

By: Priyanka Srivastava

Soil: Definition

Geological definition: “Soil is an accumulation of loose material from mechanical and chemical weathering of rocks (also relocated) and containing a large admixture of various organic substances on the Earth's surface”

Pedological definition: “Soil is a natural body, which evolved from surface weathering of the Earth crust and organic residues. Its structure and composition are the result of climate and live organisms living in the soil and on the soil”

Pedology:

It is the scientific discipline concerned with all aspects of soils, including their physical and chemical properties, the role of organisms in soil production and in relation to soil character, the description and mapping of soil units, and the origin and formation of soils. Pedology includes several subdisciplines, Like-soil chemistry, soil physics, and soil microbiology.

Components of Soils (Volume Basis):

The soil consists of four major components (Fig.1.1) i.e. mineral matter (45%), organic matter (5%), soil air (20-30%) and soil water (20-30%).

Four major components of soils (volume basis)

1. Mineral matter

The minerals are extremely variable in size. Some are as large as the smaller rock fragments, others, such as colloids clay particles, are so small that they cannot be seen without the aid of an electron microscope.

2. Organic matter

Soil organic matter represents partially decayed and partially synthesized plant and animal residues. Such material is continually being broken down by the action of soil microorganisms. Consequently, organic matter is a transitory soil constituent and renewed constantly by the addition of plant residues.

3. Soil water

Soil water is the major component of the soil in relation to the Plant growth. The water is held within the soil pores. If the moisture content of a soil is optimum

for plant growth, plants can readily absorb water. Soil water dissolves salts and makes up the soil solution, which is important as a medium for supplying nutrients to growing plants. There is an exchange of nutrients between the soil solids and the soil solution and then between the soil solution and plants roots.

4. Soil air

A part of the soil volume that is not occupied by soil particles, known as pore space, is filled partly with soil water and partly with soil air. As the pore space is occupied by both water and air, volume of air varies inversely with water. As the moisture content of the soil increases, the air content decreases and vice-versa.

Types of Soil:

There are various types of soil and are mainly classified by its texture, properties and forms of organic and mineral composition. The main four basic types of soil are:

1. Sandy Soil

These are typically comprised of approximately 80 – 100 per cent sand, 0-10 per cent silt and 0 -10 per cent clay by volume. Sandy soils are light and typically very free draining, usually holding water very poorly due to very low organic content and thus not good for the growth of plant. Sandy soil is usually formed by the breakdown or fragmentation of rocks like granite, limestone, and quartz.



Sandy Soil

2. Silt Soil

Silt, which is known to have much smaller particles compared to the sandy soil and is made up of rock and other mineral particles which are smaller than sand

and larger than clay. It is the smooth and quite fine quality of the soil that holds water better than sand. Silt is easily transported by moving currents and it is mainly found near the river, lake, and other water bodies. The silt soil is more fertile compared to the other three types of soil. Therefore it is also used in agricultural practices to improve soil fertility.



Silt Soil

iii) Loamy Soil

These are typically comprised of approximately 25 – 50 per cent sand, 30 – 50 per cent silt and 10 – 30 per cent clay by volume. Loam soils are somewhat heavier than sandy soils, but also tend to be fairly free draining, again, due to typically low organic content. It has the ability to retain moisture and nutrients, hence, it is more suitable for farming. This soil is also referred as agriculture soil.



Loam Soil

(iii) Clay Soil:

These soil are typically comprised of approximately 0 – 45 per cent sand, 0 – 45 per cent silt and 50 -100 per cent clay by volume. Clay soils are not typically free draining, and water tends to take a long time to infiltrate. When wet, such soils tend to allow virtually all water to run-off. Clay soils tend to be heavy and difficult to work when dry. The particles in this soil are tightly packed together with each other with very little or no airspace. This soil has very good water storage qualities and making hard for moisture and air to penetrate into it. It is very sticky to the touch when wet, but smooth when dried. Clay is the densest and heaviest type of soil which do not drain well or provide space for plant roots to flourish.



Clay Soil

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