

## Effect of Wetting and Drying Cycles on Estimation of Stress at Compaction Threshold of Fine-Textured Soil

M. Salehian Dastjerdi and A. Hemmat<sup>\*1</sup>

(Received: Aug. 3-2012 ; Accepted : Dec. 16-2012)

### Abstract

Flood irrigation after planting induces wetting and drying cycles in arable soils. For this reason, the effect of this process on load-bearing capacity (pre-compaction stress;  $\sigma_{pc}$ ) of a fine textured soil (silty clay) was studied. In this research, large air-dry disturbed soil specimens were prepared and some of them were exposed to five wetting and drying cycles. Next, the large soil specimens with/without wetting and drying cycles were compressed under three preloads (0, 100 or 200 kPa) and then the centre section of the preloaded soil specimen was firstly submitted to a plate sinkage test (PST). Then immediately one cylindrical sample was cored for confined compression test (CCT). The results showed that for reconstructed soil samples without wetting-drying cycles, the predicted  $\sigma_{pc}$  using PST didn't significantly differ from the applied preload. Therefore, the PST can be used to determine the load-support capacity of the tilled soils. In PST, with an increase in soil water content from 0.9PL to 1.1PL, the amount of over-prediction in  $\sigma_{pc}$  decreased. However, wetting-drying process significantly increased over-prediction in  $\sigma_{pc}$  at the same water content. Hence, soil compressibility does not simply depend on the actual soil water content but also on the previous history of water content changes (i.e., wetting-drying cycles).

**Keywords:** Flood irrigation, Wetting and drying cycles, Pre-compaction stress.

---

1. Dept. of Agric. Machinery Eng., College of Agri., Isf. Univ. of Technol., Isfahan, Iran

\*: Corresponding Author Email: ahemmat@cc.iut.ac.ir