**Introduction to Environmental Science GNED 162**

**LAB 8**

**Soil, Chemical Characteristics**

(Adopted from: AP Environmental Science Laboratories)

**INTRODUCTION**

Soil is one of the earth’s most important, yet least appreciated, resources. It performs a valuable role in land ecosystems. In order for a community of producers and consumers to become established on land, soil must be present. Furthermore, soil quality is often a limiting factor for population growth in such systems. Soil is a complex mixture of inorganic materials, organic materials, microorganisms, water and air (Read Chapter 12, p 309-312). Its formation begins with the weathering of bedrock or the transport of sediments from another area. These small grains of rock accumulate as a layer on the surface of the earth. There they become mixed with organic matter called humus, which results from the decomposition of the waste products and dead tissue of living organisms. The soil formation process is very slow (hundreds to thousands of years), so it can be very detrimental to a community if the soil is lost through erosion or its quality degraded in any way. Soil contains important primary plant nutrients such as nitrogen, potassium and phosphorus. Water and air are also trapped in its pore spaces. These are all necessary ingredients for the growth of plants.

In this lab activity you will determine chemical characteristics of your soil sample.

**LAB PROCEDURE**

Next you will use a commercial soil testing kit to determine the content of three plant nutrients: nitrogen, potassium and phosphorus. These are the primary macronutrients needed by plants. They can become depleted in soils due to human activity such as farming, runoff, or excess irrigation.

**Hints for a successful lab:**

1. Plan your time wisely. Some activities require a sample to sit for ten to thirty minutes. Begin a new activity while waiting for another activity to finish.
2. Read the instructions with the soil testing kit carefully.
3. **Do not put soil down the drain. It will clog the pipe.**

**Determine primary soil nutrients:**

1. Determine the nitrogen, potassium and phosphorous contents of the soil samples **A** and **B** following the procedure provided with the soil test kit. Note: During each of these tests you must allow the soil to settle for about ten minutes.
2. Record your results for the levels of nitrogen, potassium, and phosphorus in each sample.
3. Record the PH of each soil sample using the test strips provided.
4. **Cleanup lab:**
5. Dump unused soil in an appropriate area outside or in provided container.
6. Soil used for the chemical tests should be placed in an appropriate area outside or in provided container. Do not put soil down the sink!

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**LAB 8 Soil**

**Table 1:** Results of soil testing for Plots **A** and **B.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SOIL** | **Nitrogen** | **Phosphorus** | **Potassium** | **PH** |
| **Plot A** | Low (darker) | Low | Medium | 5 |
| **Plot B** | Low | High | Low | 5 |

1. **What role does humus play in soil fertility?**

Humus is rich in microorganisms which helps plants to absorb nutrients or to combat diseases.

1. **Why is pH such an important aspect of soil fertility?**

The level of pH will influence the kind of organisms that live in the soil. pH can also help plants grow bc each plant has an optimum pH level at which it will flourish.

1. **What are some natural sources of the nitrogen, potassium and phosphorous found in soil?**

Nitrogen: Humus and bacteria

Potassium: decaying organic matter and soil minerals

Phosphorus: decaying organisms

1. **For what are each of these three primary plant nutrients used by living organisms?**

Nitrogen: photosynthesis

Potassium: photosynthesis, creates proteins using DNA and RNA

Phosphorus: plays a role in photosynthesis by forms sugars and starches, helps assist other enzymes

1. **By what process is atmospheric molecular nitrogen (N2) converted into a form that plants can readily absorb through their roots?**

Molecular Nitrogen is converted into a form plants can use through a process called Nitrogen fixation. The nitrogen is turned into ammonia in this process.

1. **Evaluate the fertility of the soil used in this lab activity based upon your results that is, which soil sample is more fertile)?**

Sample A was more fertile because it has more nitrogen and more potassium.