Effect of irrigation with industrial treated wastewater on variation trend of some heavy metals in soil and radish (*Raphanus Sativus*) plant

Gh. Rahimi[1]*, L. Amraei[1] and A. Kimiyaei Talab[2]

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Abstract

Limited water resources in arid and semi-arid regions are one of the major limiting factors in agricultural production. Thus, unconventional water resources, such as urban and industrial treated wastewater, may be used for irrigation. Application of wastewater to soil may cause accumulation of heavy metals (HMs). Soil pollution causes uptake of these metals by plants and their entrance to food chain. In the present greenhouse research, concentration variations of HMs (zinc, copper, cadmium, nickel, iron and manganese) in soil and radish plant were investigated. The experiment was conducted as a completely randomized design with three replications and irrigation with different percentages of treated wastewater (0, 25, 50, 75 and 100%). Results of soil chemical analysis showed that irrigation with treated wastewater significantly increased sodium adsorption ratio, salinity level and chloride content of soil. While, using different percentages of treated wastewater decreased significantly ($P \leq 0.01$) soil pH. Results revealed that total and available concentrations of HMs in soil irrigated with wastewater were higher than the those in soil irrigated with tap water. However, metal concentrations were much lower than the critical limits in soil. Therefore, had no adverse effects on soil quality. The results also showed that HM concentration in roots and aerial parts of radish plant was not increased significantly as a result of wastwater irrigation.

Keywords: Industrial wastewater, Soil quality, Unconventional water resources.

1. College of Agric., Bu-Ali Sina Univ., Hamadan, Iran.
2. Industrial Parks Org., Hamadan, Iran.
*: Corresponding Author, Email: ghasmr@gmail.com

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