Effect of soil moisture and sewage-sludge compost on some soil chemical properties and alfalfa forage macronutrients concentrations in greenhouse conditions

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(Received: Dec. 24-2013 ; Accepted: March 06-2014)

Abstract

Improvement of plant nutrition is one of the approaches for augmenting the drought stress tolerance in plants. Due to low organic-matter content in most soils in arid and semi-arid regions of Iran, application of organic-wastes' compost can increase water-holding capacity of the soil and improve plant nutrition. So, in this study, the interactive effects of soil moisture and municipal sewage-sludge compost were investigated on some soil chemical properties and concentration of nitrogen (N), phosphorus (P), potassium (K), calcium (Ca) and magnesium (Mg) in alfalfa (*Medicago sativa* cv. Garehyounjeh) forage in greenhouse conditions. A factorial experiment, based on randomized complete blocks design with three replications, was conducted with two factors of soil moisture at three levels (0.81FC-FC, 0.56FC-0.75FC and 0.35FC-0.50FC) and sewage sludge compost at four levels (0, 15, 30 and 60 g/kg of soil). The results showed that the main and interactive effects of sewage sludge compost and soil moisture on the concentration of N, P, K, Ca and Mg in alfalfa forage and electrical conductivity (EC), pH and K concentration in soil solution were significant. As soil moisture content decreased, the concentration of N, K, Ca and Mg in alfalfa forage and the EC and K concentration of soil solution significantly increased; while the concentration of P in alfalfa forage and pH of soil solution were significantly decreased. In all the studied soil water contents in this experiment, application of 60 g sewage-sludge compost per kg of soil as compared to the 30 g/kg level, significantly decreased alfalfa growth by increasing the salinity of soil solution. Under well-watered and water-deficit stress conditions, application of 30 g sewage-sludge compost per kg of soil improved alfalfa nutrition and its forage quality.

Keywords: Alfalfa, Compost, Drought stress, Organic wastes, Salinity, Soil moisture.

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[DOR: 20.1001.1.20089082.1394.6.2.4.5]

[DOI: 10.18869/acadpub.ejgcst.6.2.37]