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Ex vitro growth and antioxidative responses of two *Paulownia* clones to Zn excess

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Abstract. In previous experiments elevated applications of Zn (10, 20, 30 mg L⁻¹) caused impairment in growth parameters and antioxidative performance of *Paulownia tomentosa* x *fortunei* clone TF 01 and *Paulownia elongata* x *fortunei* clone EF 02, grown in hydroponic after transferring the explants from *in vitro* micropropagation. The plants were analyzed with reference to the distribution of Zn, the accumulation of biomass and the metal effects on lipid peroxidation and accumulation of biologically active compounds, such as phenols, flavonoids and anthocyanins. Zn induced a decrease in root, stem length, leaf number, total leaf area and the ratio fresh mass/dry mass (FM/DM) in the roots, stems and leaves of both clones. The maximum accumulation of Zn occurred in roots, followed by stems and leaves of both clones. An enhanced levels of lipid peroxidation with increasing the concentrations of Zn indicated that this heavy metal caused oxidative stress in leaf tissues. The activity of phenylalanine ammonia - lyase (PAL), which participate in the control of phenolic metabolism, showed pronounced reduction in the leaves of *Paulownia tomentosa* x *fortunei* after treatments with 20 and 30 mg L⁻¹ Zn. The total contents of phenols, flavonoids and anthocyanins changes in different manner after elevated concentrations of Zn. Stronger modifications, especially concerning leaf characteristics induced

by 30 mg L⁻¹ Zn, were consistent with physiological impairments while those induced by 10 mg L⁻¹ Zn suggested a compensatory strategy for maintaining functional integrity of both clones.

Key words: *Paulownia*, zinc, growth parameters, antioxidant defense.