Improvement of Antioxidant Enzymes Activity of *Zea mays* After Treatment with Magnetized Water

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Received: 1 May 2017 Accepted: 11 July 2017

Abstract

Although the exact mechanism(s) of the effects of magnetic fields on plants is not completely understood, available evidences suggest that the effects of these fields are mediated by reactive oxygen species (ROS) and activity of antioxidant system. In the present study, the effects of a magnetic field (110 mT) on physical and chemical properties of water, and the effect of magnetized water on the antioxidant system activity of maize plants were investigated. Raman and FTIR absorption spectra of water before and after magnetization were compared. While the Raman spectrum of magnetized and normal water were identical, the intensity of FTIR absorption spectrum of magnetized water was significantly increased, suggesting changes in the distribution of hydrogen bound among water molecules and increase of its solubility. In comparison with the control plants, irrigation with magnetized water resulted in the increase of antioxidant enzymes activity i.e., SOD and CAT as well as increase of the contents of non-enzymatic compounds e.g., anthocyanins of the plants. In addition, lower amounts of \( \text{H}_2\text{O}_2 \) and lower activity of POD was observed in magnetized water-irrigated plants, compared to the control group. All together, these changes resulted in the maintenance of membrane integrity and improvement of growth and development of those plants which were irrigated with magnetized water.

Keywords: Antioxidant activity; Magnetic field; Magnetized water, Maize, Raman spectrum