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**5.1 Introduction to Soil Systems**

**I -**

Use the Environmental Science section at [www.hippocampus.org](http://www.hippocampus.org)

**Part A: Soil Profile**

Name each of the soil layers and describe its content.



O: Organic Horizon: decomposed material and humus

A: mixed mineral organic horizon: humus, ploughed

E: Eluvial, podzol, brown earth

B: Illuvial, iron humus clay deposited

C: bedrock: rock

**Part B Soil texture**

Soil is a mixture of \_\_\_\_\_\_\_\_\_\_Minerals\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_organic matter\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_gasses\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_liquids\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Soil texture is a measure of the volume proportions of \_\_\_\_\_\_\_\_\_\_clay\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_silt\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_sand\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Soil texture determines:

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_surface area\_\_\_\_\_\_\_\_\_\_\_ which is the water holding capacity of the soil and
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Porosity\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which is the rate at which water moves through it

Rate the following soil types with relation to permeability (sand, clay)

Low permeability high permeability

Clay Sand

Loam is best for growing crops as they have a mix of

\_\_\_\_\_\_\_\_\_\_\_\_\_\_water holding capacity\_\_\_\_\_\_\_\_ at the volume proportion of \_\_\_\_\_\_%

\_\_\_\_\_\_\_\_\_nutrient content\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the volume proportion of \_\_\_\_\_\_%

\_\_\_\_\_\_\_\_\_structure\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ at the volume proportion of \_\_\_\_\_\_%

**II – Primary productivity of Soil**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Texture** | **Nutrient Capacity** | **Infiltration** | **Water holding capacity** | **Aeration** | **Workability** |
| Clay | Good | Poor | Good | Poor | Poor |
| Silt | Medium | Medium | Poor-medium | Poor-medium | Medium |
| Sand | Poor | Good | Poor | Good | Good |
| Loam20% clay, 40-60% sand and 80% silt | Medium | Medium | Medium | Medium | Medium |

After looking at the structure & properties of the types of soil, predict which will have the greatest primary productivity

\_\_\_\_\_\_\_\_\_\_\_\_Loam\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* \_\_\_\_\_\_\_\_\_\_\_mineral\_\_\_\_\_\_\_\_\_ content holds nutrients and water,
* \_\_\_\_\_\_\_\_\_\_\_\_\_mineral\_\_\_\_\_\_ content ensures \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_infiltration\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of water, it has large air spaces that roots can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_spread\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and decomposers can use for decomposition.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_soil puts\_\_\_\_\_\_\_\_\_\_ the clay and sand together.

**III – The soil horizon layers**

|  |  |
| --- | --- |
| **Soil Horizon** | **Labels with details** |
| **O Organic** | l undecomposed litterf partly decomposedh well-decomposed humus |
| **A Mixed mineral organic**  | h humusp ploughedg gleyed or waterlogged |
| **E Eluvial or leached horizon (not always present, mostly in older soils)** | a strongly leachedb weakly bleached |
| **B illuvial or deposited horizon** | Fe iron depositedt clay depositedh humus deposited |
| **C bedrock or parent material** | r rocku unconcealed materials |

**IV – Define these key terms/definitions:**

|  |  |
| --- | --- |
| Terms |  |
| Leaching | Loss of certain materials/drained |
| Gleying | Wetland soil saturated with groundwater |
| Feralization | Making the ground more fertile and feeding it more decomposed material |
| Podsolization | Soil in humid areas with a leached upper |
| Salinization | Build up of salt in soil |
| Humus | Organic compounds in soil |
| Weathering | Change texture |
| Erosion | Gradual destruction |
| Eluvium | Removal of materials from geological or soil horizons |
| Alluvium | Deposit of clay, silt, sand from flooding |
| Illuvium | Material displaced |

**V –**

1. Define what we mean by the term *soil?*

Upper layer of the Earth where plants are

1. Describe how soil is a mixture of the lithosphere/biosphere/atmosphere/hydrosphere

All the gasses condense and form parts of the soil, and helps makes plants which also release gasses back up.

1. Draw and label a systems diagram of soil using inputs/outputs and stores



1. What is a soil profile (and horizon)? *Draw a sample profile with details of all the main layers.*



1. What is the average % make-up of the soil constituents?

45-49%

1. Write a simple soil food chain or web.



**VI – Group Work**

1. Create a graphic organizer on soil systems that should include the following: inputs, outputs and processes, transfers, transformations.



**VII –**

1. Identify the biome where the soil compartment represents the largest store of nutrients.

Deciduous

1. Explain the importance of soil organisms in ecosystems.

Allows plants to grow, more producers, primary consumers can consume them and the food web is made. Richer soil, more plants and more food for everyone

1. The graph in Figure 1 below shows how soil textures are classified by the proportions of sand, silt and clay present.



Figure 1

Figure 2 below shows the composition of two soil samples, Soil A and Soil B. Soil A is classified as clay and its position is indicated on Figure 1.



Figure 2

1. With reference to Figure 1 and Figure 2, determine the classification of Soil B.
2. Deduce, giving a reason, whether Soil A or Soil B would be best for growing crops.
3. The best soil for growing crops:

B

1. Reason:

Most likely loam and the most even mixture of each component