

THE EFFECT OF HUMIC ACIDS ON CADMIUM ACCUMULATION BY *AGROPYRON REPENS* L. AND BIOCHEMICAL PARAMETERS

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ABSTRACT

The effect of humic acids (HA) on the uptake of lead by quack grass plants was studied. Cadmium levels in the variant (Cd (250 mg/kg + 2,5 g/m² HA) increased in the roots in 1,6 times and in the shoots – decreased by 12% compared to control with cadmium without HA. With increasing content HA (5 g/m²) in the soil Cd content in the shoots and in the roots increased by 2.1 times compared to variant with cadmium without HA. Biochemical parameters were studied with plants grown hydroponically in 5 variants 1- 0 (control); 2 – 0.4 mM Cd (Cd1); 3 - 0.8 mM Cd (Cd2); 4 - Cd1 + HA (0,5 mM); 5 - Cd2 + HA (0, 5 mM). Chlorophyll (Chl) *a* content decreased in all treatments, except [Cd1 + HA (0,5 mM)] -variant. Content of carotenoids remained unchanged or increased in variant with HA. Proline content increased significantly in the shoots in all variants, especially in [Cd2 + HA (0, 5 mM)]-variant in 13 times, and in the roots - about in 5-9 times. Proline content in the shoots in variants without HA was lower than in the presence of HA, and in the roots, vice versa. In variant [Cd2 + HA (0, 5 mM)] was observed the most increasing of ABA content: in the shoots in 3 times and in the roots - in 2 times. Thus, HA stimulated Cd uptake by roots and shoots. Cadmium caused decrease of Chl *a* content, but increased Chl *b* and carotenoids, it might be adaptive reaction. Cadmium significantly increased proline content, this increasing roles as osmotic compatible and osmoprotector under heavy metals stress. ABA content increased in all variants, but the most increasing was observed in variant with high concentration of humic acids.

Keywords: cadmium, humic acids, chlorophyll, carotenoids, proline.

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