

Course	Agricultural Science II
Unit	Plant Science
Lesson	Photosynthesis and Respiration
Estimated Time	50 minutes
Student Outcome	

The student will be able to describe basic plant processes.

Learning Objectives

1. List the five basic plant processes.
2. Explain how nutrients and water are moved through a plant.
3. Explain how plants manufacture food.
4. Explain how plants use food that they manufacture.
5. Describe the role plants play in improving air quality.

Grade Level Expectations

SC/ME/1/I/09-11/b	SC/ME/2/A/09-11/b	SC/LO/1/C/09-11/a
SC/LO/1/C/09-11/b	SC/LO/2/A/09-11/a	SC/LO/2/A/09-11/b
SC/LO/2/A/09-11/c	SC/LO/2/B/09-11/a	SC/LO/2/B/09-11/b
SC/LO/2/B/09-11/c	SC/LO/2/D/09-11/a	SC/LO/2/D/09-11/c
SC/LO/2/F/09-11/a	SC/LO/2/F/09-11/c	SC/LO/2/F/09-11/d

Resources, Supplies & Equipment, and Supplemental Information

Resources

1. *Plant Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 1991.
2. *Plant Science Curriculum Enhancement*. University of Missouri-Columbia: Instructional Materials Laboratory, 2003.

Supplies & Equipment

- ☐ White carnation or stalk of celery
- ☐ Red or blue food coloring

Supplemental Information

1. Internet Sites
 - ☐ Photosynthesis. Estrella Mountain Community College, Arizona. Accessed January 23, 2008, from <http://www.emc.maricopa.edu/faculty/farabee/BIOBK/BioBookPS.html>.
 - ☐ Photosynthesis. University of Cincinnati Clermont College. Accessed January 23, 2008, from <http://biology.clc.uc.edu/Courses/bio104/photosyn.htm>.
 - ☐ Translocation: Transport of Organic Solutes in Plants. Gresham High School, Oregon. Accessed January 23, 2008, from <http://ghs.gresham.k12.or.us/science/ps/sci/ibbio/plants/notes/transloc.htm>.

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- ❑ Ritter, Michael E. "Transpiration." In *The Physical Environment: An Introduction to Physical Geography*. 2006. Online textbook, Department of Geography and Geology, University of Wisconsin-Stevens Point. Accessed January 23, 2008, from <http://www.uwsp.edu/geo/faculty/ritter/geog101/textbook/biogeography/transpiration.html>.

2. Print

- ❑ Parker, Rick. *Introduction to Plant Science*, rev. ed. Clifton Park, NY: Delmar Learning, 2003.
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Interest Approach

Using a white carnation, cut off the tip of the stem (1/4" to 3/8") and place it down in a jar of water that has been colored with red or blue food coloring. This can also be done with a stalk of celery. Discuss with the class just what the plant is doing while the solution is being drawn up into the plant material. Use this to lead into the lesson.

Communicate the Learning Objectives

1. List the five basic plant processes.
2. Explain how nutrients and water are moved through a plant.
3. Explain how plants manufacture food.
4. Explain how plants use food that they manufacture.
5. Describe the role plants play in improving air quality.

Instructor Directions	Content Outline
Objective 1 <i>Proper plant growth is directly related to five basic processes that occur in plants.</i>	List the five basic plant processes. <ol style="list-style-type: none">1. Photosynthesis2. Respiration3. Water absorption4. Translocation5. Transpiration
Objective 2 <i>Plants require nutrients for proper growth and development. In order for the nutrients to benefit the plant, they must be distributed throughout the plant. The movement of nutrients and water in a plant involves three processes: transportation, translocation, and absorption.</i>	Explain how nutrients and water are moved through a plant. <ol style="list-style-type: none">1. Transpiration – loss of water by evaporation through the leaf surface, causes tension on the xylem tissues which triggers the root hairs to absorb more water2. Translocation – movement of water and organic compounds within the plant<ol style="list-style-type: none">a. Xylem tissues transport water and dissolved minerals <u>upward</u> from the roots.b. Phloem tissues transport compounds from the leaves to the rest of the plant.3. Absorption – water and dissolved minerals are absorbed by plant root hairs through the process of osmosis
Objective 3 <i>Every living organism needs food to produce energy so essential activities within the cells can take place.</i>	Explain how plants manufacture food. Through the process of photosynthesis, green plants convert carbon dioxide and water in the presence of light into simple sugar (food).

Instructor Directions	Content Outline
	$ \begin{array}{ccccccc} 6 \text{ CO}_2 & + & 6 \text{ H}_2\text{O} & \xrightarrow[\text{light energy}]{\text{chlorophyll}} & \text{C}_6\text{H}_{12}\text{O}_6 & + & 6 \text{ O}_2 \\ \text{(carbon} & & \text{(water)} & & \text{(glucose)} & & \text{(oxygen)} \\ \text{dioxide)} & & & & & & \end{array} $
Objective 4 <i>Energy from the sun enables plants to produce food through the process of photosynthesis.</i>	Explain how plants use food that they manufacture. <ol style="list-style-type: none"> 1. To produce the energy necessary to perform various plant processes 2. To build new plant tissue resulting in plant growth 3. To store food in the form of carbohydrate substances 4. Respiration – uses energy to release carbon dioxide (CO₂) and water (H₂O) into the atmosphere
Objective 5 <i>Air (oxygen) is important to sustain animal life. Plants improve air quality through the process of photosynthesis.</i>	Describe the role plants play in improving air quality. Plants produce oxygen as a by-product of photosynthesis and they use carbon dioxide from the air.
Closure/Summary	The five basic plant processes needed for proper plant growth and development are respiration, photosynthesis, water absorption, translocation, and transpiration. Plants play a vital role in improving air quality by producing oxygen as a by-product of photosynthesis.
Evaluation: Quiz	Answers: <ol style="list-style-type: none"> 1. c 2. d 3. a 4. b 5. e 6. c 7. d 8. c