

Potential of Lactic Acid Bacteria for Cadmium Removal from Aqueous Solution

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Abstract : Cadmium (Cd) is a carcinogenic metal to which humans are exposed mainly due to its presence in the food chain. Lactic acid bacteria have the capability to bind cadmium and thus the potential to be used as probiotics to treat this metal toxicity in the human body. The main objective of this study is to evaluate the potential of native lactic acid bacteria, isolated from Colombian fermented cocoa, to remove cadmium from aqueous solutions. An initial screening was made with the *Lactobacillus plantarum* JCM 1055 type strain, and Cd was quantified by atomic absorption spectroscopy (AAS). *Lb. plantarum* JCM 1055 was grown in ½ MRS medium to follow growth kinetics during 32 h at 37 °C, by measuring optical density at 600 nm. Washed cells, grown for 18 h, were adjusted to obtain dry biomass concentrations of 1.5 g/L and 0.5 g/L for removal assays in 10 mL of Cd(NO₃)₂ solution with final concentrations of 10 mg/Kg or 1.0 mg/Kg. The assays were performed at two different pH values (2.0 and 5.0), and results showed better adsorption abilities at higher pH. After incubation for 1 h at 37 °C and 150 rpm, the removal percentages for 10 mg/Kg Cd with 1.5 g/L and 0.5 g/L biomass concentration at pH 5.0 were, respectively, 71% and 50%, while the efficiency was 9.15 and 4.52 mg Cd/g dry biomass, respectively. For the assay with 1.0 mg/Kg Cd at pH 5.0, the removal was 100% and 98%, respectively for the same biomass concentrations, and the efficiency was 1.63 and 0.56 mg Cd/g dry biomass, respectively. These results suggest the efficiency of *Lactobacillus* strains to remove cadmium and their potential to be used as probiotics to treat cadmium toxicity and reduce its accumulation in the human body.

Keywords : cadmium removal, fermented cocoa, lactic acid bacteria, probiotics

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