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An Investigation of the Effects of Arsenite (As^{+3}) and Arsenate (As^{+5}) Ions on Antioxidant Enzyme System of The Species, *Echinodorus amazonicus* Rataj

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Aim of the study: The aim of this research is to investigate the effects of inorganic arsenic, As^{+3} and As^{+5} at different concentrations (0, 6, 18 ve 54 µM) on the aquatic macrophyte *Echinodorus amazonicus* Rataj, also their total protein amounts, enzymatic antioxidant peroxidase (POX) and catalase (CAT) activities, and melondialdehyde (MDA) amount which is a marker of lipid peroxidation are examined. Lastly, photosynthetic pigment content is investigated.

Material and Methods: As plant material, *Echinodorus amazonicus* Rataj species is used. The instruments applied for analyses are UV/VIS spectrophotometer, water bath, precision scales, cooled centrifuge, magnetic stirrer, 8 plastic aquarium for placing plants, white tube fluorescent lamps with 300 µmol m^{-2} S^{-1} photon intensity for photoperiod implementation and an air pump for ventilating water. For the specification of chlorophyll and carotenoid the method of Arnon (1949); for the specification of protein the method of Bradford (1976), for peroxidase activity (POX) the method of Chance and Maehly (1955), for the lipid peroxidation (MDA) the method of Madhava and Sresty (2000) and for catalase activity the method of Bergmeyer (1970) are applied and these implementations are determined in a spectrophotometric way. Statistical analyses of the data are conducted with Statistica Version 10 and ANOVA and Post Hoc Tukey Test are applied in order to reveal the differences between groups.

Results: In this study, it is observed that antioxidant enzyme activities of arsenite and arsenate ions increase at low concentrations (6 µM) and decrease at high concentrations (18 and 54 µM) with the help of their increasing concentrations. It is also deduced that lipid peroxidation (MDA) shows continuous increase and that protein amounts and chlorophyll contents show a decrease with increasing concentrations. Also, necrosis and chlorosis are observed in the groups with the highest concentrations (54 µM), and As^{+3} has more toxic influence than As^{+5}.

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Keywords: Heavy metal stress, Arsenic, Aquatic macrophytes, *Echinodorus amazonicus*, Antioxidant enzymes.