

## Evaluation of heavy metal resistant of *Serratia* spp. isolated from electric

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### Abstract:

Among the pollutants of serious concern, toxic metals are becoming one of the most severe environmental and human health hazards. On microorganisms, heavy metals may exert an inhibitory action by blocking essential functional groups, displacing essential metal ions, or modifying the active conformations of biological molecules. However, the pollution of the environment with heavy metals has led to the appearance of heavy-metal-resistant microorganisms in soil and water. Since metal pollutants are non-degradable and can only be transformed to less toxic oxidation states or removed, these microorganisms have been employed for environmental clean-up in a eco-friendly and cost-effective alternative to the conventional physicochemical methods. The aim of this study was to evaluate heavy metals resistance of *Serratia* spp. strains isolated from electric energy towers, for further use in studies with bioremediation. Five *Serratia* spp. isolates (BD11, BD50, BD65, BD74, BD128) were assayed for tolerance against heavy metals  $\text{CuCl}_2 \cdot 2 \text{H}_2\text{O}$ ,  $\text{CoCl}_2 \cdot \text{H}_2\text{O}$ ,  $\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$ ,  $\text{K}_2\text{Cr}_2\text{O}_7$ ,  $\text{ZnCl}_2$ ,  $\text{FeCl}_2 \cdot 4\text{H}_2\text{O}$ ,  $\text{Na}_2\text{HAsO}_4 \cdot 7\text{H}_2\text{O}$ ,  $\text{Na}_2\text{AsO}_2$  and  $\text{HgCl}_2$  on Tris minimal medium containing different concentration of heavy metals salts (0.5–10 mM and 0,1-2 mM for  $\text{HgCl}_2$ ). The OD was prepared by a spectrophotometer ASYS ExpertPlus to monitor cell growth and determine the minimum inhibitory concentration (MIC) that completely inhibits growth of bacteria. The results indicated that most of the isolates grew well at low concentrations of different heavy metals and their number gradually decreased as the concentration increased. All isolates showed resistance above 5 mM in almost all metals studied, except for zinc which one isolate (BD 74) only grew up at 3 mM. On contrast all isolates were able to grow up at 10 mM of arsenate and was sensitive for mercury. BD 50 isolate showed high resistance to arsenite, nickel, copper and cobalt at concentrations of 10, 9, and 6 mM respectively and therefore seems to be a candidate for future studies of bioremediation. Financial support: FAPESP, Bandeirante Energias do Brasil

**Key words:** *Serratia* spp, metal resistance, bioremediation potential