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Authors: Vinicius H. de oliveira, Mark Tibbett

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Original Article

Tolerance, toxicity and transport of Cd and Zn in *Populus trichocarpa*

Vinicius H. **DE OLIVEIRA** and Mark **TIBBETT***

Centre for Agri-Environmental Research & Soil Research Centre, School of Agriculture Policy and Development, University of Reading, Berkshire, RG6 6AR, United Kingdom

Running title: Tolerance, toxicity and transport of Cd and Zn in poplar

For correspondence. E-mail: m.tibbett@reading.ac.uk

Highlights

- *Populus trichocarpa* showed a surprisingly high tolerance to Cd.
- Zn addition increased Cd uptake and accumulation in poplar leaves.
- Decreasing root-to-shoot transport is a major role in Cd tolerance.
- Expression of transporter gene HMA4 was down-regulated in roots under metal stress.

Abstract

Metal inputs to terrestrial ecosystems are of great concern due their toxicity to biota, especially for elements with no biological function such as cadmium. Fast-growing trees such as poplars may have potential in phytoremediation schemes. We assessed accumulation, metal partitioning, gene expression (*Pt-HMA4*) and overall tolerance to, and interaction between, cadmium (Cd) and zinc (Zn) in *Populus trichocarpa* 'Trichobel'. We predicted that Zn would have an antagonistic effect in Cd accumulation and anticipated some level of tolerance to these metals. Poplars were grown in sandy substrate under different metal applications, ranging from 1 to 243 mg kg^{-1} Cd; or 30 to 7,290 mg kg^{-1} Zn; and also two combined treatments: 27 mg kg^{-1} Cd with 90 or 270 mg kg^{-1} Zn. Growth parameters and