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# EFFECT OF METAL TOLERANT PLANT GROWTH PROMOTING RHIZOBACTERIA ON BEAN GROWTH, CADMIUM AND ZINC UPTAKE AND STRESS RESPONSES

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## Abstract

Plant growth promoting rhizobacteria (PGPR) serve as an alternative tool in sustainable agriculture. PGPR influence the heavy metal accumulation of crops in contaminated soils, either by decreasing or increasing the accumulation. This study focuses on the effect of plant growth-promoting rhizobacteria on the heavy metal uptake, plant growth and stress response of bean plants. The simultaneous treatment of $Cd^{2+}$ and *Mitsuaria chitosanitabida* $T_3 10^{-2}/4$ (PGPR strain) as well as $Zn^{2+}$ and bacteria resulted in the inhibition of root elongation in bean plants, but no differences were recorded in root biomass. A higher accumulation of the phytotoxic $Cd^{2+}$ in the root compared to the shoot was observed in bean plants due to the limited translocation (varying between 7.95-23%). In the case of $Zn^{2+}$ treatment the translocation from root to shoot was not limited. In the case of $Cd^{2+}$ treatment the *Mitsuaria chitosanitabida* $T_3 10^{-2}/4$ decreased the accumulation of $Cd^{2+}$ in bean plants. Differences in polyphenol oxidase (POD) and peroxidase activity (GPOX) were observed among metal stressed and control plants. *Mitsuaria chitosanitabida* $T_3 10^{-2}/4$ strain diminished the oxidative stress in the case of toxic metal ($Cd^{2+}$) treated bean plants most probably due to the inhibited metal uptake.

*Key words:* antioxidant enzymes, bean, heavy metal, plant growth promoting rhizobacteria, *Mitsuaria chitosanitabida*

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