



## Influence of irrigation method on the infiltration in loess: field study in the Loess Plateau

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### ABSTRACT

It is well known that loess soils are collapsible upon wetting, and subsidence or cracking or failure of structures induced by loess collapsing poses serious threat to human being. Wetting is the most important prerequisite for loess collapsing; however, how the irrigation water, both man-made and natural, infiltrates and flows in loess is not well known. For this reason, a field soaking test simulating flooding irrigation method and a rainfall infiltration test simulating dripping irrigation method were conducted in instrumented sites in the Loess Plateau. This paper presents the results from soil water meters to reveal the infiltration process in loess based on the soil water content variations. The results highlight the significance of the preferential flows when a large amount of water is irrigated to the soils (flooding irrigation). Owing to the presence of preferential paths, the water infiltrates from both shallower and greater depths to the intermediate depths, as a result, bell-shaped zone of wetting and saturated zone are developed in the soils. However, the influence of environmental factors is of dominance when the amount of irrigation water is very small (precipitation). The rain water, pore water, and water vapor transform from one to another depending on the rates of precipitation and evaporation as well as soil properties. For this reason, the maximum depth of the wetting front measured in a drought year was less than 3 m. The test results provide valuable information for interpreting the infiltration of water in loess with respect to varying irrigation method, soil heterogeneity, and environmental factors. However, such information is required for modeling the wetting-induced collapse of loess and analyzing the stability of structures built on loess.

*Keywords:* Loess; Irrigation method; Field soaking test; Rainfall infiltration test; Preferential paths; Water content variation; Collapse settlement; Environmental factors

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