

PARTICULAR ASPECTS OF SOIL POROSITY AND CAPILLARITY IN PRACTICE

Rajabova Mahliyo Mahmudovna

Bukhara Institute of Natural Resources Management, assistant-teacher

Jo‘raqulov Fazliddin Faxriddinovich

Eshpo‘latov Jo‘rabek

Bukhara Institute of Natural Resources Management, students

ABSTRACT

Explores capillary dynamics in fine-textured soils (clay, silt), emphasizing the influence of particle size and surface characteristics on water ascent against gravity. Investigates less-explored aspects of capillarity in coarse-textured soils (sand), uncovering implications for water availability, retention, and plant response. Analyzes the intricate relationship between pore size distribution and capillary action, offering insights into how variations impact water retention, infiltration rates, and overall soil hydraulic conductivity. Summarizes practical guidelines and recommendations derived from the study, providing actionable insights for farmers, agronomists, and policymakers to optimize soil and water management practices based on specific capillarity and porosity considerations.

Keywords: practical agricultural applications, precision irrigation, soil health enhancement, environmental considerations and conservation, water conservation practices, erosion control, technological integration, sensor technologies, modeling and simulation, guidelines and recommendations.

The main characteristics of the most common soil in the conditions of the Republic of Uzbekistan are presented in the following table:

Soil types	Relative density (G/cm ³)	Relative density (G/cm ³)	Field moisture capacity (%)	
			The interval	Average
Light	1.1 – 1.3	2.63 – 2.67	13 - 19	16
Average	1.4 – 1.6	2.60 – 2.65	19 – 21	20
Heavy	1.7 – 1.8	2.68	21 - 26	24

After each irrigation of agricultural crops, the soil is compacted to a certain extent. To prevent this, the soil is cultivated so that it comes to the top. The main purpose of cultivation is to increase the porosity of the soil and, at the same time, eliminate weeds between the rows. One of the factors in obtaining the planned harvest from agricultural crops is the timely processing of the land after irrigation and the restoration of soil granularity, that is, the structure of the aggregate composition. For this, technical crops (cotton, sugar beet, hemp, corn, and sorghum) should be cultivated when they are "ripe" (between 1-3 days) for mowing after irrigation.

The scientific article under review delves into the intricate details surrounding specific aspects of soil capillarity and porosity, offering a comprehensive exploration of their roles in agricultural systems. Employing a multidisciplinary approach, the study combines field observations, laboratory analyses, and modeling techniques to unravel the nuanced dynamics of capillarity and porosity properties within various soil environments.

The investigation begins by scrutinizing capillarity phenomena in fine-textured soils, emphasizing the influence of particle size and surface characteristics on water movement against gravity. Additionally, it explores less-explored aspects of capillarity in coarse-textured soils, shedding light on implications for water availability, retention, and plant response.

The study delves into the intricate relationship between pore size distribution and capillary action, providing insights into how variations impact water retention, infiltration rates, and overall soil hydraulic conductivity. Furthermore, it examines the dynamic nature of water movement within porous media, considering factors such as soil saturation, drainage, and the intricate interplay with capillarity.

The implications for plant-water dynamics are thoroughly investigated, highlighting the interconnectedness between capillarity and plant water uptake. Practical considerations are provided for optimizing irrigation strategies and enhancing crop resilience, with a specific focus on improving water use efficiency aligned with sustainable agriculture goals.

The article also discusses practical applications of this knowledge in agriculture, including the implementation of precision irrigation strategies. It explores the potential of specific capillarity and porosity properties for enhancing soil health through targeted practices, such as the incorporation of organic amendments and cover cropping.

In our quest for sustainability and environmental stewardship, understanding and preserving soil porosity is paramount. Through responsible land management, conservation practices, and a deep respect for the delicate balance within the soil, we can ensure that this hidden marvel continues to support life and inspire awe in the intricate tapestry of our natural world. So, let us celebrate soil porosity as a silent hero

beneath our feet, a guardian of life and a cornerstone of the ecological harmony that sustains us all.

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