

Agrium

Dear Teachers,

Welcome to the A-Maze-ing Underground game!

Purpose

Acting as junior pedologists, or soil scientists, this game will assist your students in investigating, identifying and understanding the physical and chemical properties of soil. Students will discover soil properties and drive the relationships among nutrients, organic factors and plant growth. Balancing the nutrients (N) nitrogen, (P) phosphorus and (K) potassium (and water!) is essential in producing healthy plants. The learning is fun and interactive, and students will establish a soil profile at the end of the game that enables them to connect soil health to plant/crop productivity.

Background

Soils are the natural media for the growth of plants. Think of soil as a thin living skin that covers the earth. In general terms, soil is defined as the naturally occurring mineral or organic material at the earth's surface that is capable of supporting plant growth. It is a mixture of fragmented and partly or wholly weathered rocks and minerals, organic matter, water, and air, in greatly varying proportions. Soil is more than rock particles - it includes all living things and the materials they make or change.

Soil is a complex system that has developed since the glaciation 10,000 years ago. Soil formation is a slow, but continuous process. It can take 1,000 years to form one inch of soil.

Soil horizons, or layers, have been altered by the interactions of climate and living organisms over time. Soil horizons are used to classify the soil and make interpretations. Soil horizons differ in a number of easily seen soil properties such as color, texture, structure and thickness. Other properties, such as chemical and mineral content, consistence and reaction, are less visible.

*Soil horizons are defined for students at the end of the game as an option to learn more.

The composition of soil can vary widely, but it is usually a mixture of mineral particles (sand silt and clay), organic remains in various stages of decomposition, water, air and a wide variety of living organisms. The community of organisms that live below the surface is vital to the condition of soil. The community of organisms (beetles, worms, mites, bacteria and fungi) break down and mix the organic matter in the soil. They also help aerate the soil as they move through it. These organisms are important nutrient recyclers, decomposing organic matter and returning its nutrients to the soil.

*Students can take up to 11 pictures in the game and view them after they receive their game results. Card profile include sand, silt and clay as well as various insects and animals found in North American soils. The profile cards are in PDF format and can be printed in class.

The purpose of the game is to understand the nutrient and water balance needed in the soil to grow a healthy and nutritious crop. With the A-Maze-ing Underground Agrium hopes to teach children more about soil content and structure. Understanding the nature and function of healthy soil will enhance their understanding of plant growth.

Student Outcomes

Observe, describe and compare living things.

Identify the requirements of plants to maintain life; i.e., air, light, suitable temperature, water, growing medium, space; and recognize that we must provide these for plants in our care.

Identify ways that land plants depend on soil.

Recognize that small animals, like humans, have homes where they meet their basic needs of air, food, water, shelter and space; and describe any special characteristics that help the animal survive in its home.

Identify each animal's role within the food chain.

Describe the relationships of these animals to other living and nonliving things in their habitat, and to people.

Identify ways in which animals are considered helpful or harmful to humans and to the environment.

Compare and contrast small animals that are found in the local environment. These animals should include at least three invertebrates—that is, animals such as insects, spiders, centipedes, slugs, and worms.

Identify each animal's role within the food chain. To meet this expectation, students should be able to identify the animals as plant eaters, animal eaters or decomposers and identify other animals that may use them as a food source.

Describe the relationships of these animals to other living and nonliving things in their habitat, and to people.

Identify ways in which animals are considered helpful or harmful to humans and to the environment.

Identify plant and animal wastes, and describe how they are recycled in nature. For example, plant leaves serve as a source of food for soil insects, worms and other creatures. The wastes of these animals may then be further broken down by molds, fungi and bacteria.

Describe the importance of plants to humans and their importance to the natural environment.

Identify and describe the general purpose of plant roots, stems, leaves and flowers.

Recognize that plant requirements for growth; i.e., air, light energy, water, nutrients and space; vary from plant to plant and that other conditions; e.g., temperature and humidity; may also be important to the growth of particular plants.

Use collected data to develop an understanding of the relationship between nutrients, water, soil and crop production yields.

We encourage you to fill out our teacher survey on the A-Maze-ing Underground located on the landing page of this test site. Your feedback will help us to improve the game as well as justify the expansion of it in the near future.