finished, ask youth to pronounce the scientific names aloud.
- Have youth complete the TREE PUZZLER Activity sheet.
- When youth have finished (5 or 10 minutes), read the clues aloud and ask youth to fill in the missing species.



## REFLECT

What are some ways we classify plants?

**use, toxicity, where they grow, scientific name, plant (botanical) characteristics**

What do taxonomists do?

**classify and name species**

How many scientific names were you familiar with before the exercise?

**answers will vary**

If you were not familiar with scientific names, what clues did you use to match the common plant names with their scientific names?

**English words were derived from Latin**

What are some of the advantages of using a plant's scientific botanical name?

**Each plant has one and only one scientific name worldwide**

Why is it important for you to learn the scientific names of plants?

**answers will vary**

## APPLY

- Although they are hard to pronounce, what are some of the advantages of using Latin to name things?

**Latin is accepted worldwide as the technical language of scholars.**

**Latin is considered a "dead" language and not subject to change. Using one language to name plants helps to standardize identification techniques.**

- Do you know what your scientific name is?

***Homo sapiens***

- Imagine that you "found" a new species of plant. How would you go about naming it?
- Collect tree samples in your neighborhood and identify them using a tree identification field guide or key.
- Have youth unscramble common tree names with the TREE SCRAMBLE activity.
- Create leaf rubbings or other art project to display leaf structures of different trees .



*Leaf collages and placemats*

## Activity 3 Taxonomy Answers

### Plant Names

#### COMMON PLANT NAMES

asparagus  
cinnamon  
lemon  
coffee  
wild carrot  
sunflower  
black pepper  
wild rose  
sesame  
sorghum  
wild tulip  
vanilla

#### SCIENTIFIC PLANT NAMES

*Asparagus officinalis*  
*Cinnamomum zeylanicum*  
*Citrus limon*  
*Coffea arabica*  
*Daucus carota*  
*Helianthus* sp.\*  
*Piper nigrum*  
*Rosa arvensis*  
*Sesamum orientale* L.  
*Sorghum* Moench  
*Tulipa sylvestris*  
*Vanilla planifolia*

\* Sp: Sp is used when a specific species is unknown

**Tree Puzzler** Use the clues given on the right to match the species name with the genus:

#### CLUES

<i>Pinus echinata</i>	The bark on the twigs of the short leaved pine is rough and prickly.
<i>Carya aquatica</i>	The water hickory occurs mainly in drained river hammocks, floodplains, and natural levees.
<i>Pinus glabra</i>	The spruce pine occurs in mixed hardwoods and hammocks. The bark on young trees and small branches is smooth and dark gray.
<i>Magnolia grandiflora</i>	The southern magnolia is a large, handsome evergreen tree that grows in moist hammocks throughout northern Florida.
<i>Quercus falcata</i>	The leaves on the young southern red oak are characteristically 3-lobed at the top and sickle-shaped at the base.
<i>Myrica cerifera</i>	The southern bayberry is know for its aromatic leaves and waxy fruit on the twigs.
<i>Quercus alba</i>	The leaves of this oak are distinguished by their light gray or white lower surface.
<i>Ulmus alata</i>	The cork elm is a medium sized tree whose name is attributable to the wing like protrusions on either side of the twigs.

#### SPECIES

<i>alata</i> - winged	<i>echinata</i> - prickly	<i>alba</i> - white
<i>falcata</i> - sickle-shaped	<i>aquatica</i> - of the water	<i>glabra</i> - smooth
<i>cerifera</i> - wax-bearing	<i>grandiflora</i> - large, grand	

### Tree Scramble

What kind of tree am I?



1. MAGNOLIA



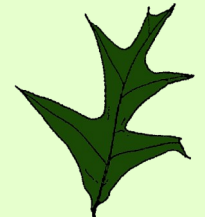
2. HOLLY



3. SWEETGUM



4. TULIP TREE



5. TURKEY OAK



6. RED MAPLE



7. PINE

# Plant Names

INSTRUCTIONS: Match the common names (use key below) to the scientific name.

COMMON PLANT NAMES

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

SCIENTIFIC PLANT NAMES

*Asparagus officinalis*

*Cinnamomum zeylanicum*

*Citrus limon*

*Coffea arabica*

*Daucus carota*

*Helianthus* sp.

*Piper nigrum*

*Rosa arvensis*

*Sesamum orientale* L.

*Sorghum* Moench

*Tulipa sylvestris*

*Vanilla planifolia*

## Clues to COMMON PLANT NAMES

asparagus

cinnamon

sesame

vanilla

black pepper

coffee

sorghum

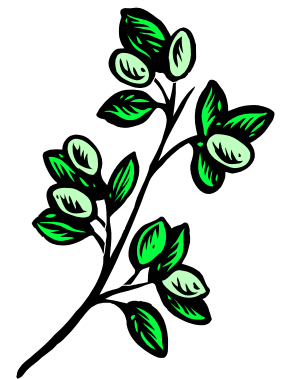
wild rose

carrot

lemon

sunflower

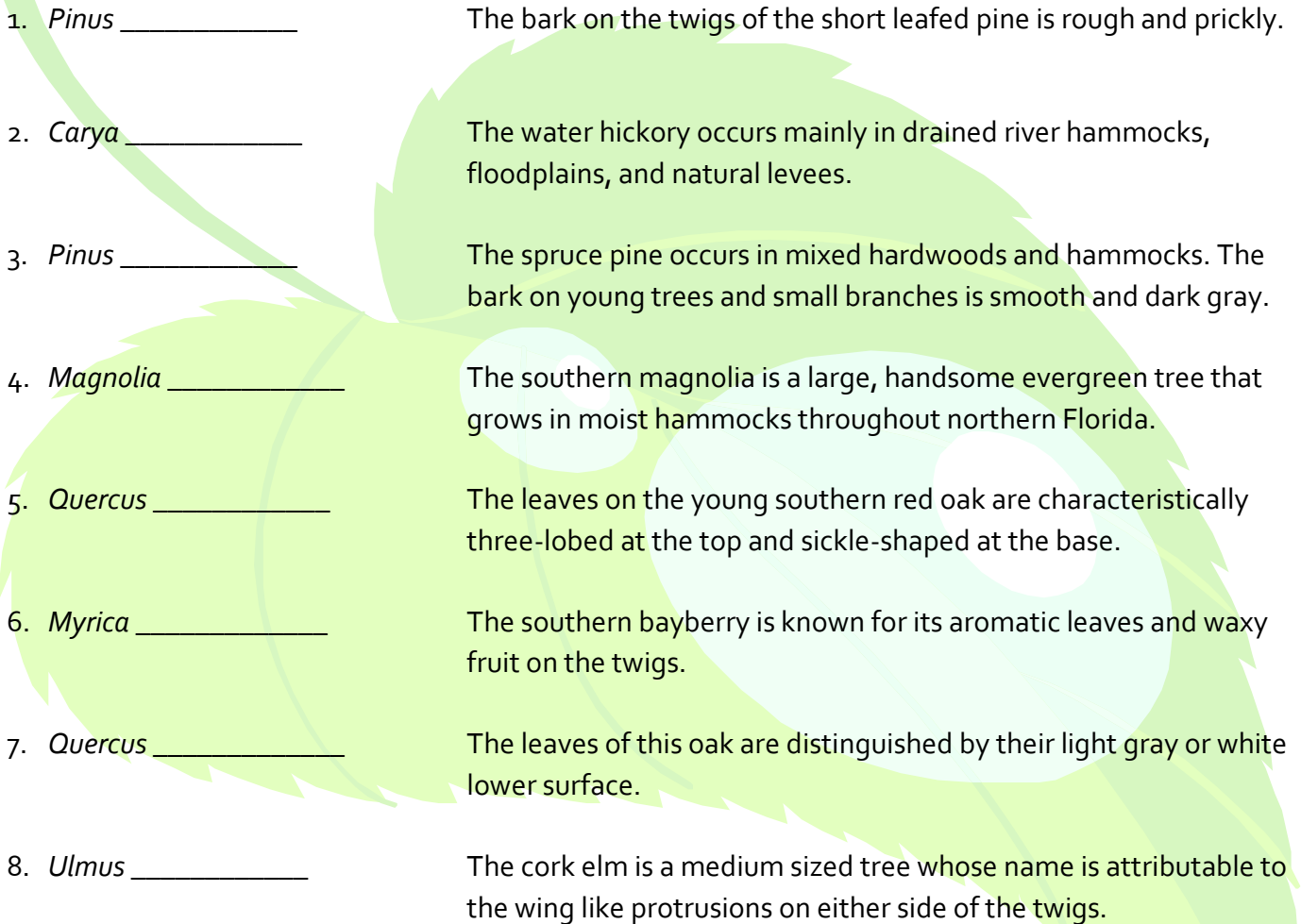
wild tulip



# Tree Puzzler

Use the clues given on the right to match the species name with the genus:

## CLUES

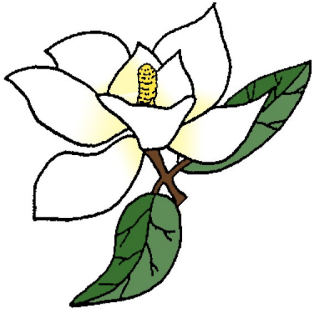
- 
1. *Pinus* \_\_\_\_\_ The bark on the twigs of the short leafed pine is rough and prickly.
  2. *Carya* \_\_\_\_\_ The water hickory occurs mainly in drained river hammocks, floodplains, and natural levees.
  3. *Pinus* \_\_\_\_\_ The spruce pine occurs in mixed hardwoods and hammocks. The bark on young trees and small branches is smooth and dark gray.
  4. *Magnolia* \_\_\_\_\_ The southern magnolia is a large, handsome evergreen tree that grows in moist hammocks throughout northern Florida.
  5. *Quercus* \_\_\_\_\_ The leaves on the young southern red oak are characteristically three-lobed at the top and sickle-shaped at the base.
  6. *Myrica* \_\_\_\_\_ The southern bayberry is known for its aromatic leaves and waxy fruit on the twigs.
  7. *Quercus* \_\_\_\_\_ The leaves of this oak are distinguished by their light gray or white lower surface.
  8. *Ulmus* \_\_\_\_\_ The cork elm is a medium sized tree whose name is attributable to the wing like protrusions on either side of the twigs.

## SPECIES

- |                                |                                   |
|--------------------------------|-----------------------------------|
| <i>alata</i> - winged          | <i>echinata</i> - prickly         |
| <i>alba</i> - white            | <i>falcata</i> - sickle-shaped    |
| <i>aquatica</i> - of the water | <i>glabra</i> - smooth            |
| <i>cerifera</i> - wax-bearing  | <i>grandiflora</i> - large, grand |

# Tree Scramble

What kind of tree do I come from?  
Unscramble the letters and you will have the answer!  
If you need help, refer to the word list at the bottom.



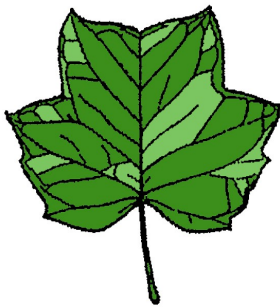
1. \_\_\_\_\_  
NOLIAGAM



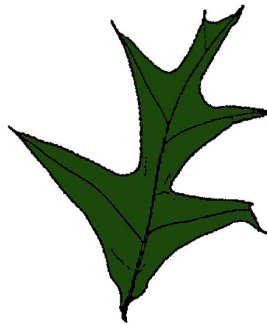
2. \_\_\_\_\_  
HLYOL



3. \_\_\_\_\_  
WETES MUG



4. \_\_\_\_\_  
UPTIL ETRE



5. \_\_\_\_\_  
TRKUEY OKA



6. \_\_\_\_\_  
DRE MPALE



7. \_\_\_\_\_  
EPNI



### OBJECTIVES:

For youth to:

- describe a plant's life cycle.
- distinguish between annuals, biennials, and perennials.
- give examples of annuals, biennials, and perennials.

### LIFE SKILL:

- Problem solving and decision making.

### MATERIALS:

- MY LIFE activity sheet
- five to ten nursery and seed catalogues
- list of common annuals, biennials, and perennials in your community (can be obtained from the County Extension Office or local nursery)
- poster paper
- pens and pencils

### TIME:

- 45 minutes

### SETTING:

- A comfortable room with tables and chairs.

## Activity 3: My Life

### INTRODUCTION

The life cycle of a plant refers to the length of a plant's life. Plants that are classified according to their life span generally fall into three groups: annuals, biennials, and perennials. Annuals are plants that germinate from seed, mature, flower, and produce seeds in one growing season. Some familiar annuals are marigolds, petunias, and spinach. Biennials are plants that complete their life cycle in two growing seasons. Did you know that cabbages and beets are biennials? In Florida, cabbages are planted in the fall and winter, this is their first growing season, during which they produce leaves, stems, and roots, at this point we harvest them for food. If we left the cabbages in the ground until spring, their second growing season, they would produce flowers and seeds and then the plant would die. Perennials are plants that live for more than two growing seasons. Examples of perennials are apple trees, roses, and maple trees. Can you give examples of other perennials? In this activity we will classify common plants according to their life cycles.

### DO

- Hand out copies of MY LIFE diagrams and pencils to each youth.
- Have youth identify and label each life cycle diagram.
- Review the MY LIFE Work activity with youth.
- Divide youth into three groups.
- Assign a plant life cycle category to each group: annual, biennial, or perennial.
- Have groups cut pictures of plants from nursery and seed catalogues based on the category they were assigned.
- Have each group make a poster displaying their assigned life cycle along with the plants cut from the magazines.
- Have each group present their posters and explain their choice of plants.

## REFLECT

What is the difference between annuals, biennials, and perennials?

**the length of a plant's life**

How did you know that a specific plant fit in your category?

**past observation, seed catalogues or researched the plant**

How long does it take for a biennial plant to produce its seed?

**2 growing seasons**

Give an example of an annual, biennial, and perennial plant.

**annuals: marigold, petunia, pansy**

**biennials: cabbage, beet, hollyhock, broccoli**

**perennials: daffodil, strawberry, oak, maple**

What were some of the problems you ran into while searching for pictures of annuals, biennials and perennials?

**answers will vary**

Besides using a seed catalog or an identification key how would you determine a plant's life cycle?

**grow the plant and keep records on the plants growth**

What are some ways we classify plants?

**use, toxicity, where they grow, scientific name, plant (botanical) characteristics**

## APPLY

- Make a list of the fruits and vegetables grown in your area or a home garden, classify them as annuals, biennials, or perennials.
- Prepare an illustrated talk on the differences between annuals, biennials, and perennials. Present your talk at a county event.
- Use on-line nursery catalogs to research, print and create exhibit boards of plants and their life cycles.
- Discuss and compare the life cycle of plants to the life cycle of humans.

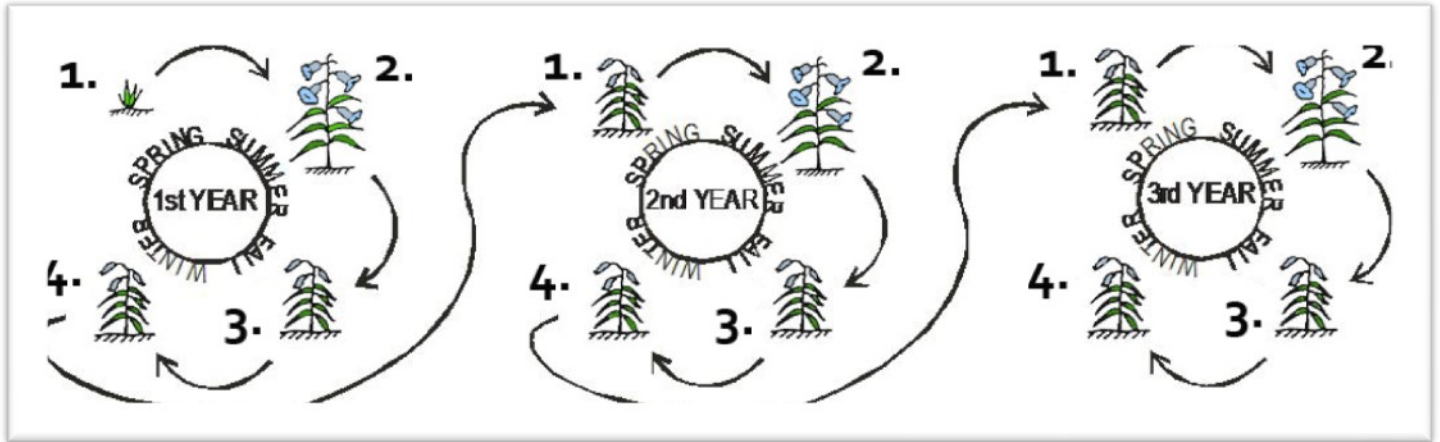


Check out this web-based program from the University of Illinois Extension Plant Science Project at: <http://urbanext.illinois.edu/gpe/case1/c1facts1b.html>

Case 1 introduces youth to plant life cycles.

# My Life

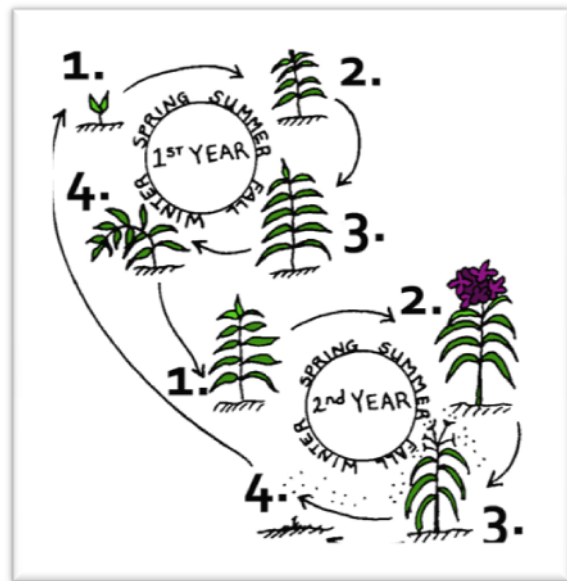
Identify each life cycle diagram below by labeling it Annual, Biennial, or Perennial and explain its characteristics.



1. \_\_\_\_\_  
Characteristics:



2. \_\_\_\_\_  
Characteristics:



3. \_\_\_\_\_  
Characteristics:





## Activity 4: Veggie Relay

### OBJECTIVES:

For youth to:

- give examples of ways to classify plants.
- predict which plants grow in cool and warm weather.
- identify warm and cool season fruits and vegetables in your area.

### LIFE SKILL:

- Problem solving and decision making.

### MATERIALS:

- 10-15 nursery and seed catalogues with pictures of cool and warm season produce (on-line catalogs are also available)
- 2 paper bags
- 2 boxes labeled warm season
- 2 boxes labeled cool season
- scissors
- tape

### TIME:

- 30 to 45 minutes

### SETTING:

- A comfortable room with tables and chairs.
- Outdoors where youth have running room.

### INTRODUCTION

Can you solve this riddle? Botanists refer to this plant as *Solanum lycopersicon* ( se LAN em lie-ko-PER-si-kon ), home gardeners know this plant as a tender perennial, cooks use its fruit in pasta sauces, and growers call this a warm season crop. What plant are we talking about? (Answer: tomato). How did the botanist, gardener, cook, and grower classify the tomato plant? (botanist - scientific botanical name; gardener - life cycle; cook - type of fruit used in cooking; grower - growing season) Can you think of other ways plants are classified or grouped? (the plants use, plant part used for food) Today we are going to learn how growers classify crops according to growing temperatures. In this classification scheme plants are referred to as either cool or warm season crops

### DO

- Divide youth into small groups of 2-3 youth. Have groups brainstorm lists of potential warm and cool season fruits and vegetables. Then merge these groups with another group to compare and contrast their lists. Have them come to consensus with one merged list of warm and cool season plants. Now, repeat this 1-2 times, merging groups until you have the total group into two large groups with combined lists. Have groups post their lists for the class to see.
- Have teams research plants on their lists to determine how accurate their predictions were of warm/cool season plants.
- Once they have checked their lists, have youth print/cut pictures of fruits and vegetables from on-line nursery and seed catalogues.

Examples of cool season crops are lettuce, asparagus, broccoli, cabbage, celery, kale, and garlic.

Some warm season crops include cucumber, eggplant, tomato, melons, summer squash, and sweet corn.

## DO (continued)

- Mark each group's pictures with a colored pen or marker and place them in the group's bag.
- Move outdoors to a grassy field or area about 30 yards long where youth can run.
- Place a paper bag for each group at one end of the field and two boxes labeled warm season and cool season halfway between the paper bag and the starting line.
- Have groups gather behind their starting line then explain the rules.
  - ◇ The first youth in each group runs (walks, hops, skips) to the paper bag and takes one picture (fruit or vegetable) from the bag.
  - ◇ That youth will run (walk, hop, skip) back to the boxes marked warm season and cool season and place the picture into the correct box.
  - ◇ When the first youth returns he/she will tag the next youth in line.
  - ◇ Repeat the activity until each group member has had a turn.
- The group with the most fruits and vegetables in the correct boxes, wins.
- Go over correct answers with the youth.

## REFLECT

What are some ways we classify plants?

**botanical classification, life cycle, growing season**

Which vegetables are grown in cool seasons? Warm?

**cool - beets, broccoli, cabbage, carrots, cauliflower, celery, collards, kale, lettuce, mustard, onions, parsley, radish, spinach, strawberries, turnips**

**warm - beans, cantaloupes, sweet corn, cucumbers, eggplant, okra, peas, peppers, summer squash, tomatoes, watermelons**

## REFLECT (continued)

Which vegetable surprised you the most?

**answers will vary**

How did you decide what box to put a fruit or vegetable in?

**answers will vary**

What season is your favorite vegetable grown in?

**answers will vary**

Why is it important for a farmer to know the growing temperature of his/her crop?

**so they don't plant out of season and lose the crop**

## APPLY

- What fruits and vegetables are grown in your area? Are they warm or cool-season crops?
- Conduct a relay based on the part of the crop that is eaten or the plant's life cycle.
- Visit a local farmers market and make a list of what is in season.
- If tomatoes are a warm season crop, why can we get them in the grocery stores in December and January?
- Have groups create a warm/cool season collage or poster with their cut pictures.



## Activity 5: Parts is Parts

### OBJECTIVES:

For youth to:

- identify six common plant parts or structures.
- list the different functions of plant parts.
- give examples of plant parts that are eaten.

### LIFE SKILL:

- Communicating and relating to others.

### MATERIALS:

- FORBIDDEN PLANTS game card for each youth
- stop watch for each group
- pens or pencils
- copies of PLANT PARTS SCAVENGER HUNT Activity sheet for each youth

### TIME:

- 45 minutes

### SETTING:

- A comfortable room with tables and chairs.

### ADVANCE PREPARATION:

- Copy the FORBIDDEN PLANTS game sheets, paste onto construction paper and cut into cards.

### INTRODUCTION

The structures common to most plants are the leaves, stems, roots, flowers, fruits, and seeds. Each of these structures has a function that is necessary to the survival of the plant. For example, the main function of a leaf is to produce food for the plant. Stems support leaves, flowers and fruits, and transport water and nutrients through the plant. Can you tell me what the main function of plant roots are? (Answer: absorb water and nutrients, store nutrients, and anchor the plant). What about flowers, fruits, and seeds? (Answer: reproductive structures of the plant) Today, we're going to play a game called FORBIDDEN PLANTS, where you will guess plant names, structures, and functions based on clues given by your teammates.

### DO

- Divide youth into three groups.
- Give each group member one FORBIDDEN PLANTS game card. (This game is similar to the popular game called Taboo.)
- Have youth privately review their cards without showing other group members.
- Explain that the object of FORBIDDEN PLANTS is for group members to guess the word (in bold) at the top of the card. Each youth must give word clues to their own groups without saying the word (in bold) or the clues below the word.
- One member of the group should time how long it takes for the group to guess each word. The group taking the least amount of time to guess all the words are the FORBIDDEN PLANTS champs.
- If a group member accidentally says one of the clue words add 15 seconds to the final group score.
- To extend game time, have teams switch game cards and start again.

## REFLECT

Can you name six common plant parts or structures?

**seeds, flowers, fruit, stems, roots, and leaves**

What is the function of a leaf, stem, root system, seed, flower, or fruit?

- leaves produce food
- stems support leaves and transport water and nutrients: store food
- roots anchor the plant ;absorbs water, transports dissolved nutrients; stores food
- flowers, fruit, and seed are reproductive structures

What are some examples of different plant parts? Which ones do we eat?

**answers will vary**

Which words were the most difficult to communicate to your groups?

**answers will vary**

What are some of the clues you gave the group when you described a particularly difficult word?

**answers will vary**

Using word clues, how would you describe yourself?

**answers will vary**

## APPLY

- Take-home Assignment: Have youth fill out PLANT PART SCANVENER HUNT Activity sheet.
  - What kind of plant parts do you find in your house?
  - What kinds of seeds are in your kitchen? Check the spice rack!
  - What plant parts did you eat today and last night?

# Forbidden Plants

## Game Cards

**SEED**  
EGG  
EMBRYO  
FRUIT  
SMALL/LITTLE

**BANANA**  
YELLOW  
MONKEY  
PEEL  
FRUIT

**CELERY**  
STALK  
STEM  
GREEN  
CRUNCHY

**FRUIT**  
SEED  
SNACK  
REPRODUCTION  
TYPES OF FRUIT  
(i.e. APPLES)

**ROOT**  
ANCHOR/SUPPORT  
UNDER-GROUND  
CARROT  
SOIL/DIRT

**SOIL**  
DIRT  
GROUND  
BROWN  
ROOTS

**PETAL**  
FLOWER  
ROSE  
SMELL  
COLOR

**CARROT**  
ORANGE  
RABBIT  
ROOT  
CELERY

**ANNUAL**  
ONE  
YEAR  
SEASON  
CYCLE

**HERB**  
BASIL  
SPICE  
SEASONING  
OREGANO

**TREE**  
OAK  
TALL  
SHADE  
WOODY

**PECAN**  
TREE  
NUT  
PIE  
WALNUT

# Forbidden Plants

## PHOTOSYNTHESIS

LEAF  
FOOD  
GREEN  
SUNLIGHT

## ROSE

FLOWER  
SMELL  
BUD  
DOZEN

## COMPOST

BREAKDOWN  
ORGANIC MATTER  
WORMS  
PROCESS

## POLLINATION

BEE  
HONEY  
REPRODUCTION  
POLLEN

## LIFE CYCLE

ANNUAL  
BIENNIAL  
PERENNIAL  
GROWTH

## NUTRIENT

FOOD  
NITROGEN  
FERTILIZER  
SOIL

## LETTUCE

SALAD  
GREEN  
LEAF  
BAR

## AGRICULTURE

GROW  
CROP  
FOOD  
FARMER

## ORANGE

ORANGE  
FRUIT  
CITRUS  
JUICE

## APPLE

FRUIT  
RED  
SAUCE  
EAT

## HYDROPONICS

SOILLESS  
DIRT  
SOLUTION  
WATER

## ENTOMOLOGY

INSECTS  
BUGS  
STUDY PESTS

## MUSHROOM

FUNGI  
SALAD  
BROWN  
SPORES

## FERTILIZER

NITROGEN  
N-P-K  
NUTRIENT  
PLANT

## EVERGREEN

PINE  
TREE  
DECIDUOUS  
LEAVES

# Plant Part Scavenger Hunt

Instructions: Plant parts are used in a variety of things we may find common around our homes. Can you identify examples of things around your house that are plant parts.

- Product: Cotton socks
- Plant and Part: Name the plant and its plant part you think the product comes from (ex. Cotton plant-cotton boll, which is the fruit of the cotton plant.
- Function/Use: the cotton fibers are used to make the cotton yarn knitted for my socks.



## SEEDS

Product:

Plant and Part:

Function/Use:

## LEAVES

Product:

Plant and Part:

Function/Use:

## ROOTS

Product:

Plant and Part:

Function/Use:



# *Plant Part Scavenger Hunt*

## **FLOWERS**

Product:

Plant and Part:

Function/Use:

## **STEMS**

Product:

Plant and Part:

Function/Use:

## **FRUIT**

Product:

Plant and Part:

Function/Use:

*Hint: Don't forget to check the  
Spice Rack in the Kitchen!*





### OBJECTIVES:

For youth to:

- discover the world of plants.
- give examples of different kinds of plants.
- describe an interesting fact about the plant world.

### LIFE SKILL:

- Teamwork

### MATERIALS:

- PLANT FACTS trivia questions
- PLANT FACTS flower pieces: stems, leaves, petals, and button for each group
- colored paper for the flower pieces
- construction paper
- glue
- paper for each youth
- pens and pencils

### TIME:

- 45 minutes

### SETTING:

- A comfortable room with tables and chairs.

### ADVANCE PREPARATION:

- Using the FLOWER TEMPLATE, cut green paper for stems and leaves.
- Cut colored paper into petals.

# Activity 6: Plant Facts

## INTRODUCTION

Did you know that there are over 400,000 different kinds of plants? These plants range in size from microscopic algae to gigantic seaweeds and California redwoods. Plants live on both land and in the sea. Some familiar categories of plants are trees, shrubs, ferns and grasses. Some of the lesser known plant categories include algae, stoneworts and mosses. There is such a great variety of plants that they can be found in any environment that will support life. They are found in the hottest, driest deserts to the cold arctic. Although there is great diversity among plants, there are also some common features. For instance, green plants make their own food through a process called photosynthesis. Let's see how much you already know about plants.

## DO

- Divide youth into five groups.
- Give each group a green stem. Choose a member from each group to glue the stem onto a piece of construction paper. Each time the group receives a new flower piece, select a different member to glue it to the flower.
- Each group will attempt to answer questions from the PLANT FACTS trivia categories. The five categories are:
  1. vegetables and fruits;
  2. soil;
  3. plant structure;
  4. general; and
  5. bonus. (Do not use the PLANT FACTS bonus category until a group has received all its petals and leaves.)
- Ask group #1 a PLANT FACTS trivia question. If necessary, give the group several minutes to discuss the question and respond.

## DO (continued)

If the question is answered correctly the group will receive a petal or leaf.

- Repeat with groups #2 through #5 using different PLANT FACTS questions from the same category. When all the questions from each category have been asked move to the next category.
- After a group has received all four petals and two leaves they will try to answer a PLANT FACTS bonus question. If the question is answered correctly the group will receive a button for the center of the flower.

Be sure to complete all PLANT FACTS Questions before finishing this activity.

## REFLECT

Did anyone person in your group know all the answers?

How did working as a team help you become more successful?

What were some of the things you did not know?

During this Plants project you will be introduced to many of these concepts. For now, let's review what you recall from the game:

Can you name examples of different ways to classify plants?

**Artificial systems (ex. tree, vine, shrub or herb or annuals, biennials, perennials or warm/cool season plants)**

**Natural systems (ex. kingdoms, genus, species)**

What does a botanist study?

**plants and plant life**

What is the process that green plants use to make their own food?

**Photosynthesis**

What is a weed?

**any plant growing in an undesirable or unwanted location**

## REFLECT (continued)

What are three distinct parts of most plants?

**roots, stems, leaves**

What new plant fact did you learn today?

**answers will vary**

Which plant fact surprised you?

**answers will vary**

Why are these facts important to know?

**answers will vary**

## APPLY

- Have the youth list three different plant parts and indicate how each of them may be useful to humans. These are not necessarily from the same plant.
- Have youth list how they used a plant today.
- Have youth describe their favorite kind of pizza, then list the plants needed to make the pizza.
- Discuss the following statement: "A rose is a rose, only if it is not a weed".



# **PLANT FACTS:**

## ***Vegetables and Fruits***



This game has some items that are listed elsewhere in the book so you may still have to do additional research if not familiar with plants.

A plant or plant product that can be grown and harvested extensively for profit or nourishment is called a \_\_\_\_.

- crop
- vegetable
- food

**Answer: crop**

True or False: Agronomists study how crop quality and production can be improved?

**Answer: True**

Today, in the United States, one farmer produces enough food for approximately \_\_\_\_.

- 10 people
- 50 people
- 100 people

**Answer: 100 people**

Double cropping, raised beds and wide rows are all ways to \_\_\_\_.

- plant a garden
- harvest vegetables
- fertilize a garden

**Answer: plant a garden**

Iceberg, buttercrunch and bibb are varieties of \_\_\_\_.

- beans
- celery
- lettuce

**Answer: lettuce**

Beets, broccoli, peas, and radishes are considered \_\_\_\_ vegetables.

- cool-season
- warm-season

**Answer: cool-season**

Hamlin, navel and Ambersweet are varieties of \_\_\_\_.

- grapefruit
- peaches
- oranges

**Answer: oranges**

True or False: Sweet corn is a member of the grass family.

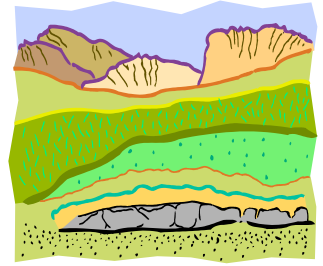
**Answer: True**

True or False: Olericulture is the branch of horticultural science involving the production of fruits and nuts.

**Answer: False, production of vegetables**

# PLANT FACTS:

## Soil



True or False: Soil is formed from the breakdown of rock into smaller particles through the actions of heat, cold, water, wind and organisms.

**Answer: True**

Which is the smaller soil type?

- silt
- sand
- clay

**Answer: clay**

Which type of soil holds more water?

- sand
- clay
- silt

**Answer: clay**

The term used to describe partially decomposed plant and animal materials is \_\_\_\_\_.

- soil structure
- organic matter
- physical properties

**Answer: organic matter**

True or False: A soil profile is a horizontal section of soil exposing its various layers.

**Answer: False, a vertical section**

Wearing away of the earth's surface by the forces of wind and water is called \_\_\_\_\_.

- excavation
- erosion
- drainage

**Answer: erosion**

\_\_\_\_\_ is a natural process which occurs on the forest floor and other places where bacteria, fungi, worms, and other organisms break down organic matter.

- Erosion
- Decomposition
- Mulching

**Answer: Decomposition**

Vermiculite and perlite are types of soil-less \_\_\_\_\_.

- structure
- media
- texture

**Answer: media**

True or False: Fertigation is the application of fertilizer through an irrigation system.

**Answer: True**

# PLANT FACTS:

## Plant Structure



Sepals, anthers, style and pollen are all parts of a \_\_\_\_.

- seed
- flower
- fruit

**Answer: flower**

The food-making process of green plants is called?

**Answer: photosynthesis**

The process by which the plant seed starts to grow is called \_\_\_\_\_.

- germination
- seedling
- cultivation

**Answer: germination**

True or False: Water, light, climate, temperature, animals and diseases are all factors in plant growth?

**Answer: True**

Nutrient storage, uptake and anchorage are all functions of plant \_\_\_\_.

- roots
- stems
- leaves

**Answer: roots**

The correct order of a plants life cycle is \_\_\_\_\_.

- seed, sprout, seedling, plant and flower
- sprout, seed, seedling, plant and flower
- flower, seed, seedling, sprout and plant

**Answer: seed, sprout, seedling, plant and flower**

Lenticels, bud scale scars and leaf scars are all part of a \_\_\_\_.

- stem
- leaf
- flower

**Answer: stem**

True or False: Stolons, corms, and bulbs are types of roots.

**Answer: False: modified stems**

True or False: The surface of some leaves are waxy to prevent oxygen loss.

**Answer: False, prevent water loss**

# PLANT FACTS:

## General



Adding plant nutrients to help plants grow better is called \_\_\_\_\_.  
fertilization  
nitrification

**Answer: fertilization**

Which chemical category is used to control weeds?  
fungicide  
herbicide  
insecticide

**Answer: herbicide**

The science and art of growing fruits, vegetables, flowers and ornamental plants is called \_\_\_\_\_.  
agriculture  
horticulture  
landscaping

**Answer: horticulture**

True or False: Measuring soil pH is a method of determining soil temperature.  
**Answer: False, acidity or alkalinity**

Catnip, rosemary and horehound are examples of \_\_\_\_\_.  
weeds  
herbs  
vegetables

**Answer: herbs**

\_\_\_\_\_ refers to process of growing plants without soil.  
Culture  
Germination  
Hydroponics

**Answer: Hydroponics**

True or False: Carrots, beets, radishes and sweet potatoes all have edible roots.  
**Answer: True**

True or False: Integrated pest management or IPM is a pest management strategy that uses high levels of pesticides to eradicate insects.

**Answer: False, IPM uses a combination of measures to reduce pest damage with the least disruption to the environment. Pesticides are used as the last method.**

\_\_\_\_\_ is the art of dwarfing and shaping trees and shrubs in shallow containers by pruning and controlling fertilization.

Ikenobo  
Floriculture  
Bonsai

**Answer: Bonsai**



## PLANT FACTS: Bonus



If a soil's pH is 3.5 then the soil is:  
acidic  
basic

**Answer: acidic**

\_\_\_\_ grow for one season, producing their seeds and then die,  
while \_\_\_\_\_ grow for several years, producing a new crop of seeds each year.  
Biennials, annuals  
Annuals, perennials  
Perennials, biennials

**Answer: Annuals, perennials**

True or False: A plant pathogen is an organism which causes disease in plants.

**Answer: True**

True or False: A weed is any plant that is growing in an unwanted or undesirable place.

**Answer: True**

True or False: Most of the world's food comes from 3 crops: wheat, rice and corn.

**Answer: True**

A general-purpose fertilizer contains large amounts of which three primary macronutrients:  
nitrogen, phosphorus, potassium  
carbon, nitrogen, oxygen  
calcium, nitrogen, potassium

**Answer: nitrogen, phosphorus, potassium**

Plant pathologists use a disease triangle to help them explain the relationship between \_\_\_\_\_.

disease causing organisms, the plant and the environment  
plants, nutrition and diseases  
production, life cycle and drought

**Answer: disease causing organisms, the plant and the environment. All three must be favorable for a disease to occur.**

True or False: Pollination occurs when pollen is transferred from the female part of the flower to the male part of the same or different flowers.

**Answer: False, transferred from male to female**

True or False: Cordate, ovate, and wedge are terms used to describe the leaf margin.

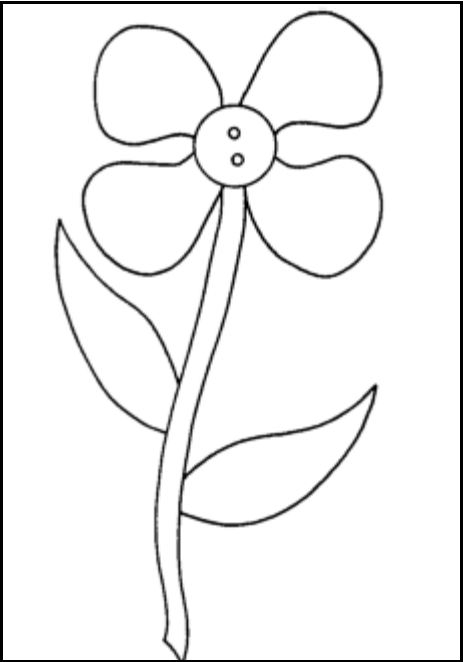
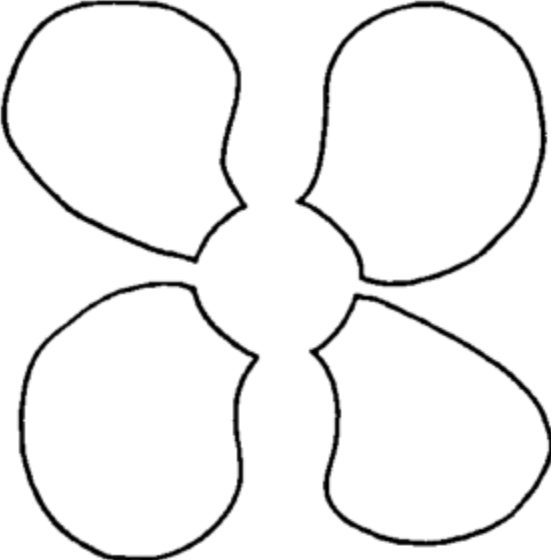
**Answer: False, leaf shapes**

Biennials are plants that complete their life cycle in \_\_\_\_ growing seasons.

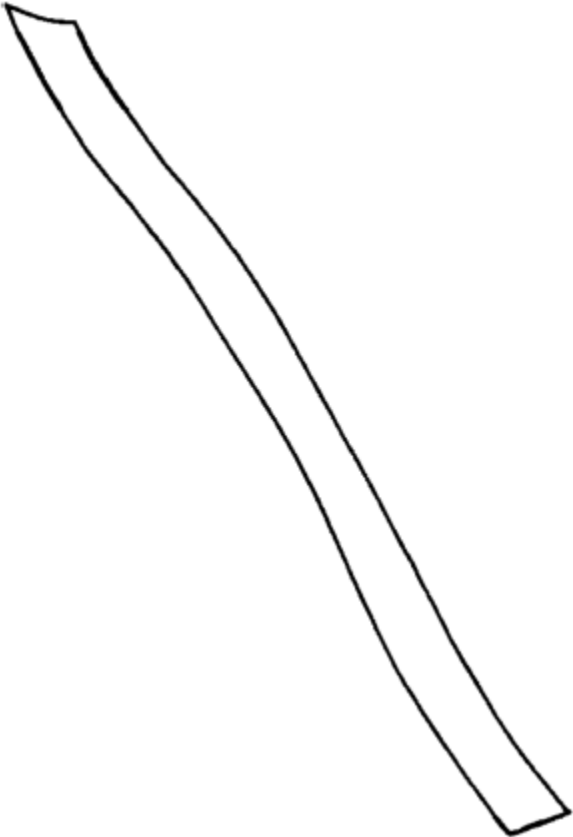
one  
two  
three

**Answer: two**

# Flower Template



Sample Flower



## *CREDITS AND ACKNOWLEDGMENTS*

**4-H PLANT CONNECTIONS** was developed through a team effort of the Department of Family, Youth and Community Sciences, Institute of Food and Agricultural Sciences, The Florida 4-H Youth Development Office and the Departments of Horticultural Sciences and Environmental Horticulture, University of Florida. Original publication date May 1997. Revised January 2015.

The curriculum package was originally created by Janice Easton, Alachua County Extension Service, and Deborah J. Glauer, Extension Youth Development Specialist and Plant Science Design Team Leader, Department of Family, Youth and Community Sciences. Additional assistance was provided by Christy Poole and Lynne Schreiber, project assistants. Technical review and assistance was provided by the following members of the Cooperative Extension Service Plant Science Curriculum Design Team (FL 712): Dr. Robert Black, Associate Professor, Department of Environmental Horticulture; Dr. Jeffery Williamson, Associate Professor, Department of Horticultural Sciences; Mr. Jim Stephens, Professor, Department of Horticultural Sciences; Dr. Joy Cantrell Jordan, Associate Professor and 4-H Youth Development Curriculum Specialist; Ray Zerba, Clay County Extension Horticulture Agent; Linda Landrum, Volusia County Extension Horticulture Agent; Charles Fedunak, Lake County Extension Horticulture Agent; Bob Renner, Marion County Extension 4-H Agent; Cindy Higgins, Columbia County Extension 4-H Agent; and David Dinkens, Bradford County Extension Director.

Reviews and revisions were completed by Dr. Sydney Park Brown, Associate Professor, Environmental Horticulture; Norma Samuel, Urban Horticulture-Agent II, Marion County; Dr. Paula Davis, 4-H Youth Development-Agent III, Bay County; and Dr. Joy C. Jordan, Associate Professor, Department of Family, Youth and Community Sciences.

Special thanks to reviewers: Dana Venrick, Extension Horticulture Agent, Volusia County; Heather Kent, NW Regional Specialized 4-H Agent; John Lily, 4-H Agent, Jefferson County; Janet Psikogios, 4-H/OMK Regional Coordinator, Bay County; and Jean Rogalsky, 4-H Agent, Pinellas County.

The use of any trade names in this publication is solely for the purpose of providing specific information. It is not a guarantee, warranty, or endorsement of the products named and does not signify that they are approved to the exclusion of others.



The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. For more information on obtaining other UF/IFAS Extension publications, contact your county's UF/IFAS Extension office.

U.S. Department of Agriculture, UF/IFAS Extension Service, University of Florida, IFAS, Florida A & M University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Nick T. Place, dean for UF/IFAS Extension.