

The effects of different levels of nitrogen and molybdenum in nutrient solution on quantitative and qualitative traits and nitrate concentration of cucumber in hydroponic culture

S. Beigi*, A. Golchin and S. Shafiei¹

(Received : 1 June 2011 ; Accepted : 26 July 2011)

Abstract

In order to study the effects of different levels of nitrogen (N) and molybdenum (Mo) in nutrient solution on quantitative and qualitative traits and nitrate concentration of cucumber (Sultan cv.), a factorial hydroponic-experiment with completely randomized design and three replications was conducted in the greenhouse of Soil Science Department, Zanjan University, in 2009. The concentrations of N in nutrient solution were 238 and 310 mg/L, and Mo was used at the rates of 0.01, 0.1 and 1 mg/L. The results showed that the effects of N and Mo levels were significant ($P \leq 0.01$) on plant yield and growth indices such as average weight, length and diameter of fruit and chlorophyll content of leaf. The chlorophyll content of leaf increased but fruit yield and average weight, length and diameter of fruits decreased as the N concentration of the nutrient solution increased. Increasing the Mo level in the nutrient solution decreased the growth indices and yield of cucumber. The highest fruit yield was obtained when the concentration of Mo in the nutrient solution was 0.01 mg/L. But it didn't have significant difference with 0.1 mg/L treatment. However, the yield decreased significantly as the Mo concentration increased to 1 mg/L. The effects of N and Mo levels of nutrient solution were significant ($P \leq 0.01$) on nitrate concentration of the fruits. As the N level of nutrient solution increased, the nitrate concentration of cucumber fruit increased from 1356 to 2122 mg/kg (on dry weight basis), and exceeded the toxicity limit of 1500 mg/L. Increasing the concentration of Mo of the nutrient solution from 0.01 to 0.1 mg/L decreased nitrate concentration of fruits from 1961 to 1703 mg/kg, without decreasing the fruit yield. With an increase in N concentration of the nutrient solution, the fruit concentrations of N, potassium and calcium increased, but those of phosphorus, magnesium and Mo decreased significantly. Also, as the concentration of Mo in the nutrient solution increased, the concentrations of iron, manganese and in fruit increased and that of copper decreased.

Keywords: Mineral nutrients, nitrate concentration, Growth indices, Greenhouse cucumber.

1. MSc. Student, Prof. and PhD Student, Respectively, Soil Sci. Dept., Zanjan Univ., Zanjan, Iran.

*: Corresponding Author, Email: s.beige1362@yahoo.com