

Effects of Mg^{2+} and root zone temperature on growth, yield and physiological properties of greenhouse cucumber (*Cucumis sativus* L.) in hydroponics

R. Azarmi^{1*}, S. J. Tabatabaei² and N. Chaparzadeh³

(Received: 07 Dece. 2016 ; Accepted : 25 June 2017)

Abstract

Magnesium plays a key role in photosynthesis, partitioning of carbohydrates, phloem export of sucrose, photo-oxidation and leaf chlorosis of plants. In order to evaluate the effect of various concentrations of Mg (0 (control), 2 and 4 mM) in the nutrient solution and root zone temperature (RZT) (15, 25 and 35 °C) on growth, yield and physiological properties in cucumber (*Cucumis sativus* L. cv. Nagen 792) grown in hydroponic system, an experiment was carried out as factorial based on randomized complete blocks design with four replications, in 2014. Results showed that zero Mg treatment (control) significantly decreased leaf fresh and dry weights, number of leaves, leaf area and SPAD index; but remarkably increased shoot to root ratio. These effects were more pronounced when control treatment was combined with RZT of 35°C. The highest yield (578 g per plant) was observed in plants treated with concentration of 4 mM Mg and 15 °C RZT. The lowest yield (276 g per plant) was obtained under concentration of 2 mM Mg and 35 °C RZT. The Fv/Fm value increased with the increase of Mg concentration in the solution and with the decrease of root temperature. Increased Mg concentration in the nutrient solution increased leaf Mg and root phosphorus (P) content. Leaf P content increased as RZT increased. Whereas, root P content decreased as RZT increased. It can be concluded from the results of this research that increasing Mg concentration in the solution decreased the adverse effects 35 °C RZT. Therefore, Mg concentration of 4 Mm in the solution and 15 °C RZT can be considered as an appropriate treatment for hydroponic cucumber cultivation.

Keywords: Hydroponic system, Substrate temperature, Nutrient solution, Temperature stress.

1. Dept. of Plant Prod., Moghan College of Agric. and Nat. Resour., Univ. of Mohaghegh Ardabili, Ardabil, Iran.

2. Faculty of Agric., Shahed Univ., Tehran, Iran.

3. Dept. of Biol., Faculty of Sci., Azarbaijan Shahid Madani Univ., Tabriz, Iran.

* Corresponding Author, Email: r_azarmi@uma.ac.ir