Otimization of Cd, Zn and Pb removal by *Serratia marcescens* isolated of coffee processing wastewater in multicontaminates medium

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Microorganisms play a important role in environment contaminated by trace elements, because yours mechanisms for transformation of elements its solubility and insolubility phase (Gadd, 2004). The isolament and identification of microorganism presents in contaminated areas is important, because present high potential of using witch biotechnology tools (Lu et al., 2008). Trace elements can be highly toxic for organisms, show persistence in environment and accumulates in organisms trough food chains.

Process of bioremediation utilizing microorganisms received attention in recent decades, selecting microorganisms wich potential for use in bioremediation, evaluating various characteristics well resistance of metal concentrations and yours resistance mechanisms efflux, extracellular complexation, biosorption, precipitation, alterratino in cell morphology, enhanced siderophore produced and intracellular bioaccumulation (Naik; Dubevm, 2013). The presence of trace elements in composition of agricultural inputs can be contaminated of wastewater witch consequent resistance of bacterial these elements.

The present study aims to optimize the Cd, Zn and Pb removal, in medium multicontamined, utilizing the Plackett-Burman (PB) delineament and after the Central Compost Rotacional Delineament (CCRD).

Methodology: For PB delineament were evaluated the Ph (4,0; 5,0 and 6,0), cell density (log 3, log 5 and log 8 CFU/ml) and concentration of Cd (0,1; 0,5 and 1 mM), Pb (0,1; 2,0 and 4,0 mM) e Zn (1,0, 4,0 and 8,0 mM). For trace elements removal, the variables witch show significance were the initial concentration of metals and pH. In this way, haven't significance of multi-contamination and cell concentration in evaluated conditions.

The cell were grown in medium nutrient broth until the logarithmical phase, after, 10, 6,12 and 3,75 ml of broth witch the cells was centrifuged and ressuspended in 1 ml of sterile distillated water, respectively for the concentrations of log 9, log 5 and log 8. The volume as passed for tube in proporcion of 1:10 containing the solution witch trace elements.

Therefore, in CCRD, it was fixed the cell concentration of log8 CFU/ml, evaluated of Cd (0,29; 0,5; 1,0; 1,5 and 1,705 mM), Pb (0,18; 1,0; 3,0; 5,0 and 5,82 mM), Zn (0,36; 2,0; 4,0; 6,0 and 7,64 mM) concentration and pH (3,09; 3,5; 4,5; 5,5; 5,91).

Results and discussion: The higher removal rate for Cd was obtained in 1,5 mM of Cd concentration and pH 3,5, having a removal rate of 99,95%. For Pb removal, the higher rate removal was 99,63% in concentration of 5,82 mM and pH 4,5. For Zn, the higher removal was 44,53%, obtained in 7,64 mM of Zn and pH 4,0.

The mechanisms of bioaccumulation, They're dependent of elements concentration, suggesting that low concentrations favor mechanisms of intracellular accumulation, while high concentration are related wich mechanisms of extracellular accumulation, since, high concentrations of metal can damage the bacterial cell, exposing occult bind sites our even excluding mechanisms of complexation in inside cells, leading to increased export of metal for extracellular binding sites (Huang et al., 2014). The pH is an important factor, it also affect the solubility of metal and the binds sites in superficies of cell wall of bacterias (Aryal; Kyriakides, 2015).

Conclusion: The microorganisms utilized in present study, presented good results in trace elements removal, mostly for Pb and Cd. May thus be used in investigated in future for application in bioremediation process.

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