NUTRIENTS FOR LIFE NUTRIMENTS POUR LA VIE

HERE'S A LESSON WORTH TEACHING

Lesson #2

Investigating Nutrient Movement

Appropriate for Middle & High School

SUPPLIES NEEDED

Large container
Disposable paper or plastic cup
Food colouring
Water

OVERVIEW

Plants remove water and nutrients from the soil through the plant's root system. Some nutrients move into root cells from the soil by diffusion and others by an energy-requiring process (active transport). This diffusion activity represents one-way movement of dissolved nutrients into the plant roots.

PRIOR TO THE EXPERIMENT

Ask your students, "How do nutrients in the soil water get into the plant's root hairs?"

a. Accept all answers at this time.

Explain that there are two ways water and nutrients move into plants' root system. One is active transport, and the other is diffusion. In diffusion, molecules move randomly due to their kinetic energy. This movement causes molecules to intermingle.
The net movement of molecules is from an area of high concentration to one of lower concentration. The net movement stops when the concentration of the molecules is the same everywhere. The movement comes from their kinetic energy and does not need additional energy (unlike active transport).

PROCEDURE



STEP 1: Pass out a container, water, food colouring and cup (with 2 holes opposite each other towards the base of the cup) to each group. The water level in the larger container must be higher than where the holes on the cup will be.
STEP 2: Fill the cup about ½ full of water. Have someone hold the holes closed.
STEP 3: Place the cup of water into the centre of the larger container.
STEP 4: Fill the larger container with the water until it is level with the amount of water placed into the cup.
STEP 5: Add several drops of food colouring to the water in the larger container and gently mix the water until the color is evenly distributed. Do not add colouring inside of the cup!
STEP 6: Watch the water in the cup for 5 minutes and record observations.

MAJOR CONCEPTS

Diffusion is the movement of a nutrient ion from an area of high concentration to an area of lower concentration.

In a soil system, the surface of the root is usually considered to be the area of lower concentration. The surface of the clays in the soil aggregates is thought to be the area of high concentration. Therefore, the positively charged nutrient ions diffuse from the surface of clays in the soil to the surface of the root. Nutrient uptake by plants keeps the concentration at the root surface low.

Diffusion is slow but continuous as long as the plants are growing.

OUR MISSION

Educating Canadians about the sustainable use of nutrients to increase the health and quality of our soil, improve production of nutritious food, and preserve green spaces.

Nutrients for Life Foundation Canada is a non-profit organization that provides information and resources to educators and individuals like you, to help inform the public about the vital role that plant nutrients play in feeding the world. The information we have compiled is science-based and user-friendly. It has been successfully implemented by educators across the country. Through a grassroots effort, we can spread the word about soil health to students of all ages and to adult organizations that are always looking for programs. Our story is not only important, but it is interesting and serves a vital role in educating consumers and decision-makers in the future.

This lesson is found in NFL's resource, ***Nourishing the Planet in the 21st Century***.

All of our resources are free to teachers across Canada.