

Lesson C2–1

Classifying and Naming Plants

Unit C. Plant and Soil Science

Problem Area 2. Basic Principles of Plant Science

Lesson 1. Classifying and Naming 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. 5. Classify plants by economic value.

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

1. Explain the importance of plants.
2. Explain the taxonomic classification of plants.
3. List characteristics that determine the classification of plants.
4. Describe how plants are named.
5. Explain reasons for using the scientific names of plants.

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:

Cooper, Elmer L. *Agriscience Fundamentals and Applications*. Albany, New York: Delmar Publishers, 1997. (Textbook and Lab Manual, Unit 15)

Lee, Jasper S. and Diana L. Turner. *Introduction to World AgriScience and Technology*. Danville, Illinois: Interstate Publishers, Inc., 1997. (Textbook and Activity Manual, Chapter 6)

Other Resources. The following resources will be useful to students and teachers:

Biondo, Ronald J. and Jasper S. Lee. *Introduction to Plant and Soil Science and Technology*. Danville, Illinois: Interstate Publishers, Inc., 1997. (Textbook and Activity Manual, Chapter 3)

Janick, Jules and James E. Simon. *New Crops*. New York: John Wiley & Sons, Inc., 1993.

Parker, Rick. *Introduction to Plant Science*. Albany, New York: Delmar Publishers, 2000.

Schraer, William D. and Herbert J. Stoltze. *Biology: The Study of Life*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1995.

Smith, C. Wayne. *Crop Production: Evolution, History, and Technology*. New York: John Wiley & Sons, Inc., 1995.

List of Equipment, Tools, Supplies, and Facilities

Specimen plant materials (potted plants, leaves, seed, etc.)

Writing surface

Overhead projector

Transparencies from masters

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

Common names

Dichotomous key

Kingdom

Morphology

Plant

Scientific names

Species

Taxonomy

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

Bring samples of two common plants (such as corn and a native grass) into the classroom. Stems, leaves, or an entire plant will be satisfactory. Ask students to name the plants. Once name agreement has been reached, ask students to describe how the two specimens are alike and different. (They are alike because both are in the grass family and both are monocotyledons. They are different because one produces ears of corn and the other does not.) Indicate that scientists use the similarities and differences observed in specimens to classify and name plants.

Summary of Content and Teaching Strategies

Objective 1: Explain the importance of plants.

Anticipated Problem: What is a plant and why are they important?

- I. A **plant** is a living organism that has the capacity to make its own food through a process known as photosynthesis.
 - A. Plants are found in varying climates.
 1. Some 350,000 different species of plants have been identified.
 2. Knowing the requirements of a particular plant helps in successfully growing it.
 - B. Plants are made of many cells.
 1. Some plants, such as trees, grow quite large and live for many years.
 2. Some plants are small and may live for only one year, with lettuce and petunias being examples.
 - C. Plants are used in many ways. Common uses of plants are as:
 1. Food—Plants are used to produce human food and animal feed materials.
 2. Clothing—Plant fibers are used to produce clothing.
 3. Shelter—Plant materials, especially lumber and plywood, are used in building houses and other structures.
 4. Paper—Many kinds of plants are used in manufacturing paper, with pine trees being widely used.
 5. Human appeal—Some plants are used for their beauty in landscaping and preparing floral displays.
 6. Others—Plants have many uses in the lives of humans, ranging from fuel sources, to medical applications, and in hobbies like gardening.

Ask one or more students to explain what plants are and how they are used. Show specimens of materials from plants, such as lumber and clothing, and have students explain how these are related to plants. List

the uses of plants on a writing surface. TM: C2–1A may be used to define plants and list examples of uses. Another approach to emphasize the importance of plants is to ask students to name the items that would be removed from their classroom if there were no plants. Their desks, tables, chairs, notebooks, and nearly everything would most likely be removed!

Objective 2: Explain the taxonomic classification of plants.

Anticipated Problem: What is plant classification and how are plants classified?

- II. The classification of plants and other living things is known as **taxonomy**.
 - A. The first efforts in taxonomy began over 2,000 years ago in Greece.
 - B. Modern taxonomy uses seven divisions or stages in classification, with each stage being more specific than the previous stage. These stages form a taxonomic hierarchy. The seven stages in the hierarchy are listed here.
 1. Kingdom—**Kingdom** is the first stage, with all living organisms fitting into one of five stages: plant, animal, fungi, protista, and monera.
 2. Division—Ten divisions are used in the plant kingdom. (This stage in animal classification is known as phylum.)
 3. Class—Members of a class have more common characteristics than those of a division.
 4. Order—Members of an order are more alike than those of a class.
 5. Family—Members of a family are more alike than those of an order.
 6. Genus—Members of a genus are very similar.
 7. Species—The **species** is the most specific stage in the taxonomic hierarchy for an organism. Members of a species can be bred and produce offspring similar to their parents. No two species have the same scientific name. Groups within a species that have unique traits may be formed into subspecies or varieties. Species names are comprised of the genus and species.
 - C. Plant classification often involves the use of a dichotomous key.
 1. A **dichotomous key** is a written set of choices that leads to the name of a plant or other organism.
 2. The choices are sequential and involve determining if a plant fits a group with specific characteristics.

Write the word, *taxonomy*, on a writing surface. Ask students if they have heard of taxonomy before. If so, ask them to explain what it is and use what students say to develop a definition. Put the definition on the writing surface. Use TM: C2–1B or the writing surface to list the seven stages in modern classification. Have students use a dichotomous key to classify plant specimens. (A sample classification key activity is available in the Activity Manual for Introduction to World AgriScience and Technology, Chapter 6.)

Objective 3: List characteristics that determine the classification of plants.

Anticipated Problem: What plant characteristics are used in classifying plants?

- III. Distinctions in the divisions or stages in modern scientific classification are largely based on the morphology of organisms.
 - A. **Morphology** is the study of the internal and external appearance of an organism.
 - 1. Most plants are identified by external appearance.
 - 2. Internal appearance of plant growth structures will help verify classification and may be needed with some species.
 - 3. The characteristics observed are often referred to as evidence in classification.
 - B. Scientists look for similarities and differences in organisms.
 - 1. Common characteristics with plants include leaf shape and arrangement; stem structure, including exterior bark or epidermis; root system, such as fibrous or tap; and flower color, structure, and other features.
 - 2. Scientists may also use chromosomes, embryo growth, and biochemistry of a plant in its classification.

Put the word, morphology, on the writing surface. Have students provide information to develop a definition. Place the definition on the writing surface. Ask students to give examples of differences in plants and how these relate to classification, such as differences in leaf shapes and stem structures. Examine several plant specimens that are brought into the classroom, observed on the school grounds, or growing in the greenhouse to determine morphological differences between species. An approach is to form students in small groups and have each group compare the different plants and prepare reports for the class on their observations.

Objective 4: Describe how plants are named.

Anticipated Problem: How are plants named?

- IV. Plants have common and scientific names.
 - A. **Common names** are the “everyday” names that people use.
 - 1. Common names may vary from one region or location to another.
 - 2. One plant species may be known by several different common names.
 - 3. An example is the lima bean, which is also known as a butter bean.
 - B. **Scientific names** are the names of plants based on taxonomy.
 - 1. A scientific name is often comprised of two words—the genus and species of the plant.
 - 2. Scientific names are written in italics or are underlined.
 - 3. The first letter of the genus is capitalized; no other letters are in capital letters.
 - 4. An example is *Phaseolus limensis*—which is the lima bean or butter bean.

5. Other examples of common and scientific names are:

Butterfly Orchid—*Orchis Papilionacea*

Dreamland Zinnia—*Zinnia elegans*

Norway Spruce—*Picea abies*

Soybean—*Glycine max*

Ask students if they know the difference between a butter bean and a lima bean. Show a specimen of dried lima beans. After some discussion, divide the specimen of beans into two nearly equal quantities. Label one “lima bean” and label the other “butter bean.” Indicate that the possible confusion of common names is why scientific names are used. Place the scientific name of the bean on a writing surface. Form students into small groups and give each group three examples of plants found locally and have them determine the scientific names of the plants. Have each group report their findings to the class.

Objective 5: Explain reasons for using the scientific names of plants.

Anticipated Problem: Why are scientific names used?

- V. Scientific names enhance communication about plants.
- A. Scientific names are based on relationships among different species of plants.
1. Plants with common characteristics are in the same family, order, class, and division. (These help scientists understand characteristics shared by different species of plants.)
 2. Two examples are beans and corn—all beans (soybeans, lima beans, etc.) are in the Leguminosae family (commonly referred to as “legume”) while corn is in the grass family, Gramineae. (The scientific name for corn is *Zea mays*.)
- B. Scientific names illustrate differences between plants.
1. Differences should be obvious from the names of plants.
 2. Corn, wheat, and oats are in the grass family and are obviously different from strawberries and apples in the rose family, Rosaceae.
- C. Scientific names are universally accepted by scientists and agriculturalists.
1. Using the scientific name assures that there is no confusion about which crop is being discussed.
 2. Using scientific names enhances the exchange of research information.

Ask students to give examples of why scientific names are used. Help them to see that the common names used in local areas or regions may create confusion in communication about plants. No such confusion exists when scientific names are used. Invite an agricultural scientist or botanist to serve as a resource person in class and discuss the importance of scientific names.

Review/Summary Use the objectives as the guides for reviewing and summarizing the content of the lesson. Call on various members of the class to explain the content associated with

each objective. Activities in small groups will also help in reviewing and summarizing the content. Use observations as the basis for reteaching areas where student mastery may need improvement.

Application. Application can involve one or more of the following activities:

- Use a dichotomous key activity (*Activity Manual for Introduction to World AgriScience and Technology*, Chapter 6)
- Use small group activities to determine the scientific names of various plant species found locally.
- Use any of the Exploring activities at the end of Chapter 6 in the textbook, *Introduction to World AgriScience and Technology*.

Evaluation. Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as observation of class participation and the use of a written test. A sample test is attached.

Answers to Sample Test:

Part One: Matching

1=e, 2=i, 3=a, 4=c, 5=j, 6=g, 7=d, 8=b, 9=f, 10=h.

Part Two: Completion

1. (any two of the items listed) food, clothing, shelter, paper, and human appeal
2. morphology
3. Gramineae
4. Leguminosae
5. Greece

Part Three: Discussion

The answer should include the following areas: leaf shape and arrangement, stem structure, type of root system, and flower characteristics.

Test

Lesson C2–1: Classifying and Naming Plants

Part One: Matching

Instructions. Match the term with the correct response.

- | | |
|--------------------|--------------------|
| a. plant | f. common name |
| b. taxonomy | g. scientific name |
| c. kingdom | h. species |
| d. morphology | i. Gramineae |
| e. dichotomous key | j. <i>Zea mays</i> |

- _____ 1. A written set of choices that leads to the name of a plant.
- _____ 2. Family name of all grasses.
- _____ 3. Living organism that makes its own food.
- _____ 4. The first stage of classification with all living things in one of five groups.
- _____ 5. The scientific name for corn.
- _____ 6. The two-word name of a plant used by plant scientists.
- _____ 7. Study of the internal and external appearance of a plant.
- _____ 8. The scientific classification of plants and other organisms.
- _____ 9. The name used by people without regard to scientific classification.
- _____ 10. The most specific stage in scientific classification.

Part Two: Completion

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

- Two important uses of plants are for _____ and _____.
- Distinctions in the stages of scientific classification are based on _____.
- Corn is in the _____ family.
- Soybeans are in the _____ family.
- The first efforts in plant classification began 2,000 years ago in _____.

Part Three: Discussion

Instructions. Use correct spelling and complete sentences to answer the following question.

What major characteristics of plants are used in classification?

PLANTS: DEFINITION AND USES

Plant—a living organism that can make its own food through a process known as photosynthesis.

Uses of plants:

- 1. Food**
- 2. Clothing**
- 3. Shelter (wood building materials and furniture)**
- 4. Paper**
- 5. Human Appeal (ornamentals, forests, etc.)**
- 6. Others (fuel sources and medical applications)**

STAGES IN PLANT CLASSIFICATION

Kingdom

Division

Class

Order

Family

Genus

Species