Grade 5 Structures & Functions of Living Organisms

Focus on: Abiotic and Biotic Factors for Pollination

This lesson is meant to support the unit on Structures & Functions of Living Organisms. It can be done prior to the unit to establish background information, during the unit to reinforce lessons or as a follow up to the unit to increase the retention of information. How you guide your students will depend on the information you have already taught and the information you want to introduce. Please remember that many gardens run on a yearly cycle and it will be easier to find more components of that ecosystem when it is at its peak season. You can, of course, utilize the garden at different times of the year, but the components of the ecosystem will be most evident during the peak growing season.

Clarifying Objectives:

5.L.2.2 Classify the organisms within an ecosystem according to the function they serve: producers, consumers, or decomposers (biotic factors)

5.L.2.3 Infer the effects that may result from the interconnected relationship of plants and animals to their ecosystem.

Focus Question:

Is pollination a biotic or abiotic factor in the garden ecosystem? How do you know?

Key Vocabulary:

Definitions can be found at http://learnersdictionary.com

-Biotic Factor
-Abiotic Factor
-Organism
-Ecosystem
-Function
-Producers
-Consumers
-Decomposers
-Infer
-Interconnected Relationship

Materials:

School Garden
Science Notebooks
Garden Gloves to wear while exploring the garden especially if touching plants, lifting pots, etc.

Activities:

1. Have students visit the school garden to look for pollinators. Use the Guiding Questions as they explore while students record their findings in their science notebooks.
2. Students will naturally observe flowering plants with bees and butterflies. After exploring those plants, direct students attention to a grass plant such as corn, popcorn, zebra grass, pampas grass, etc.

Guiding Questions:

- What is a pollination?
- What animals are doing the pollinating (bees, butterflies, moths and wasps will be most common)

(If these types of plants are not grown in your garden, talk to your garden coordinator about possibly adding them to your garden.) 3. You can also remind students of the green pollen that falls on everything in North Carolina in the spring when pine trees are pollinating 4. Ask students to hypothesize how plants like these pollinate. If no one suggests it, tell students that plants like these pollinate with the wind. Would wind be a biotic or abiotic factor? Would bees be a biotic or abiotic factor? 5. Is pollination a biotic or abiotic factor in the garden ecosystem? How do you know? 6. For more information, have students read the segment from an article found on the following page or visit the following website to read the entire article: http://www.eoearth.org/view/article/155289/ 7. Discuss	• What other animals can pollinate (other insects, humming birds, bats) • Are these animals consumers or decomposers? • Do all plants need these animals to pollinate them? (No, members of the grass family including rice, corn, wheat, etc. do not need pollinators in order to pollinate. Neither do some trees such as pine and other plants such as cabbage.)

http://www.eoearth.org/view/article/155289/

Pollination from “The Encyclopedia of Earth”

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Types of Pollination

Abiotic pollination refers to situations where pollination is mediated without the involvement of other organisms; these abiotic factors that achieve pollination include wind and gravity. Only 10% of flowering plants are pollinated without animal assistance.[2] The most common form, anemophily, is pollination by wind. This form of pollination is predominant in grasses, most conifers, and many deciduous trees. Hydrophily is pollination by water and occurs in aquatic plants which release their pollen directly into the surrounding water. About 80% of all plant pollination is biotic. Of the 20% of abiotically pollinated species, 98% is by wind and 2% by water.

A hummingbird feeding.

Biotic pollination is the more common process of pollination which requires biotic pollinators: organisms that carry or move the pollen grains from the anther to the receptive part of the carpel or pistil. This is '''biotic pollination'''. The various flower traits (and combinations thereof) that differentially attract one type of pollinator or another are known as pollination syndromes.

There are roughly 200,000 varieties of animal pollinators in the wild, most of which are insects.[2] '''Entomophily''', pollination by insects, often occurs on plants that have developed colored petals and a strong scent to attract insects such as, bees, wasps and occasionally ants (Hymenoptera), beetles (Coleoptera), moths and butterflies (Lepidoptera), and flies (Diptera). In '''Zoophily''', pollination is conducted by vertebrates such as birds and bats, particularly, hummingbirds, sunbirds, spiderhunters, honeyeaters, and fruit Bats. Plants adapted to using bats or moths as pollinators typically have white petals and a strong scent, while plants that use birds as pollinators tend to develop red petals and rarely develop a scent (few birds have a sense of smell).