

## **Investigating the Role of Slope Gradient and Soil Properties in the Variations of Soil Water Content in Rainfed Lands of Semi-Arid Regions, Northwest of Iran**

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### **Abstract**

Soil water content (SWC) plays an important role in plant growth, particularly in rainfed lands in arid and semi-arid regions. Knowledge of the variability of SWC is critical for understanding a range of hydrological processes including infiltration, runoff, and evapotranspiration. It is an integrative state variable affected by climate, soil properties, land cover, and topography. In this study, the variability of SWC was investigated in seven wheat rainfed lands with 4%, 8%, 11%, 15%, 18%, 20%, and 24% slope under fallow conditions in west of Zanjan province. The SWC was measured at a depth of 20 cm in three plots (1.5 m×2.5 m) with 5-day interval during the growing period of winter wheat from 2014 to 2015. The SWC showed a large variation during the study period which was associated with the monthly variation of precipitation. Significant ( $P < 0.01$ ) difference in the SWC was found among the lands. The SWC steadily decreased from 4% to 11% slope and showed a negligible decline in higher slopes (15-24%). Decrease in the SWC in the lands was attributed to increases in the surface runoff. Correlation matrix ( $r$ ) for determining the effects of land characteristics (slope gradient and soil properties) showed that the SWC was significantly correlated with slope gradient, sand, clay, organic matter contents, and soil infiltrability. Multiple regression analysis indicated the SWC was significantly ( $R^2 = 0.78$ ,  $P < 0.01$ ) related to slope gradient and sand content. The SWC in the semi-arid rainfed lands can be reliably estimated using the slope gradient and sand content in the soil.

**Keywords:** Precipitation, Particle size distribution, Surface runoff, Winter wheat.

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\*-Received: November 2016, and Accepted: February 2017