



**Biotica
Research
Today**

Vol 2:11 **1135**
2020 **1136**

Soil Physical Properties Influencing Irrigation

Nabanita Sarkar

Dept. of Soil and Water Engineering, Faculty of Agricultural Engineering, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur, Nadia, Mohanpur, West Bengal (741 252), India



Open Access

Corresponding Author

Nabanita Sarkar

e-mail: nabanitasarkar84@gmail.com



Keywords

Capillary, Irrigation, Soil structure, Soil texture

Article History

Received in 09th November 2020

Received in revised form 12th November 2020

Accepted in final form 13th November 2020

E-mail: bioticapublications@gmail.com

How to cite this article?

Sarkar, 2020. Soil Physical Properties Influencing Irrigation. Biotica Research Today 2(11): 1135-1136.

Abstract

Soil-water-plant relationship relate to the properties of soil and plants that affect the movement, retention, and use of water. The rate of entry of water into the soil and its retention, movement and availability to plant roots are all physical properties of soil. A number of soil physical characteristics collectively have potential to impact irrigation practices and management, and how efficient a job is done with irrigation.

Introduction

Soil is comprising of three phase system, viz., (a) Solid phase made of mineral and organic matter and various chemical compounds, (b) the liquid phase (soil moisture phase), and (c) the gaseous phase (soil air phase). The main components of solid phase are soil particles, soil size and shape of which give rise to pore spaces of different geometry. These pore spaces are filled with water and air depending on amount of moisture present. Soil usually contains numerous living organisms like bacteria, fungi, algae, protozoa, insects and small animals which directly or indirectly affect soil structure and plant growth. The most important soil properties influencing irrigation are its infiltration characteristics and water logging. Other soil properties like soil texture, soil structure, capillary conductivity, soil profile conditions, and depth of water table are also important for the management of irrigation water.

Soil and Water Relationship for Plant Growth

Water is held in soil in two ways such as a thin coating on the outside of soil particles and in the pore spaces. Soil water in the pore spaces can be divided into two different forms as gravitational water and capillary water. Gravitational water generally moves quickly downward in the soil due to the force of gravity. Capillary water is the most important for crop production because it is held by soil particles against the force of gravity. As water infiltrates into a soil, the pore spaces fill with water. As the pores are filled, water moves through the soil by gravity and capillary forces. Water movement continues downward until a balance is reached between the capillary forces and the force of gravity. Water is pulled around soil particles and through small pore spaces in any direction by capillary forces. When capillary forces move water from shallow water table upward, salts may precipitate and concentrate in the soil as water is removed by plants and evaporation.

Advantages of Soil Physical Properties on Irrigation

Keeping soil physical properties in mind in designing and operating irrigation systems, it may be possible to:

- Achieve better plant responses to irrigation water applications.

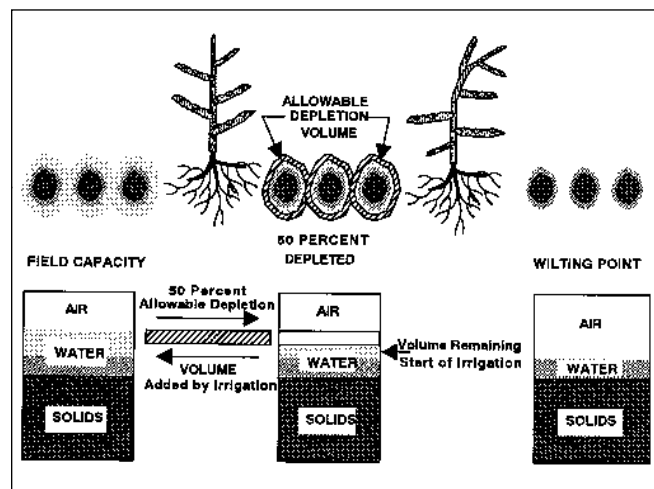


Figure 1: Soil, Water and Crop Characteristics Important to Irrigation Scheduling

- Improve uniformity of both applied and infiltrated irrigation water.
- Limit losses associated with aeration/ anoxia problem.
- Deal better with salinity issues and salt loading in root zone.
- Reduce deep percolation losses.
- With deep percolation reductions, have better control over drainage volumes and rising water tables.
- Localized erosion problems.

Conclusion

Soil properties are very important factor for irrigation management. The timing and amounts of rainfall during the season, the soil's ability to hold water and the crop's water requirements are all factors that influence the need for irrigation. If they are not compatible, the applied irrigation water could have an adverse effect on the chemical and physical properties of the soil.

References

- Thomas, F., Scherer, 2017. Extension Agricultural Engineer Soil, Water and Plant Characteristics Important to Irrigation, AE., 16-75.
- Lyon, T.L., Buckman, H.O., Brady, N.C., 1986. The nature and properties of soils. A college text of edaphology: 61.
- Irrigation theory and practice by A.M. Michael, vol.1, 58-60.