

Greenhouse Operation and Management

Curriculum Guide: *Greenhouse Operation and Management*

Unit: IV. Plant Growth

Unit Objective:

Students will demonstrate an understanding of the basic plant processes of germination and photosynthesis by conducting a seed germination experiment and writing a summary of their findings.

Show-Me Standards: 1.8, SC7

References:

Greenhouse Operation and Management. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

The National Arbor Day Foundation. Accessed December 11, 2003, from <http://www.arborday.org/>.

Reiley, H. E., & Shry, C. L., Jr. *Introductory Horticulture*, 6th ed., Delmar Learning, 2000.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 4.2, Effects of Light on Plants; AS 4.5, Growing Media and Containers; and AS 4.8, Over-, Under-, and Proper Watering.
- Additional activities that relate to the unit objective can be found under the headings “Other Activities and Strategies” and “Unit IV Activity” in the following locations: p. 180, p. 203, and p. 279.

Performance-Based Assessment:

Students will work individually to conduct a seed germination experiment comparing the differences in growth patterns based on the variable to which the seeds are exposed. Each student will plant and care for approximately 10 seeds (e.g., corn or beans) to the instructor’s specifications. Students will examine the plants each class period and record the differences (i.e., the height and appearance of the plant) in a chart that they design. Before the students plant their seeds, they must hypothesize what will happen to their seeds. At the end of the experiment, students will write a short summary of their findings.

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Assessment will be based on the overall content and presentation of the chart and summary. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

Unit IV—Plant Growth Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Students will work individually to conduct a seed germination experiment comparing the differences in growth patterns based on the variable to which the plant seeds are exposed.
2. Give each student specifications (a variable) for planting or caring for his or her seeds. Variables may include, but are not limited to, the following:
 - Light (different light strengths or light colors)
 - Media type
 - Moisture levels
 - Fertilizer (amount or type)
 - pH
 - Seed depth
3. Before the students plant their seeds, have them hypothesize what will happen to their seeds based on their given variable. For example, they should address whether the plants will grow well or poorly and if the plants will have root system problems.
4. Provide each student approximately 10 seeds (e.g., corn or beans). Have the students plant the seeds according to specifications and care for them.
5. Have students develop a chart to record their plants' activity.
 - a. The chart will include a space at the top for writing the hypothesis before the experiment begins.
 - b. Students will examine their plants and record activity (e.g., the height and appearance of the plant) every day that they are in the classroom.
6. At the end of the experiment, each student will write a short summary that presents his or her findings and evaluates how the hypothesis held up. The summary should at least cover the following topics:
 - General performance of the plants
 - What the variable was
 - What the initial hypothesis was and how it changed (if applicable)
 - Summary of the care given to the plants

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7. The final assessment will be based on the overall content and presentation of the chart and summary. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

8. **ADDITIONAL ACTIVITY:** For further review, an additional unit-level activity, Plant Portfolio, is included on p. 279 of the *Greenhouse Operation and Management* Instructor Guide. For this activity, students create a portfolio of the plants they grew at the beginning of unit I. They are asked to provide basic information and specific greenhouse needs for the plants in their portfolio. See the activity for additional directions and details. Answers will vary.

Unit IV—Plant Growth Student Handout

1. You will work individually to conduct a seed germination experiment comparing the differences in growth patterns based on the variable to which your plant seeds are exposed.
2. Your instructor will give you a variable (e.g., different light strength or color, media type, moisture level, fertilizer amount or type, etc.) for planting or caring for your seeds.
3. Before planting your seeds, hypothesize what will happen to your seeds based on the given variable. For example, address whether the plants will grow well or poorly and if the plants will have root system problems.
4. You will plant approximately 10 seeds (e.g., corn or beans) according to specifications and care for them.
5. You will develop a chart to record your plants' activity.
 - a. The chart will include a space at the top for writing your hypothesis before the experiment begins.
 - b. Each day you are in the classroom, you will examine your plants and record the activity (e.g., the height and appearance of the plant).
6. At the end of the experiment, you will write a short summary that presents your findings and evaluates how your hypothesis held up. The summary should at least cover the following topics:
 - General performance of the plants
 - What your variable was
 - What your initial hypothesis was and how it changed (if applicable)
 - Summary of the care you gave to the plants
7. Your final assessment score will be based on the overall content and presentation of the chart and summary. Spelling, grammar, punctuation, and capitalization will also be factors in the assessment.

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Unit IV—Plant Growth Scoring Guide

Name _____

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| Assessment Area | Criteria | 0 Points | 1 Point | 2 Points | 3 Points | 4 Points | Weight | Total |
|--------------------------|--|----------------|-----------------|----------------|----------------|--------------------|--------|-------|
| Chart | <input type="checkbox"/> All entries were made and are complete <input type="checkbox"/> Information is accurate <input type="checkbox"/> Easy to read and understand <input type="checkbox"/> Well organized | 0 criteria met | 1 criterion met | 2 criteria met | 3 criteria met | All 4 criteria met | X 15 | |
| Summary | <input type="checkbox"/> Contains all elements required <input type="checkbox"/> Information is complete <input type="checkbox"/> Conclusions are valid <input type="checkbox"/> Well organized | 0 criteria met | 1 criterion met | 2 criteria met | 3 criteria met | All 4 criteria met | X 7.5 | |
| Technical Considerations | <input type="checkbox"/> Spelling <input type="checkbox"/> Grammar <input type="checkbox"/> Punctuation <input type="checkbox"/> Capitalization | 0 criteria met | 1 criterion met | 2 criteria met | 3 criteria met | All 4 criteria met | X 2.5 | |
| TOTAL | | | | | | | | |

Final Assessment Total _____/100 pts.

Comments:

