

BOTANY, PLANT PHYSIOLOGY AND PLANT GROWTH

Lesson 6: PLANT PARTS AND FUNCTIONS

Flowers and Fruit

PART 4

I. LESSON DESCRIPTION

Students attend a presentation on plant roots, flowers, and fruits and seeds; then participate in classroom team activity to quiz their knowledge of roots, to identify flower parts, and to identify seed parts. *Estimated time requirement for this lesson is 55 minutes.*

Curriculum Standards: Minnesota Academic Standards in Science, Minnesota Department of Education, 5-24-10, Grades 9-12:

- 9.4.1.2.4 “Explain the function and importance of cell organelles for prokaryotic and/or eukaryotic cells as related to the basic cell processes of respiration, photosynthesis, protein synthesis and cell reproduction.”

National Agriculture, Food and Natural Resources (AFNR) Career Cluster Content Standards, National Council for Agricultural Education, 2009:

- Natural Resource Systems (NRS):
 - NRS.01.02.01.a. Describe morphological characteristics used to identify trees and other woody plants.
- Plant Systems (PS):
 - PS.01.02.02.a. Identify the components, the types and the functions of plant roots.
 - PS.01.02.05.a. Identify the components of a flower, the functions of a flower and the functions of flower components.
 - PS.01.02.05.b. Identify the different types of flowers and flower forms.
 - PS.01.02.06.a. Explain the functions and components of seeds and fruit.

Roots anchor the plant; flowers and fruit perpetuate the species.

Student Learning Objectives: After this class students will be able to:

- (1) Name three functions of roots.
- (2) Name the female and male parts of a flower, and the parts of each.
- (3) Define a fruit, in scientific terms.

Instructional Methods: Informal Lecture w/ PowerPoint, Cooperative Learning Activity

Instructional Materials & Resources:

- For the Cooperative Learning Activity, Part Two – Flowers: Collect 3 or 4 species of flowers with prominent flower parts, so that each group of about 6 students will have one flower of each species. For Part Three – Fruit: Purchase enough fresh groceries to

distribute one piece to each student; for example, if you have 30 students, purchase 30 green beans or peas in the shell, 30 pistachios in the shell, and 30 bean sprouts or alfalfa sprouts. OPTIONAL: If you can find an acorn in the ground that has recently produced its first set of leaves, consider bringing the seedling to class.

II. LESSON PLAN

Introduction

Legend:

Text in normal face - Represents teacher's words.

Text in italic face - Represents suggestions for the teacher.

Interest Approach:

- Draw on the chalkboard or whiteboard: *“Roots, Flowers, Fruits”*.
- QUESTION: Can you please give me some specific examples of each part of a plant – roots, flowers, and fruits - examples that are important to everyday life for food, clothing, and so forth? First, what are some examples of roots?
- STUDENT RESPONSE: *(Correct answers can include carrots, sweet potatoes, and radishes.)*
- QUESTION: Remember that white potatoes and onions are composed of stem tissue, not roots. What are some examples of flowers?
- STUDENT RESPONSE: *(Correct answers can include broccoli, roses, and orchids.)*
- The term fruit means different things to different people. To the grocer, fruit means only the juicy apples, melons, and oranges. To the botanist, however, fruit has a broader meaning; technically, a fruit is the combination of seeds and their ovary, which may be fleshy like an apple, or dry like a double samara, such as the winged fruit of a maple.
- QUESTION: What examples of fruits come to mind?
- STUDENT RESPONSE: *(Correct answers can include apples, pears, peaches, pineapple, and so forth.)*
- RESOLUTION: These are good examples. Some other examples we may not have considered, also fall into these categories. A grain of wheat is also a fruit. Both apples and nuts are fruits; while we eat the fleshy covering surrounding the apple seeds, we eat the seeds from the nut fruit after we separate them from the ovary. Notice that some vegetables in botanical terms really are fruit, such as tomatoes, zucchini squash, and bell peppers. Vanilla is derived from the long seed capsule of an orchid. Used as a spice and dye, saffron is derived from the red-orange stigmas of crocus flowers. And consider the great commercial value derived from the cotton plants, for the cloth woven from long hairs on their seeds.

Relevancy:

- When we discuss roots, flowers, and fruits in these two lessons we have abstracted the life cycle of a plant: From the ROOTS emerge the plant that matures and produces FLOWERS, which ripen into FRUIT that contain SEEDS; from there the process will cycle back to a ROOT - the root is the first part to emerge from a seed.

Learning Objectives:

- After attending this class, you will be able to:
 - (1) Name three functions of roots
 - (2) Name the female and male parts of a flower, and the parts of each
 - (3) Define a fruit, in scientific terms.
- Now let's learn some basic anatomy and physiology of roots, flowers, fruits and seeds.

Instructional Methods**Informal Lecture: 20 minutes estimated**

- Present the PowerPoint file *06_FlowersFruit_PowerPoint.ppt*, according to the narration script file, *06_FlowersFruit_PowerScript.doc*.

Cooperative Learning Activity: 30 minutes estimated

- Divide the class into teams of about 6 students each.
- If you haven't already, distribute the handout, "*05_Roots_Task.doc*".
- Now let's practice some of the principles we've learned.
- PART ONE - ROOTS: First, I want you to assess your understanding of roots. In your team discuss the possible answers for this challenge in Part One of your handouts. You have a list of three words in each row, but only one word relates to roots. In the blank, enter the first letter of the correct response. You have 10 minutes to produce a team consensus.
- Has each team reached a consensus? The answer is, you can't have your cake and eat it too. Your column of responses should read "Carrot Cake". (*The correct responses are discussed on your response sheet, "05_Roots_TaskTEACHER.doc".*)
- PART TWO - FLOWERS: On your handout you have a diagram of a flower. As a team, see how many structures you can identify in the flowers I'll give you. (*Distribute the flowers to the teams. Allow about five to ten minutes.*)
- PART THREE - FRUIT: On your handout you have a diagram of a seed. As a team, examine these items closely and try to locate any prominent seed parts pictured on the diagram. (*Distribute the green beans, peas in the shell, pistachios in the shell, bean sprouts or alfalfa sprouts, and the optional sprouted acorn.*)

Summary:

With the new knowledge and skills, you developed, you can:

- (1) Understand the hidden workings of a healthy root system,
- (2) Appreciate the wide variety of form in flowers, and
- (3) Gain a new perspective of the fruit of a plant.

We've completed the series of lessons on plant anatomy, where we just glanced at plant functions. Next, we'll delve more deeply into the functions, or plant physiology.

OPTIONAL ACTIVITIES

- If the school has a garden or greenhouse, then you can schedule some field time making further observations regarding roots, flowers, and fruit (seeds).
- Soak some dried beans overnight, then place between sheets of blotter paper or thick paper towels and keep moist until the beans sprout.
- As a classroom exercise, or for homework, students can cut cross-sections of fruit such as apples, which have 5 sections; remember the number of fruit compartments relates to the number of petals.
- If a plant in your yard or a student's yard has recently succumbed, consider performing an autopsy. Dig up the plant and wash off all the soil, then examine the root system; perhaps you'll even learn what killed the plant.
- Assign a research project to list dioecious plants, which have separate male and female plants. Most hollies are dioecious.

RESOURCES**Books:**

- *Biology of Plants*, Seventh Edition (December 17, 2004), by Peter H. Raven, Ray F. Evert, Susan E. Eichhorn. Publisher: W. H. Freeman; Hardcover: 944 pages. ISBN: 0716710072 - Comprehensive book on botany.

Article:

- <http://www.greenbeltconsulting.com/ctp/treeandsoil.html> - See article "The Tree and the Soil", adaptation of a 1970 USDA publication, FS-32 "How a Tree Grows"