

UNIT II - PLANT SCIENCE

Lesson 4: Plant Care Requirements

Objective: Identify the important factors to consider in caring for plants

Study Questions

1. **What are the factors affecting plant growth?**
2. **What are the essential nutrients for plant growth?**
3. **What care should be provided for indoor plants?**
4. **What care should be provided for outdoor plants?**

References

1. *Exploring Agriculture in America* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit II.
2. Transparency Masters

TM 4.1 What Do the Numbers 10-15-10 Mean?
TM 4.2 Rules of Proper Watering
3. Activity Sheets

AS 4.1 Plant Care Contest (Instructor)
AS 4.2 Plant Care Requirements

UNIT II - PLANT SCIENCE

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TEACHING PROCEDURES

A. **Review**

The previous lesson focused on the underground environment of plants, which is very important to their overall health. Nearly every product people use or consume can be traced back to the soil. This lesson will focus on the aboveground needs and the essential nutrients for plant growth.

B. **Motivation**

1. Ask students how many have houseplants at home. Discuss the problems they have noticed. Identify procedures a parent, brother/sister, or they do that result in healthy plants. See if the concept of proper watering of houseplants surfaces as the number one factor in plant survival.
2. Bring in samples of healthy plants and samples of plants showing water stress, soil problems, sun damage, or pest problems. Have students look at the top growth and root system. Discuss the differences between the healthy plants and those with problems. Discuss how proper care could help prevent these problems.
3. Ask students what humans need to survive. What do plants need to survive and grow?
4. Have students begin AS 4.1. Remind them that the information they learned earlier about plants will assist them in this activity.

C. **Assignment**

D. **Supervised Study**

E. **Discussion**

Q1. What are the factors affecting plant growth?

A1.

- a) **Water**
 - 1) **Essential for photosynthesis**
 - 2) **Maintains cell shape**
 - 3) **Enables nutrients to be absorbed and transported throughout the plant**
 - 4) **Transports manufactured food to all parts of the plant**
- b) **Growing medium**
 - 1) **Provides support for the roots**
 - 2) **Allows water and air filtration and movement**
 - 3) **Stores needed nutrients**
- c) **Nutrients (fertilizer) - 16 nutrients essential for plant growth**
- d) **Light**
 - 1) **Plants need different levels of light intensity.**
 - 2) **Light is required for photosynthesis.**
- e) **Temperature**
 - 1) **Plants differ greatly in their tolerance for hot and cold temperatures.**
 - 2) **Extremes in temperature can cause slow growth, fruit or flower damage, or death of the plant.**

- f) **Humidity - to help prevent leaves from drying**
- g) **Gases - important in photosynthesis**
- h) **Pest control - increases plant growth**

Bring in samples of plants with different water requirements, such as cactus, water lily, and philodendron. Discuss how knowledge of their water requirements is important. Also bring in plants that have different light requirements, such as ferns, hostas, and geraniums. Discuss how trying to grow them under the same conditions will result in the death of some plants.

Q2. What are the essential nutrients for plant growth?

A2. The 16 essential nutrients are broken down into four categories:

- a) **Primary macronutrients (large amounts)**
 - 1) **Nitrogen (N)**
 - 2) **Phosphorus (P)**
 - 3) **Potassium (K)**
- b) **Secondary macronutrients (moderate amounts)**
 - 1) **Calcium (Ca)**
 - 2) **Magnesium (Mg)**
 - 3) **Sulfur (S)**
- c) **Micronutrients (small amounts)**
 - 1) **Boron (B)**
 - 2) **Chlorine (Cl)**
 - 3) **Copper (Cu)**
 - 4) **Iron (Fe)**
 - 5) **Manganese (Mn)**
 - 6) **Molybdenum (Mo)**
 - 7) **Zinc (Zn)**
- d) **Elements from air**
 - 1) **Carbon (C)**
 - 2) **Hydrogen (H)**
 - 3) **Oxygen (O)**

Most fertilizers contain three primary macronutrients: nitrogen (N), phosphorus (P), and potassium (K). Bring in a lawn fertilizer bag and have students identify the nutrients supplied by the fertilizer. Show TM 4.1 during your discussion.

Q3. What care should be provided for indoor plants?

A3.

- a) **Provide proper water.**
 - 1) **Use a well-drained growing medium.**
 - 2) **Water plants as needed.**
 - 3) **Water thoroughly at every watering.**
- b) **Control humidity levels.**
- c) **Maintain appropriate temperature range.**
- d) **Maintain appropriate light levels.**
- e) **Fertilize the growing medium as needed.**
- f) **Provide appropriate pinching and pruning.**
 - 1) **Pinch or prune dead/damaged leaves and branches.**
 - 2) **Pinch or prune to maintain plant shape.**

Ask students what care should be provided for indoor plants. Bring in several plants and discuss their care requirements. Use TM 4.2 to discuss proper watering rules.

Q4. What care should be provided for outdoor plants?

A4.

- a) **Watering is usually only required during dry periods.**
- b) **Grow in areas where they are adapted.**
- c) **Select tolerant plants for locations where pollution can be a problem.**
- d) **Fertilizer is generally only needed once per year.**
- e) **Prune occasionally to remove dead and damaged leaves and branches.**
- f) **Prune to maintain the plant's natural shape, when required.**

Ask students to discuss the growing conditions that outdoor plants need. Which conditions are supplied by nature? Have students complete AS 4.2 to reinforce what they have learned about plant care.

F. *Other Activities*

1. Provide plants for students to care for at the school or in the community for several weeks. Students could help the garden club or city plant flowers downtown or in parks.
2. Have students design experiments to see how different levels of light, water, fertilizer, etc., affect plant growth.
3. Plant several trees at the school or conduct a landscaping project at the school or in the community.
4. Allow a geranium to grow naturally from the start of the course to the end. Pinch a second geranium to develop a more compact and desired shape during the course. Compare them at the conclusion of the course.

G. *Conclusion*

Many factors need to be considered in caring for plants. Plants differ in their need for these factors depending on the variety and location. However, all plants require three major nutrients: nitrogen (N), phosphorus (P), and potassium (K). A key skill to be mastered in caring for plants is watering. More plants are damaged or die from overwatering than underwatering. Keeping a plant in good health will reduce the possibility of having pest problems.

H. *Answers to Activity Sheets*

The instructor should determine if the answers are appropriate.

I. *Evaluation*

A unit test is provided at the end of this unit. If a lesson quiz is needed, use questions pertaining to this lesson from the unit test.

What Do the Numbers 10-15-10 Mean?



10% Nitrogen (N)
15% Phosphorus (P)
10% Potassium (K)

Rules of Proper Watering

Use a well-drained growing medium.

- The medium should be porous yet retain water.

Water plants as needed.

- Observe the color of the medium.
- Test for moisture by touch.

Water thoroughly at every watering.

- Water should flow out the bottom of the container.

Plant Care Contest

Objective: Students will demonstrate their ability to care for plants.

Directions: Provide students with a small/young houseplant that does not have critical care requirements (a geranium is a good example). The school or a commercial greenhouse might provide a plant for each student. The horticultural science class could start enough vegetative or seed geraniums for Exploring Agriculture in America students to use. A key factor for this project is to have uniform plants for the students.

Use AS 4.2 as a way to obtain important plant care requirements. Start the project at school and use this activity to teach students how to care for indoor plants. After one or two weeks, the students can take the plants home and care for them for the rest of the course.

During the last week of the course, students should bring their plants back to class. Evaluate the students on how good their plants look. In addition, it may be time to put the houseplant in a larger container. The instructor can demonstrate repotting, and then students can do the same with their plants.

Prizes could be awarded to the largest, smallest, best looking, etc.

Lesson 4: Plant Care Requirements

Name_____

Plant Care Requirements**Objective:** Students will identify care requirements of selected plants.**Procedure:**

1. Select two houseplants and two outdoor plants to research.
2. Use general references such as the ones listed below to find care information about the plants to fill in the chart. One example has been provided.

A few suggested references include:

Green and Blooming Plants. Redbook Florist Services, 1992.

(Available for free loan at the Missouri Resource Center for Career & Technical Education (MRCCTE), University of Missouri-Columbia.)

Ingels, Jack E. *Ornamental Horticulture: Principles & Practices*. Albany, NY: Delmar Publishers, 1985.

(Available for free loan at the MRCCTE, University of Missouri-Columbia.)

Reiley, H. Edward and Shry Jr., Carroll L. *Introductory Horticulture*, 5th ed. Albany, NY: Delmar Publishers, 1997.The Ohio State University Horticulture and Crop Science in Virtual Perspective, <<http://www.hcs.ohio-state.edu/hcs/hcs.html>>.

University Extension Bulletins: University of Missouri-Columbia.

Plant Name	Light Needs	Water Needs	Fertilizer Needs	Type of Growing Medium	Common Pests	Other Information
Boston Fern	partial sun	keep moist	feed lightly every 4 months	1-peat 2-sand 1-soil	mealy bugs	50-70°F temperature, mist often

