

INTRODUCTION TO SOIL SCIENCE (Biol 409)



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1. Introduction

1.1 Importance of soil

- soils have five key roles to play
 1. soil supports the growth of higher plants
 - mainly by providing a medium for plant roots and supplying nutrient elements
 2. soil properties are principal factor controlling fate of water in the hydrologic system
 - Water loss, utilization, contamination & purification are all affected by the soil

3. Soil functions as nature's recycling system

- Within soil, waste products & dead bodies of organisms are **decomposed**
- And their basic elements are made available for reuse by the next generation of life

4. Soils provide habitats for a countless of living organisms

- Microbes, Plants, Animals live and interact there

5. Soil plays important role as an engineering medium in human-built ecosystems

- important building material in the form of earth fill and bricks
- provides the foundation for every road, airport & house we build.

1.2 Concepts of Soil

- Human have different concepts about soil
 - for **farmer** soil is a habitat for plants
 - For a **mining engineer** the soil is the debris covering the rocks or minerals
 - He perceives soil as a pest and wants to remove it
 - For a **highway engineer** soil is a material on which a roadbed has to be placed.
- In general, there are 3 d/t concepts of soils

A. Medium for Plant Growth (Earliest concept)

- Man understood that the potential for plant growth lies in the soil
- Consequently, he started classifying soil based on their production potentials

B. Weathered rock (Impact of geology on the study of soils)

- Geologists, engineers, space scientists and oceanographers share this idea
- They believe **character of source rock** determine nature of the soil
- Soil by this concept includes **unconsolidated rock + mineral matter** on surface all planets

C. A natural body (Soil as a product of the environment under which it develops)

- soil is a **natural body that** varies with climate, vegetation, relief, rock type & time
- It was this concept that realized that soil is a unique being formed through pedogenic processes & is different from underlying rocks & minerals

1.3 Approaches in soil study

The **two basic approaches** to soil study are:

A. Soil as a natural entity,

- Soil bio-chemically weathered & synthesized product of nature(***pedological approach***)
- A pedologist considers soil as a natural body & places minor emphasis on its immediate practical utilization
- The information about the soil is useful to any user of the soil

B. Soil as a natural habitual for plants

- ***Edaphological approach***
- An edaphologist considers the various properties of soil in related to plant production
- Thus, looks reasons for variations in productivity of soils & options for improving them

1.4. Definition of soil

- A widely accepted definition today was devised by the Soil Taxonomy in 1999
- *soil is a natural body*
 - *comprised of **solids** (minerals and organic matter), **liquid, & gases***
 - *occurs on the land surface*
 - *is characterized by horizons or layers*
 - *distinguishable from initial material as a result of additions, losses, transfers & transformations of energy & matter*

It can be also defined as:

- Mineral & Organic material that supports plant growth on the earth's surface
- Mixture of particles of rock, organic materials, living forms, air, water