

Nitrogen-Fixing Rhizobacteria (*Rhizobium mililoti* 2011) Enhances the Tolerance and the Accumulation of Cadmium in *Medicago sativa*

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Abstract : It is known that the symbiotic association between plant and microorganisms are beneficial for plant growth and resistance to metal stress. Hence, it was demonstrated that Arbuscular mycorrhizal fungi have a positive effect on host plants growing in metal polluted soils. Legume plants are those which normally associate to rhizobacteria in order to fix atmospheric nitrogen. The aim of this work was to evaluate the effect this type of symbiosis on the tolerance and the accumulation of Cd. We chose *Medicago sativa*, as a modal for host legume plants and *Rhizobium mililoti* 2011 as rhizobial strain. Inoculated and non-inoculated plants of *M. sativa* were submitted during three month to 0, 50, and 100 mgCd/kg dry soil. Results showed that the presence of Cd in the medium induced, in both inoculated and non-inoculated plants, a chlorosis and necrosis. However, these symptoms were more pronounced in non-inoculated plants. The beneficial effect of inoculation of *M. sativa* with *R. meliloti*, on plant growth was confirmed by the measurement of biomass production which showed that the symbiotic association between host plant and rhizobacteria alleviates significantly Cd effect on biomass production, so inoculated plants produced more dry weight as compared to non-inoculated ones in the presence of all Cd treatments. On the other hand, under symbiosis conditions, Cd was more accumulated in different plant organs. Hence, in these plants, shoot Cd concentration reached 425 and it was 280 µg/gDW in non-inoculated ones in the presence of 100 ppm Cd. This result suggests that symbiosis enhances the absorption and translocation of Cd in this plant. In nodules and roots, we detected the highest Cd concentrations, demonstrating that these organs are able to concentrate Cd in their tissues. These data confirm that *M. sativa*, cultivated in symbiosis with *Rhizobium mililoti* could be used in phytoextraction of Cd from contaminated soils.

Keywords : Cd, phytoremediation, *Medicago sativa*, Arbuscular mycorrhizal

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