

## Lesson A2–1

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# Classifying Ornamental Plants

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**Unit A.** Horticultural Science

**Problem Area 2.** Plant Anatomy and Physiology

**Lesson 1.** Classifying Ornamental Plants

### **New Mexico Content Standard:**

**Pathway Strand:** Plant Systems

**Standard: II:** Address taxonomic or other classifications to explain basic plant anatomy and physiology.

**Benchmark: II-B:** Classify plants based on physiology for taxonomic or other classification.

**Performance Standard:** 1. Classify plants as monocots or dicots. 2. Classify plants as annuals, biennials or perennials. 3. Classify plants according to growth habit. 4. Classify plants by type.

**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.

**List of Resources.** The following resources may be useful in teaching this lesson:

**Recommended Resources.** One of the following resources should be selected to accompany the lesson:

Biondo, Ronald J. and Jasper S. Lee. *Introduction to Plant and Soil Science and Technology*, Second Edition. Danville, Illinois: Interstate Publishers, Inc., 2003.

Schroeder, Charles B., et al. *Introduction to Horticulture*, Third Edition. Danville, Illinois: Interstate Publishers, Inc., 2000.

## List of Equipment, Tools, Supplies, and Facilities

Writing surface  
Overhead projector  
Transparencies from attached masters

**Terms.** The following terms are presented in this lesson (shown in bold italics):

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. Two possible approaches are included here.

*Ask students to list as many plants as they possibly can in 2 or 5 minutes. (An interesting side activity is to ask them to list as many animals as possible in 1 minute. One will notice that many more animals are listed on the sheet of the average student!) Begin a discussion on what type of plants were listed. Are they*

monocots or dicots, deciduous or evergreen, annual or perennial? (With the side activity, are they mammals, birds, reptiles, amphibians or fish?) Why do students know more animals than plants? Why are students better able to classify animals than plants? Is it because of parents lack of plant knowledge or weaknesses in the educational system?

Go around the room from student to student asking each to name one plant that they know. Immediately classify each plant as a fern, gymnosperm or angiosperm (and whether each angiosperm is a monocot or a dicot). 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.

**Anticipated Problem:** How are plants named and classified?

- 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. The categories, from general to specific, are:
  - A. Kingdom
  - B. Phylum
  - C. Class
  - D. Order
  - E. Family
  - F. Genus
  - G. Species

All plants are in the Kingdom Plantae. Vascular plants (plants with tissue specialized for conducting materials) are all in the Phylum Tracheophyta. 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). This classification system was developed by Carolus Linnaeus and uses Latin terms to name plants. 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. *Liriodendron tulipifera*) 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. For instance, *L. tulipifera* is known in the U.S. as both the Yellow Poplar and the Tulip tree. Scientific names are specific and remain the same across languages and borders. Although it is the Yellow Poplar in the U.S., the plant is *Liriodendron tulipifera* everywhere on Earth.

Use the text to strengthen student understanding of the objectives. Have students complete a leaf collection activity. It will reinforce the concepts presented in this objective and the next.

**Objective 2:** Identify the major groups of plants.

**Anticipated Problem:** What are some ways that we can put plants into groups?

- 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.
- 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.
  - 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”.
  - 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. An example is the bald cypress.
  - 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.
    - 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, sweet corn, and lilies.
    - 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, and geraniums.

*If possible, bring in samples of each type of plant, either fresh or dried and pressed, for the students to see. Use TM: A2–1A to help give a visual picture of monocots and dicots. Use the recommended resources to strengthen student understanding.*

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

**Anticipated Problem:** What is the difference between an annual, biennial, and perennial?

- 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.
- 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 impatiens, snapdragons, crabgrass, and field corn.
  - 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, carrot (we harvest after the first growing season and eat the stored food), and Queen Anne's lace.
  - 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, Kentucky bluegrass, and all trees and shrubs.

*Use the recommended resources to reinforce student attainment of the objectives. Ask students to recount life cycles of some common plants of each group. Display TM: A2-1B 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.

**Application.** Application can involve the following activities.

Student lists of plants from the Interest Approach.

Readings from *Introduction to Plant and Soil Science and Technology*.

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    2. c    3. b    4. d    5. g    6. f    7. e    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. Examples: woody stem—any tree or shrub, oaks, maples, viburnums, yews, junipers, many vines, English ivy. Herbaceous stem—most flowers and weeds and foliage plants, tulips, daffodils, dandelions, jade plant, spider plant.
3. A plant is evergreen if it holds on to its leaves all year long.

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# Test

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## Lesson A2-1: 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.

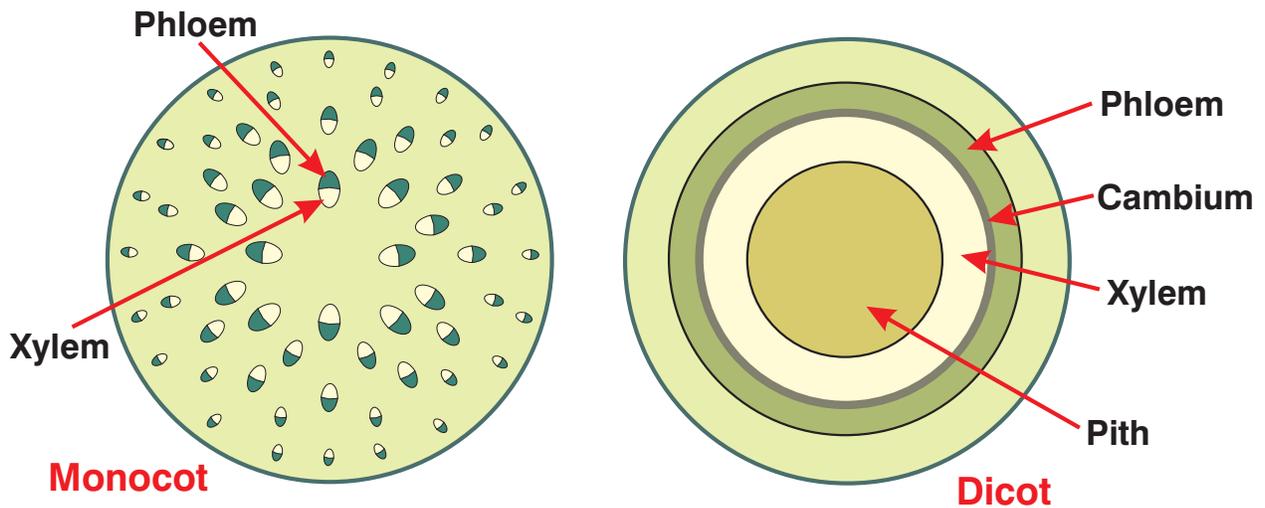
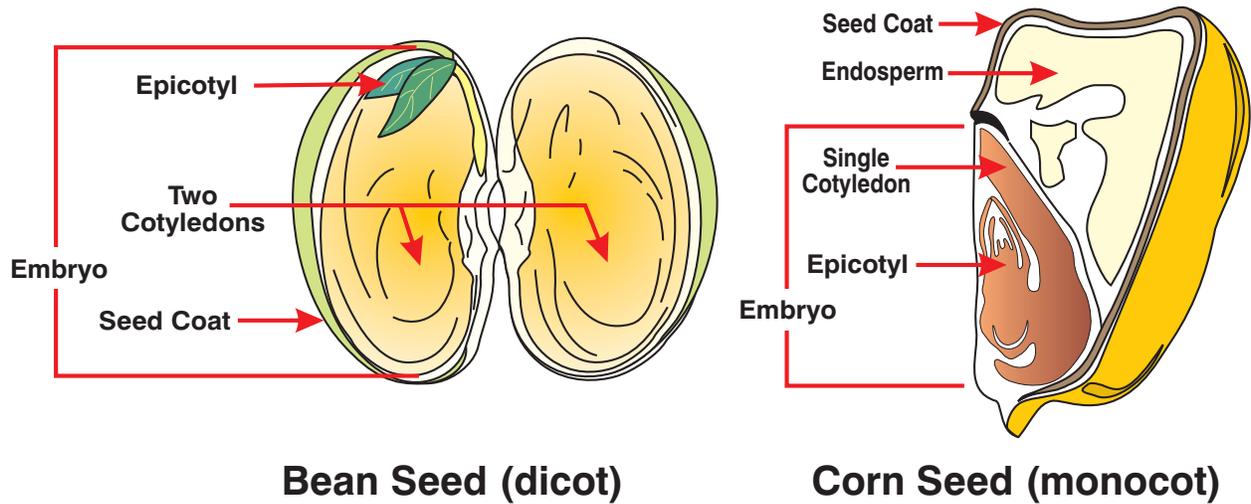
### Part Two: Completion

*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.



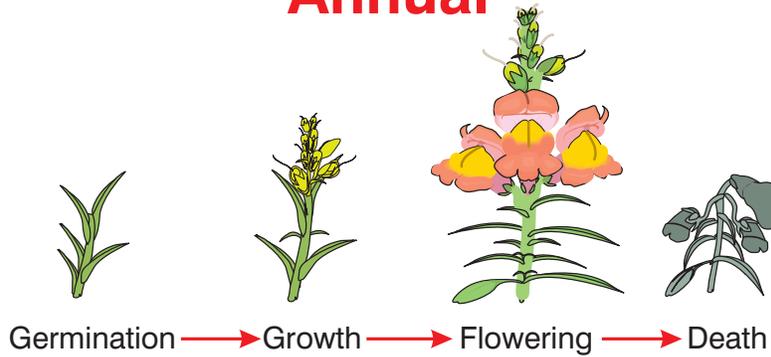
# DICOTS AND MONOCOTS



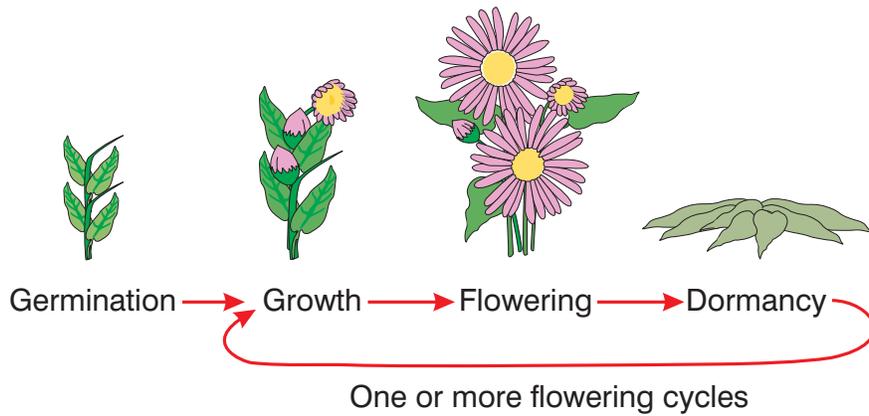
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# PLANT LIFE CYCLES

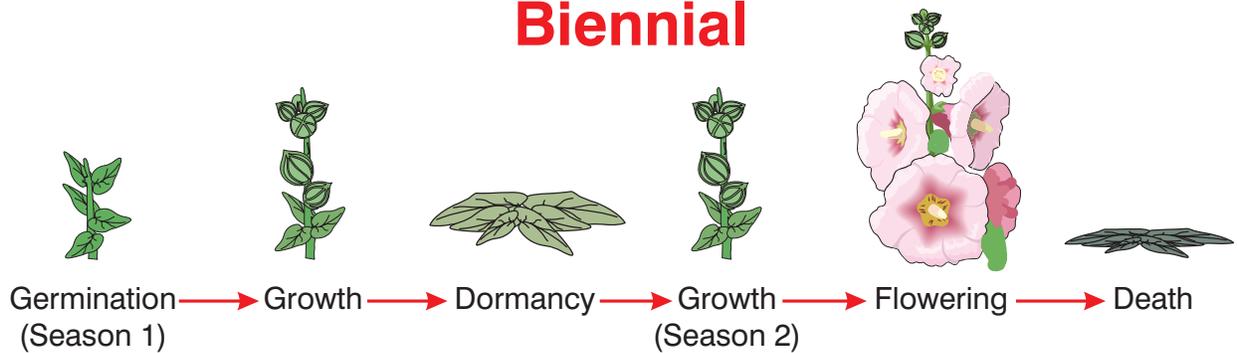
## Annual



## Perennial



## Biennial



(Courtesy, Interstate Publishers, Inc.)