

Unit A: Understanding Horticulture

Lesson 4: Classifying Ornamental Plants

Student Learning Objectives: Instruction in this lesson should result in students achieving the following objectives:

1. Describe the system used for naming and classifying plants.
2. Identify the major groups of plants.
3. Describe the differences between annuals, biennials, and perennials.

Recommended Teaching Time: 2 hours

Recommended Resources: The following resources may be useful in teaching this lesson:

1. A PowerPoint has also been developed for use with this lesson plan
2. <http://www.enchantedlearning.com/subjects/plants/activity/key.shtml>
3. <http://www.spectrumanalytic.com/support/crops/croplist-sci.html>
4. <http://watershed.csumb.edu/ron/roncor/cor/did.htm>

List of Equipment, Tools, Supplies, and Facilities:

Writing surface
PowerPoint Projector
PowerPoint Slides
Transparency Masters
Plant specimens

Terms: The following term is presented in this lesson (shown in bold italics and on PowerPoint Slide 2):

- Angiosperms
- Annuals
- Biennials
- Binomial nomenclature
- Bryophytes
- Conifer
- Cotyledon
- Deciduous
- Dicots
- Evergreen
- Ferns
- Genus
- Gymnosperms
- Herbaceous
- Monocots
- Perennials
- Species
- Woody

Interest Approach: Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Ask students to list as many plants as they possibly can in 2 or 5 minutes. Begin a discussion on what type of plants were listed. Are they monocots or dicots, deciduous or evergreen, annual or perennial?

Go around the room from student to student asking each to name one plant that they know. After each student has had a turn, allow the class to make observations as to which types of plants are the most familiar and common.

Summary of Content and Teaching Strategies

Objective 1: Describe the system used for naming and classifying plants.
(PowerPoint Slide 3)

I. Plants are classified based on the similarities of their characteristics. Plant taxonomists compare flowering patterns, stem and leaf structures, life cycles, genetic similarities, and many other characteristics in deciding which plants are the most closely related. Taxonomists use categories to group the plants.

(PowerPoint Slide 4)

A. The categories, from general to specific, are: Kingdom, Phylum, Class, Order, Family, Genus, Species

(There is an example of Soft Shield Fern's classification)

(PowerPoint Slide 5)

B. All plants are in the Kingdom Plantae.

C. Vascular plants (plants with tissue specialized for conducting materials) are all in the Phylum Tracheophyta.

(PowerPoint Slide 6)

D. There are many Classes, Orders, and Families of plants. Even though each plant is categorized using at least seven names, we call plants by only their last two scientific names, a naming system called **binomial nomenclature** (which means a two-name system of identifying).

1. This classification system was developed by Carolus Linnaeus and uses Latin terms to name plants.

(PowerPoint Slide 7)

2. The two names that we use for the scientific names of plants are the **Genus** name, which is always capitalized, and the **species** name which is always lower case (e.g. *Solanum melongena*)

3. The genus is a group of plants that are very similar to each other. The species is a group of plants that are so similar that they usually mate freely with each other in the wild. Plants are also called by common names, but those names are specific for language and geographic location. Scientific names are specific and remain the same across languages and borders. Although it

is the Aubergine in Afghanistan, the plant is *Solanum melongena* everywhere on Earth.

****Call on students to give the 7 stages in Plant Classification you just went over. As they give them to you one by one write them on the board. Once all seven are given, have the students repeat these aloud as a class. Do this until they are speaking all together.**

Objective 2: Identify the major groups of plants.

(PowerPoint Slide 8)

II. The plant kingdom has become successful all over the Earth. They have done so by adapting to a wide variety of different conditions and niches. The following are some of the major groups of plants.

(PowerPoint Slide 9)

- A. **Bryophytes** are plants which are classified in the Phylum Bryophyta. These are non-vascular plants such as mosses and liverworts. They tend to live in damp places and are very limited in size due to the lack of conducting tissue. All higher plants are in the Phylum Tracheophyta.

(PowerPoint Slide 10)

- B. **Ferns** are vascular plants which reproduce by spores. Some people call them the amphibians of the plant world because they are dependent on water for their sperm to swim through during reproduction. Ferns have no true leaves but have fronds which have a double purpose of food production and spore formation. Fronds tend to unfold from the center of the plant, causing the newest fronds to be called “fiddlehead”.

(PowerPoint Slide 11)

- C. **Gymnosperms** are plants which reproduce with seeds that lay naked on scales. Most gymnosperms reproduce using a structure called a cone. Any gymnosperm which reproduces by cone is called a **conifer**. Examples include pines, spruces, and cedars. Conifers leaves are specialized to be either needles or scales. Most conifers are **evergreen**, holding their leaves all year round. But some are **deciduous**, dropping their leaves in the winter.

(PowerPoint Slide 12)

- D. **Angiosperms** are seed plants whose seeds develop within a fruiting body. Angiosperms all reproduce by flowers, although many flowers are very small and not showy. So if any plant has flowers, it is in the Angiosperm group. There are two types of Angiosperm.

(PowerPoint Slide 13)

1. **Monocots** are plants which have a single **cotyledon**, or seed piece. Monocots have flower parts in multiples of three, parallel venation on their leaves, and stems with scattered vascular bundles, and narrow leaves. Examples include grasses, maize, and lilies.

(PowerPoint Slide 14)

2. **Dicots** are plants with two cotyledons in their seeds. They have flower parts in multiples of four or five, netted veins, and stems

which are organized in a ring pattern. They have broad leaves and include roses, petunias, cranesbill, and beans

****If possible, bring in samples of each type of plant, either fresh or dried and pressed, for the students to see. If samples are available, divide students into groups and have them classify the plants based on Objective 2. Use TM: A4-1 or PowerPoint Slides 15, 16, and 17 to help give a visual picture of monocots and dicots.**

Also have students return to the list they created at the beginning of this lesson. Have them classify the plants as a fern, gymnosperm or angiosperm (and whether each angiosperm is a monocot or a dicot).

Objective 3: Describe the differences between annuals, biennials, and perennials.

(PowerPoint Slide 18)

III. Plants are often classified based on their life cycles. Gymnosperms and angiosperms reproduce by seed, of course, but there are different strategies for passing on that seed to future generations of plants.

(PowerPoint Slide 19)

A. **Annuals** are plants which grow from a seed, then flower, then produce seeds in one season. After the plant finishes producing seed, it will die. All of its energy and reserves go into seed production. Annual ornamental plants need to be replanted every year. Annual plants always have an **herbaceous** stem, which is a stem with no woody tissue in it. Examples of annual plants are petunias, zinnias, and maize. **(Click on the green arrow to see the life cycle of an annual)**

(PowerPoint Slide 20)

B. **Biennials** are plants which live for two years, then flower and die. Biennials flower only during their second season after having simply produced and stored food during the first growing season. To have ornamental biennials in flower every year, they must also be planted every year. Some examples of biennials are foxglove and carrots **(Click on the green arrow to see the life cycle of a biennial)**

(PowerPoint Slide 21)

C. **Perennials** are plants which live for three or more years. Perennials often flower for a short time every year. They usually do not die after flowering, holding some energy in reserve for survival and growth next year. Perennials do not usually have a predetermined age of death, some living for three or four years, some for over 1000. Although many perennial plants have herbaceous stems, some also have **woody** stems, stems which are very thick and have xylem made of wood. Some examples of perennials are tulips, irises, and all trees and shrubs. **(Click on the green arrow to see the life cycle of a perennial)**

**** Ask students to recount life cycles of some common plants of each group. Display TM: A4–2 and PowerPoint Slide 22 to help students begin to understand plant life cycles.**

Review/Summary: Use the student learning objectives to summarize the lesson. Ask students to explain the meaning of each of the terms in each objective. Look for them to be able to use the terms in describing a plant. Student responses can be used to determine which objectives need to be reviewed. Use questions on PowerPoint Slides 23 and 24 as review.

Application: Application can involve the following activities.

Student lists of plants from the Interest Approach.

A possible lab activity might include having students collect leaves from your area. The leaves can be pressed in a book and used to reinforce different plant characteristics.

Evaluation: Evaluation should focus on the students' achievement of the objectives for the lesson. Various techniques can be used. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

- | | |
|------|------|
| 1. h | 5. g |
| 2. c | 6. f |
| 3. b | 7. e |
| 4. d | 8. a |

Part Two: Completion

1. biennial
2. deciduous
3. conifers
4. *Dizygotheca, elegantissima*

Part Three: Short Answer

1. An herbaceous stem is fleshy and water-filled, a woody stem has xylem arranged in concentric rings that are made of wood.
2. Answers will vary. Use the classification definitions for plants around your area that students would list.
3. A plant is evergreen if it holds on to its leaves all year long.

Sample Test

Name _____

Test

Unit A Lesson 4: Classifying Ornamental Plants

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

- | | | |
|--------------|--------------------------|----------------|
| a. annual | d. dicot | g. angiosperms |
| b. perennial | e. binomial nomenclature | h. gymnosperms |
| c. monocot | f. Ferns | |

- _____ 1. A group of plants with naked seeds.
- _____ 2. A group of plants with parallel veins on the leaf.
- _____ 3. A plant which lives for three or more years.
- _____ 4. A group of plants with two seed pieces.
- _____ 5. A group of flowering plants with seeds held inside a fruit.
- _____ 6. A group of plants that reproduce using spores on the back of fronds.
- _____ 7. A plant naming system that uses two names for each plant.
- _____ 8. A plant which lives from year to year only by re-seeding itself.

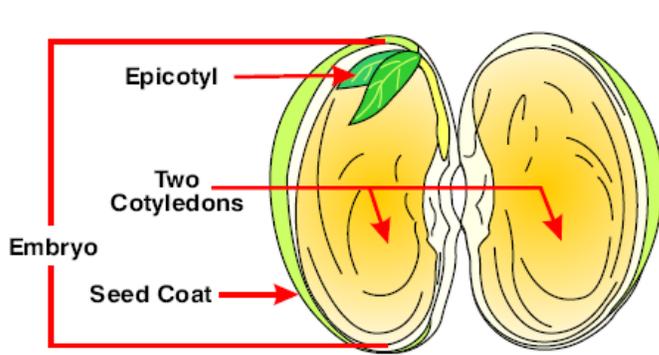
Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

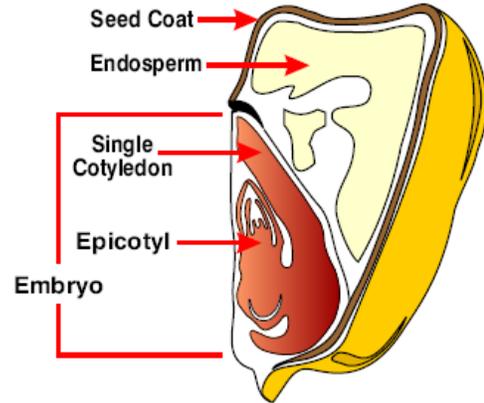
1. A _____ is a plant that lives for two years, flowering and dying in the second year.
2. A plant which loses its leaves in the winter is _____.
3. Cone bearing plants like Pines and Spruces are _____.
4. In the name *Dizygotheca elegantissima*, _____ is the genus name and _____ is the species name.

TM: A4-1

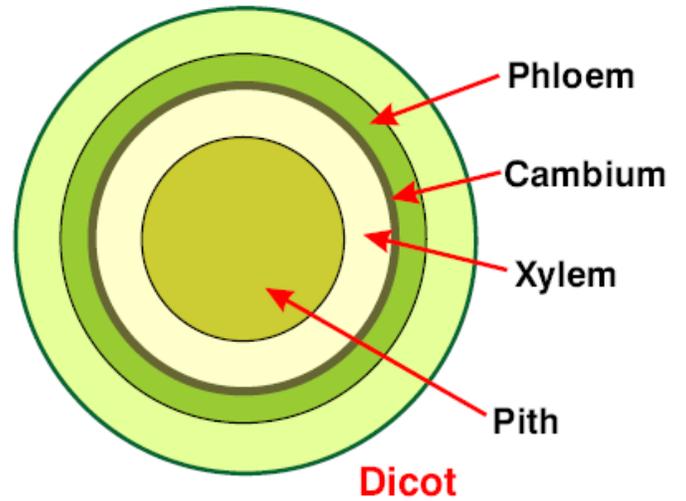
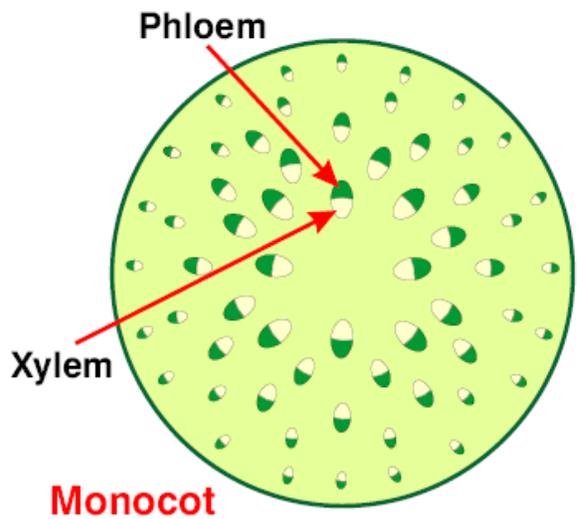
DICOTS AND MONOCOTS



Bean Seed (dicot)

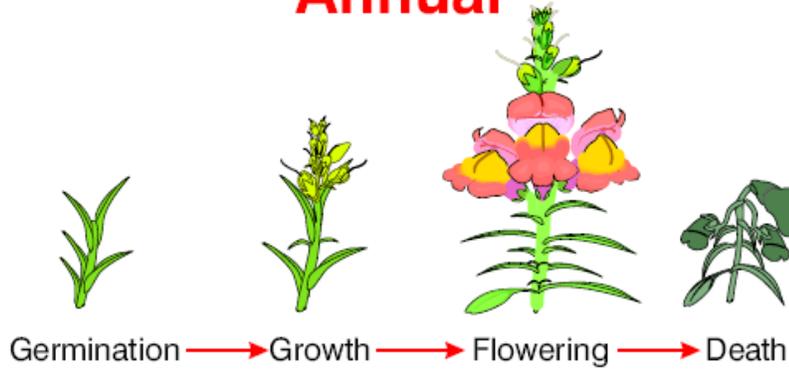


Corn Seed (monocot)

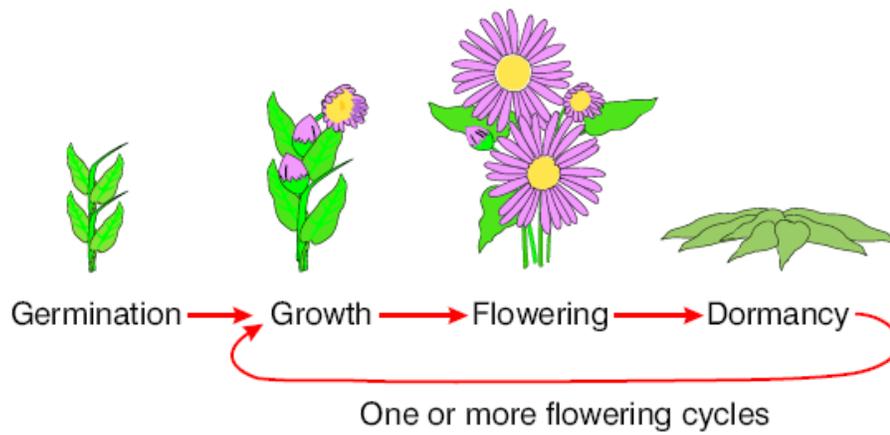


TM: A4-2

Annual



Perennial



Biennial

