Mission 3

We have learned about the Moon’s environment and about the parts of plants. In this mission we will begin to learn what it takes to keep plants alive. Plants need seven important things in order to grow, and the next two missions are about these seven things. We will compare the Moon environment to the Earth environment. Does the Moon have all of the same conditions as Earth? If not, what do we need to think about to make sure the plants can grow on the Moon?

Soil and Plants

Plants and humans need three of the same things to live: air, water, and nutrients. The soil on Earth plays an important role in getting water and nutrients to the roots of plants. The soil also allows air movement around the roots. Remember, the roots take in water and nutrients from the soil and move them into the plant. Soil has other important roles, too. Soil keeps the roots of plants secure and supports plants so they can grow well. Some types of food that we eat everyday are even grown completely under the soil! Potatoes, radishes, and carrots grow and develop in the soil itself.

Soil on the Earth

The soil on Earth is made up of four main things. Rock particles broken down by wind and water make up the largest part of soil on Earth. Soil also contains water and air. Lastly, soil is made up of organic materials. Humus is among the richest and darkest of soils and develops from decaying plant and animal life. Humus is generally very dark and is a good fertilizer because of the nutrients contained in the decaying plants and animals. Humus can hold and release water and nutrients as needed. It also improves the soil so that air can move in the soil. It is crumbly instead of sandy, like a beach or clumpy like clay.

Soil can be described in terms of its texture. Texture refers to how much sand, silt, and clay is in the soil. Sand is the largest of these soil particles. Sand is very rough and does not hold nutrients that plants need to grow very well.

Silt is a medium-sized soil particle that feels smooth to the touch. Silt can hold a lot of water, and water moves easily through it. Large amounts of silt can be found where rivers empty into lakes because silt is washed downstream by rivers. Clay is the smallest or finest particle in soil. Clay is smooth and can hold many nutrients, but water and air do not move through clay very well.

Loam is soil that has the best mixture of clay, sand and humus for growing plants. In trying to get the right balance of nutrients, many people make their own organic material and add it to the soil. It is called compost. Composting is the natural breakdown of plants and other once-living materials. As the materials die and break down they release nutrients for other plants to use. Composting happens in nature when leaves on the forest floor decay and pass their nutrients on to the soil, but humans can also make
compost. To make a compost pile, you add the right combination of dead leaves, lawn clippings, and food scraps. The compost pile must be stirred once in awhile so that air can help the material to decay. Tiny creatures called microorganisms, such as bacteria and fungi, break down the organic matter, and heat is produced when this happens. When a compost pile is working well, it can get very hot in the middle!

**Soil on the Moon**

Now that we know more about soil on Earth, what about soil on the Moon? There are two types of terrain on the Moon: areas filled with craters (called the highlands) and smooth areas (called the maria). Craters are bowl-shaped marks on the Moon's surface that were made after the Moon was hit by large objects, such as meteors. The maria are craters that were flooded and filled with molten lava. The surface of the moon is mostly covered with regolith, a mixture of fine dust and rocky debris made by meteor impacts. Regolith can be called the "soil" of the Moon. The look and feel of regolith is different from place to place on the Moon and is deeper in some places than in others.

What about Moon rocks? The rocks of the Moon were formed when lava cooled and hardened many years ago. How are rocks on the Moon different than on Earth? Remember, the Moon has no atmosphere or weather. So rocks on the Moon are not eroded by wind, water, or ice.

**To Soil or not to Soil…**

Do plants really need to have soil in order to get water, air and nutrients? Maybe not. Many new vegetable farms are using a system to grow plants called hydroponics. In hydroponics, plants can get some things they need to live without the use of soil. The plant food in a hydroponic garden is given to the plants by mixing natural fertilizers in water to make a 'nutrient solution'. The plant roots may be put on a block or tube that allows air to flow around the roots. In aeroponics the roots are constantly sprayed with a nutrient-rich solution.