

Soil aeration

Soil aeration is defined as the exchange of gases between the soil and the atmosphere.

The composition of soil air at any time is the result of two sets of rate processes such as:

- a) The rate of production of carbon dioxide and consumption of oxygen.
- b) The rate of carbon dioxide is escaped from the soil and is replaced by oxygen.

The composition of soil air should have the following characteristics:

1. Generally, oxygen content decrease and the carbon dioxide increase with depth of soil.
2. The carbon dioxide content of soil shows as seasonal variation, being higher in summer than in winter, because of greater root and microbial activity in summer.
3. The oxygen and carbon dioxide content of soil air depends upon the application of organic matter. The increase of organic matter causes increase in carbon dioxide.
4. The carbon dioxide content is higher in wet soil than in dry soil.
5. The oxygen and carbon dioxide contents of the soil air depend upon porosity of the soil. Oxygen content is lower and carbon dioxide is higher in fine textured soil.

Factors affecting soil aeration

- a) Soil water content: soil aeration decreases with increase in water content.
- b) porosity of soil: the volume of pores of a soil is the most important factor influencing the soil aeration.
- c) Tillage: Tillage generally increases air filled porosity causing an increase in soil aeration.
- d) Drainage: Drainage of waterlogged lands improves soil aeration.

Measurement of Aeration conditions of soil

The aeration condition of a soil can be determined by various ways, the most important ways are:

Aeration porosity

Aeration porosity signifies the volume fraction of soil mass occupied by air. It can be determined indirectly from soil volume relations:

$$F_a = F - \theta$$

F_a = Aeration porosity

F = total porosity

θ = Volumetric water content

Importance of Soil Aeration

1. Plant and root growth: Soil aeration is an important factor in the normal growth of plants. The supply of oxygen to roots in adequate quantities and the removal of CO₂ from the soil atmosphere are very essential for healthy plant growth

2. Microorganism population and activity: The microorganisms living in the soil also require oxygen for respiration and metabolism. Some of the important microbial activities such as the decomposition of organic matter.