

MINERAL ELEMENT DISTRIBUTION OF *LYCOPERSICON ESCULENTUM* MILLER GROWN IN FIELDS AND GREENHOUSES IN TURKEY

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ABSTRACT

Tomato (*Lycopersicon esculentum* Miller) is an edible perennial plant belonging to *Solanaceae* family. Its homeland is South and Central America. It is very important food source in human diet because of its high lycopene content and other nutritional elements. In this study, grown tomato samples collected from both fields and greenhouses in six different cities of Turkey, during 2014, were analyzed for B, Ca, Cu, Fe, K, Mg, Mn, Na, and Zn concentrations using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The results were evaluated using IBM SPSS Statistics 20 Program, to exhibit the differences in mineral element contents of field and greenhouse tomatoes. The study revealed that there are differences between macro and micro element contents of field and greenhouse grown tomatoes. Greenhouse tomatoes have greater nutritional element contents because the tomatoes in greenhouses are protected from external effects and pesticides so they can grow in a healthy and nutritionally rich manner. The lowest and highest concentrations (mg/kg dw) of mineral elements were B (18.374 and 28.713), Ca (1416.042 and 1847.041), Cu (5.178 and 9.619), Fe (20.247 and 28.066), K (20471.263 and 22448.108), Mg (1917.188 and 2114.811), Mn (10.483 and 24.180), Na (136.596 and 211.351) and Zn (16.004 and 26.087).

Keywords: *Lycopersicon esculentum* Miller, Tomato, Macro Elements, Micro Elements, Field, Greenhouse, ICP-OES, Turkey.

1. Introduction

Tomato is a very prevalent fruit in the world and one of the most important vegetable crop worldwide. It is grown in either fields or greenhouses depending on the prevalent weather conditions in region. Environmental factors are more stable in greenhouse than in field. This provides a protected environment for tomatoes grown in greenhouses. For example, temperature in greenhouses can be controlled effectively throughout the year. Besides, tomatoes in greenhouses are more protected against UV-radiation than that of field plants (Stewart *et al.*, 2000). In this study, grown tomato samples collected from both fields and greenhouses in six different cities of Turkey, were analyzed for B, Ca, Cu, Fe, K, Mg, Mn, Na, and Zn concentrations using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES). The results were evaluated using IBM SPSS Statistics 20 Program, to exhibit the differences in mineral element contents of field and greenhouse tomatoes. The study revealed that there are differences between macro and micro element contents of field and greenhouse grown tomatoes.

2. Materials and methods

A total of 96 samples were collected from six different cities of Turkey, including Antalya, Çanakkale, Eskişehir, İzmir, Mersin and Şanlıurfa. The samples were washed with ultra-pure water, separated into parts, oven-dried at 80°C for 48 h, and milled in micro-hammer cutter and fed through a 1.5 mm sieve. Samples were weighed between 0.20 - 0.25 g, transferred into Teflon vessels and then 8 mL 65% HNO₃ (by weight) was added to each vessel. All samples were mineralized in microwave oven (Berghof-MWS2) programmed in such a way that they are kept

for 5 min at 145°C, 5 min at 165°C and 20 min at 175°C. After cooling, each sample was filtered using Whatman filter paper and its volume was completed to 50 mL with ultra-pure water in a volumetric flask. All samples were stored in falcon tubes. Standard solutions were prepared by using 1000 ppm multi-element stock solutions (Merck). Macro and micro element (B, Ca, Cu, Fe, K, Mg, Mn, Na, and Zn) measurements were done by Inductively Coupled Plasma Optical Emission Spectroscopy (Perkin Elmer-Optima 7000 DV).

3. Results and discussion

The results indicated that highest concentrations (mg/kg dw) of B, Ca, Cu, Fe, K, Mg, Na, and Zn were obtained from greenhouse tomatoes. These values were measured as 28.71 for B, 1847.04 for Ca, 9.62 for Cu, 28.07 for Fe, 22448.11 for K, 2114.81 for Mg, 211.35 for Na, and 26.09 for Zn. For these elements, concentrations in field tomatoes appeared to be lower than in greenhouse tomatoes at all locations. On the contrary, for all locations, Mn concentration was obtained to be higher in field tomatoes, the highest value being 24.18 mg/kg dw that was measured in the field tomatoes from Mersin. People consuming tomatoes from Şanlıurfa and Mersin are taking more nutrient elements and therefore need less external dietary nutrient supplements than the people consuming tomatoes from İzmir and Eskişehir.

REFERENCES

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