

## Assessing Changes in Quality of the Treated Wastewater by Passing through a Soil Column for Irrigation of Agricultural Crops

**H. Javani <sup>\*1</sup>, A. Liaghat, and A. Hassanoghli**

Ph.D. student, Irrigation and Reclamation Engineering Department, University of Tehran.

**Hr\_javani@yahoo.com**

Professor, Irrigation and Reclamation Engineering Department, University of Tehran.

**Aliaghat@ut.ac.ir**

Associate Professor, Agricultural Engineering Research Institute, Agricultural Research, Education and Extension Organization, Karaj, IRAN.

**Arho49@yahoo.com**

### Abstract

Reuse of treated municipal wastewater in agriculture and artificial recharge of aquifers in arid and semi-arid regions are of great interest to water resources specialists. In the use of treated wastewater for artificial recharge operations, the fate of substances added to the soil by wastewater transmission of pollutants to the aquifer depth and movement is very important, because they may cause contamination of soil and groundwater resources. In this study, an L-shaped cylindrical column, made of PVC with a diameter of 30 cm was used to simulate the vertical movement of water and its movement in the shallow groundwater layer during artificial recharge operations. Horizontal sections along the vertical length were 300 cm and 250 cm. The column was filled with a sandy loam soil and the treated wastewater of Mahdasht treatment plant located in Alborz Province was used for artificial recharge operations. During the test period, the effect of management strategy of permanent water logging for 40 days and a dry period for the removal of wastewater pollutants in the soil column were examined. Values of BOD<sub>5</sub>, COD, EC, coliform, fecal coliform, phosphorus and nitrate in water samples collected from the inlet and the path length were measured at one meter intervals. The results indicated the high efficiency of removing pollutants in the soil column, while the nitrate removal efficiency and EC changes were low. The values of BOD<sub>5</sub>, COD, EC, coliform, fecal coliform, phosphorus and nitrate in the best of cases were 96.4%, 91.8%, 15.4%, 99.3%, 99.4%, 92.4% and 17.2%, respectively. A comparison with National Guides of Iranian Environmental Protection Agency shows that the outflow of artificial recharge system can be used for irrigation of agricultural crops. However, it is to be noted that, generally, use of wastewater for irrigation of food crops is not recommended.

**Keywords:** Artificial recharge, Permanent flooding, BOD<sub>5</sub>, COD, Removal of wastewater pollutants.

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1 - Corresponding Author: Irrigation & Reclamation Engineering Department, University of Tehran.

\* - Received December 2012 , and Accepted: August 2016 .