AGRORES

XI INTERNATIONAL SYMPOSIUM OF AGRICULTURAL SCIENCES

BOOK OF ABSTRACTS

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26-28, May, 2022
Trebinje
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Effect of manganese on antioxidant activity in maize

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Abstract

Manganese (Mn) is an essential element for plant growth. For metabolic function, Mn^{2+} is required at low concentrations, but Mn^{2+} excess can change the activity of various enzymes and interfere with the absorption and translocation of some minerals such as Ca, Mg, Fe, and P. Mn availability to the plants depends on pH of the growth medium and on root exudates for Mn chelation or reduction. The main aim of this research was to investigate the effect of Mn^{2+} on the main parameters of secondary metabolism: total phenolic content (TPC) and total antioxidative activity (TAA) in maize (*Zea mays* L.) shoots and roots. Maize was chosen as agricultural species important for human and animal nutrition, and a simply cultivated plant. Maize seeds (inbred line Va35) were germinated in distilled water and then transferred into the hydroponic (KNOP/2) growth solution. Mn^{2+} was applied in two different concentrations (5 and 100 μM) by adding $MnSO_4$ into the hydroponic solution. After 7 days (December 2021) of growing under 8/16h photoperiod, the leaves and roots were collected. The TPC was measured according to Folin-Ciocalteu's spectrophotometric procedure, while TAA was determined by ABTS/HRP assay. The results showed that TAA was significantly decreased only in maize roots after the treatment with 5 μM Mn^{2+}, while higher Mn^{2+} concentration (100 μM) did not change TAA in maize roots. TAA in shoots and TPC in both parts of maize was unchanged. Finding that 5 μM of Mn^{2+} have decreasing effect on maize antioxidative activity without harming plants indicates that lower concentration can be more toxic due to: 1. plants excreting an excess of Mn^{2+} into the environment after the treatment with high Mn^{2+} concentration and 2. Mn can affect the metabolism of small molecules (enzymes or phytochelatins) binding for them and decreasing the total ROS scavenging activity.

Key words: maize, manganese, total antioxidant activity, total phenolic content