

# PLANTS AND POLLINATORS

## MIDDLE SCHOOL

### Life Science TEKS

*Sixth Grade:* 6.12C, 6.12E, 6.12F

*Seventh Grade:* 7.10A, 7.10C, 7.11B, 7.12A, 7.13A, 7.13B, 7.14A

*Eighth Grade:* 8.11A, 8.11B, 8.11C

### Life Science Vocabulary

abiotic, biodiversity, biotic, bulb, community, consumer, ecological succession, ecosystem, environments, environmental changes, external stimuli, domains, generation, genetic, heredity, internal stimuli, long-term changes, microhabitats, organisms, interdependence, internal structures, organisms, phloem, phototropism, populations, producer, short-term changes, soil composition, species, stalactites, stalagmites sustainability, taxonomic classification, variation, xylem, wilting

### Pre-Show Activity

#### Pre-Show Lesson: Biotic and Abiotic Features in a Cave Ecosystem

*Question:* "Do all ecosystems depend on plants?"

*Materials:* a picture of darkness, cave picture with stalactites and stalagmites, cave resource books or print outs

*Resources:*

Kramer, Stephen. *Caves: Nature in Action*. Minneapolis: Carolrhoda Books, 1995.

Taylor, Michael Ray. *Caves: Exploring Hidden Realms*. National Geographic, 2001.

If you search the Internet for "what lives in the dark zone in caves," you will find resources that you can use for this activity.

*Procedure:*

1. Tell the students that you are going to show them a picture of a mysterious ecosystem. Tell them that you want to share a picture of this ecosystem and that you would like them to think about the biotic and abiotic features found here. Show the kids a picture of darkness - just a black image. Tell them to begin discussing this ecosystem with their group. When they start to question, give them some hints. It's located in the Guadalupe Mountains in West Texas. It's always the same temperature - cool, even though it is located in the Guadalupe Desert. Most of the habitat has never been touched by light.
2. Once they guess that it is a cave, have them complete the assignment by
  - A. List the biotic and abiotic features of a cave in a T chart.
  - B. Create a cave food web.
  - C. Explain at least 3 ways these features are interdependent.

Explain to students that caves have 3 distinct areas - the entrance, the twilight zone, and the dark zone. You might want to show them a picture of what a cave looks like in the dark zone. This would include stalactites and stalagmites. Tell the students that you want them to discuss only what they would find in the dark zone habitat of a cave. You may want to give them a copy of an informational article about caves or a resource book to help them.

*Possible Answers:*

*Biotic: Troglodites live in the dark zone. These organisms have undeveloped eyes, poor pigment and long antennae because they've adapted to live in this environment. Some cave dwellers include; bats, fish, salamanders, insects, spiders, shrimp, crickets and a variety of fungi and bacteria. Plants have not yet to be found living in caves.*

*Abiotic: air (at a constant cool temperature), rock (often limestone), stalactites, stalagmites, darkness, moisture in the air, etc.*

*Interdependence: To adapt to complete darkness many cave dwellers have underdeveloped or no use of eyes and have developed a keen sense of hearing. Bat guano is a major source of nutrients for other cave dwellers. Some animals take shelter in the entrance or twilight zone in the summer to stay cool. Bats hang on the rough surface of the cave ceiling.*

3. In small groups discuss, "Where does the food chain start in a cave if there are no plants?"

Food moves into the cave in two ways: it is washed in, or it is carried in by animals. The water that enters the cave every day, even without a flood or rain, may look clear, but it contains much dissolved organic matter. Much of the food inside a cave is carried in by bats. Also, bat guano, cricket eggs, or dead organisms provide food. But, it all started with a plant somewhere outside of the cave.

## Post-Show Enrichment Activities

### Activity One: Reflection R.A.F.T.

In groups, students will write creatively using a R.A.F.T. to illustrate what they learned today.

Role: Students write as if they are a plant.

Audience: They are writing to humans.

Format: Their writing should take the form of a diary entry.

Topic: Describe what you like in your world and what humans can do to help keep it that way.

### Activity Two: Environmental Issue Analysis

Show students a current event about an environmental issue. There are many places to find these on the Internet. Ask them to work in groups to explain the cause and effect relationship between the abiotic and biotic factors in the ecosystem. They may want to create a flow chart to illustrate this. Discuss environmental changes. You may choose to give each group a separate article to review and present to the class.

### Activity Three: Plant Behaviors Experiment

Have students design a test using lima bean plants or grass seed to experiment with the causes of wilting, phototropism or the effect of an environmental change such as water pollution on a plant. They should identify their problem, hypothesis, variables, materials and procedure. Throughout the next couple of weeks, they should record observations in a data chart. Finally, they should analyze their data to draw conclusions and make inferences. They should include a data chart and a graph of their results.

### Activity Four: Xylem and Phloem

Investigations: Can plants absorb material in water? Put a celery stalk in a cup of colored water. Put another celery stalk in a cup of colored water with sugar or Kool-Aid. Put a third celery stalk in colored water and sand. Let them sit for a day. Using a plastic knife, students will cut open the stalks identifying the xylem and phloem. They will taste to see if the dissolved material (sugar) was transported through the stem. They will also look for the appearance of sand. Students will record their results and explain how the ability for plants to absorb dissolved material is important for their survival.