In the Water: In the Plants

Objectives

Learners will:

- Understand the capability of wetlands to cleanse water through storage of soluble substances in living plants.
- Understand that any natural systems (*wetlands*) can become overloaded if there are too many contaminants.

Method

Learners will observe the ability of plants to absorb soluble substances in water.

Materials

- "It's in the Water" data sheet, one copy per team
- Two sets of two plastic water cups per team, 250 ml polypropylene beakers
- Red food coloring
- Vinegar
- Two measuring cups, 250 ml polypropylene beakers
- One paring knife per team
- Several bunches of fresh celery stalks
- One ruler per team

Background

Wetlands play an important role in maintaining water quality. Water enters the wetland from surface runoff or from ground water. Either of these water sources may bring with them fertilizers and other waterborne contaminants.

Many things may be dissolved in the water that moves through plants. If the water carries pollutants, these pollutants may be left in the plant; if the plant is one used for food, then these pollutants may get into the people or animals who eat them.

In the summer when plants are actively growing, nutrients and contaminants are absorbed by wetland plants. In the fall and winter when plants die and decay, these nutrients are released. There is a lower concentration of nutrients in water from runoff and ground water in the winter so ecosystems downstream can generally make good use of these released nutrients.

Wetlands have been called natural "water treatment operations." In a time when humans introduced fewer pollutants and less silt to the waters entering wetlands, they were very efficient indeed.

Today heavy metals, petroleum products, and fertilizers are more abundant in the environment. Wetland's ability to purify water can be exceeded, resulting in degradation of other parts of the environment. As you study the ability of plants to remove contaminants from the system, remind students that the ultimate answer is to reduce the amount of these pollutants in the environment.

Procedure

Divide the group into two teams. Give each team two plastic cups and two stalks of celery. Have the learners trim the bottom end off each celery stalk. No stalk should be longer than 11 inches. Use stalks with leaves if possible. Label the plastic cups with masking tape: cup "A," cup "B."

In Cup A put 3/4 cup water, several drops red food coloring, and 1/4 cup vinegar. Add a trimmed celery stalk. In Cup B put 1 cup water, several drops red food coloring, and a trimmed celery stalk.

Place all the cups near a window and leave them there for a minimum of 4 hours, overnight, or up to several days. Ask the learners what they think will happen to each celery stalk. How will the results in Cup A differ from Cup B? Have the learners answer the questions on page 1 of the Data Sheet with what they expect to find for each celery stalk. If you are doing this activity as a demonstration, place the celery in the prepared cups 48 hours before you will show it to the learners.

Results

When the celery has been soaking a sufficient amount of time, some red color may show on the celery stalks that have leaves.

Ask the learners to observe their celery stalks beginning with Cup B. For this part of the investigation, learners will need a ruler, a knife, and a piece of notebook paper. Each team should answer all the questions on the data sheet. After the teams have completed their observations, bring the group back together and compare results.

Discussion

Could anyone tell, just by looking at the celery stalks, that a substance other than red colored water was in one of the celery stalks?

If the pollutant in the water used by the celery stalk had no color, no odor, and no taste, how would we know it was there?

Extension

A demonstration of the movement of water through the celery stalk and out of the leaves—*transpiration*.

Place an extra celery stalk containing leaves in one of the Cup B solutions. Over the leaves at the top end of the stalk, place a plastic sandwich bag. Secure the bag around the celery stalk with a rubber band. After a period of time, water droplets will collect in the bag. The water has moved from the cup, through the celery, and out into the air to be captured in the plastic bag.

Water droplets in the bag will be clear, not red. Why?