Comparing the effects of titanium and nano-titanium on growth and photosynthetic changes of tomato in hydroponic culture

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Abstract

Titanium (Ti) has beneficial effects on growth, physiology and metabolism of plants. On the other hand, there is a high concern to use the nano-fertilizers with technological progress. In this respect, a hydroponic experiment, was designed in which Ti and nano-titanium (N-Ti) were added to the nutrient solution (NS) in two concentrations of 1 and 2 mg/L; the NS without adding treatments was considered as control. The experiment had completely randomized design with four replicates, and the growth changes and photosynthesis attributes of tomato were studied. The results showed that the effect of N-Ti in NS on root growth was more than shoot and had more positive effect on dry and fresh weight of the roots in 1 mg/L treatment. Ti and N-Ti increased transpiration, photosynthesis and inter-stomata CO_2 content. N-Ti showed more effectiveness than Ti on transpiration and photosynthesis and this effect was more pronounced at higher concentrations. The chlorophyll content, root volume, fresh and dry weight of shoot, and time to the emergence of the first flower did not change significantly by Ti and N-Ti treatments. Conclusively, Ti at higher levels and N-Ti, due to its tiny size and easiness of penetration into the roots, can be effective on some growth and photosynthetic characteristics of tomato.

Keywords: Beneficial elements, Transpiration, Photosynthesis.

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