**Soil Characteristics and Plant Growth Lab**

**Objective**:

Determine which soil type is best at growing radish plants.

Develop a testable hypothesis and design an experiment to test which soil mixture will grow successful radish plants as measured by biomass.

**Soil Characteristics:**

Soil consists of a mixture of mineral materials of different sizes and chemical composition, air, moisture, and living organisms. Particle size influences water-holding capacity and pore space. Pore space allows air to penetrate the soil. Plants need three resources from the soil in order to grow. The roots need oxygen to carry on aerobic respiration and grow. Water is needed as a transport medium and a raw material for photosynthesis. Mineral nutrients, such as nitrogen, phosphorus, and potassium, as well as many minor nutrients are needed for the addition of new living material to the plant. In this experiment, you will look at the way in which soil type influences the growth of plants.

**Question**: Which soil type will be best at growing radish plants?

**Questions to address in the Introduction**:

1. What is the chemical formula for both photosynthesis and aerobic respiration? Explain how both of these processes interact to allow for plant growth.

1. Differentiate between the most common soil types (sand, silt, clay, and loam) as they relate to plant growth.

**Lab Design**:

1. Create a testable hypothesis based on the question posed with regard to radish plant growth. Remember to use “if…, then…” and include changes (increase/decrease). Needs to be specific. *(Hint: You may want to do some background research on soil types and radish growth before designing hypothesis.)*
2. Determine both the independent and dependent variables for your experiment.
3. Design a control group for your experiment.
4. Determine all external factors that must be controlled throughout the experiment. Include maintenance of growing over 2-week period.
5. Develop your own set of procedures based on the lab design and materials available.
6. Set up experiment to test radish growth using one control and minimum of 3 test groups.

**Materials for Use:**

Syrofoam cups

Graduated cylinders

Ruler

Radish plant seeds

Water

Sand

Cotton Balls

Pea gravel

Topsoil

Commercial potting soil

**Data**: Design a table to include your collected data, which should include all characteristics you will monitor during the 2-week growth period and after growth (may include any of the following):

1. Water holding capacity (per soil type).
2. Number of germinated seeds (daily).
3. Color of plant visible (daily).
4. Height of plant visible (daily).
5. Plant root growth (after growth; average and total).
6. **Biomass production** (after growth; average and total).

**Questions to address in the Conclusion**:

1. Describe how the results of the experiment supported or refuted your original hypothesis.
2. Which soil showed the greatest biomass production?
3. What soil characteristics do you believe contributed to these results and why?
4. Which soil showed the least biomass production? Why?
5. Do the sizes of the root masses differ in different soils? How?
6. Explain how sources of error may have skewed your results (cannot be human error). How could the lab have been improved in order to provide better results?
7. Based on the results, develop a follow-up hypothesis to extend the experiment.
8. A farmer in a nearby area has mainly sandy loam soil. As an extension agent, would you recommend he plant radishes in his fields, and if not, what type of edible vegetation would he economically benefit from?