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Cadmium stress in rice plants: The effect of cadmium on some chemical parameters in rice (*Oryza sativa* L.)

Elham Abedi¹ and Ramazan Ali Khavari-Nejad²¹Islamic Azad University, Iran²Kharazmi University, Iran

The objective of the present work was to evaluate the effect of exogenously applied cadmium on the physiological response of rice (*Oryza sativa*). The study investigated the long-term effect (18 days) of cadmium on the total protein content, malondialdehyde (MDA) content, antioxidant enzymes (peroxidase, catalase) in *O. sativa*. The treatment was at six levels: 0, 15, 25, 35, 45 and 55 μM CdCl_2 . Cadmium treatments caused a significant change in the accumulation of soluble protein. Content of protein was significantly declined by rising concentration of cadmium ($p < 0.05$). While content of MDA was enhanced by presence of cadmium, the treatment at 35 and 55 CdCl_2 μM increased the content of MDA by 77, 89.8% in *O. sativa*, respectively. Plants with higher amount of MDA under stressful conditions are generally considered as low tolerant to stress. Moreover the content of peroxidase increased with increasing Cd (II) doses up to 15 μM , and had slightly decreased at the concentration of 45 μM . Low doses of cadmium stimulated catalase (CAT) in this plant, with increasing cadmium, however the accumulation of active oxygen in the plant body was beyond the adjustment ability of enzymes, thus this inhibited the CAT activity, so that the CAT activity declined. Heavy metal stress time to plants also have an impact on CAT activity. According to this results *O. sativa* has a low tolerance to cadmium. Also, these results suggest that high concentration of cadmium is more effective on peroxidase in comparison with catalase activity, so peroxidase has an important role in tolerant of these plants.

Recent Publications

1. Arshad M, Shafaqat A, Noman A, Qasim A, Rizwan M, Farid M and Irshad M K (2016) Phosphorus amendment decreased cadmium (Cd) uptake and ameliorates chlorophyll contents, gas exchange attributes, antioxidants and mineral nutrients in wheat (*Triticum aestivum* L.) under Cd stress. Archives of Agronomy and Soil Science 62(4):533-546.
2. Xie P P, Deng J W and Zhang H M (2015) Effects of cadmium on bioaccumulation and biochemical stress response in rice (*Oryza sativa* L.). Ecotoxicology and Environmental Safety 122:392-398.
3. Herath H M D A K, Bandara D C, Weerasinghe P A, Iqbal M C M and Wijayawardhana H C D (2015) Effect of cadmium on growth parameters and plant accumulation in different rice (*Oryza sativa* L.) varieties in Sri Lanka. Tropical Agricultural Research 25(4):532-542.
4. Basnet P, Amarasiriwardena D, Wu F, Fu Z and Zhang T (2014) Elemental bio-imaging of tissue level trace metal distributions in rice seeds (*Oryza sativa* L.) from a mining area in China. Environmental Pollution 195:148-156.
5. Ding Y, Feng R, Wang R, Guo J and Zheng X (2014) A dual effect of Se on Cd toxicity: evidence from plant growth, root morphology and responses of the anti-oxidative systems of paddy rice. Plant and Soil 375(1-2):289-301.

Biography

Elham Abedi has studied Plant Physiology. She has completed her BS in Plant Physiology in the Department of Basic Science, Isfahan University, and MS in Science and Research at Islamic Azad University, Tehran, Iran. In 2015, she has started her PhD in the same department where, her thesis is entitled as "Effect of different concentrations of nanoparticles and sodium selenate on germination, some physiological and biochemical parameters of *Dorema ammoniacum* D. Don". She has worked in evaluation of some physiological parameters in several Poaceae family plants under *in vitro* stresses, such as heavy metal and salt. Now she has focused on selenium supplement on endemic species plants.

elham.abedi@srbiau.ac.ir