

A Comparative Study of the Effectiveness of *Opuntia ficus-indica* and *Aloe barbadensis miller* in the Biosorption of Manganese (II) Ions and Dispersion of Oil

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This project examined the abilities of *Opuntia ficus-indica* and *Aloe barbadensis miller* to reduce concentrations of Mn^{2+} ions and act as an oil dispersion agent. The *Opuntia ficus-indica* and *Aloe barbadensis miller* were peeled and blended into a gelling-extract. All experimental groups for Mn^{2+} biosorption were treated with 100mL of a 100ppm Mn^{2+} solution made from manganese chloride. Each group was exposed to the ions for three days. Then, the concentration of Mn^{2+} was measured using a manganese Chemetrics kit. For the dispersion of oil, each group was vortexed for three minutes using a standard mini vortex. Afterwards, the average size of the droplets were viewed and measured under a high power microscope. Results showed that *Opuntia ficus-indica* is more effective in oil dispersion. The average droplet size for *Opuntia ficus-indica* was 0.2mm, the average droplet size for *Aloe barbadensis miller* was 0.33mm and the average droplet size for the control group was 0.5mm. The smaller the size of the droplets, the more effective the oil dispersant agent was, so therefore *Opuntia ficus-indica* is more effective. For Mn^{2+} biosorption, results showed that as the mass of each plant increased, the percent reduction increased as well. The *Aloe barbadensis miller* had a correlation coefficient of 0.9 ($R^2=0.946$) and the *Opuntia ficus-indica* had a correlation coefficient of 0.9 ($R^2=0.964$), indicating a high effectiveness. The *Aloe barbadensis miller* used half as much mass as the *Opuntia ficus-indica* and achieved the same correlation coefficient, so therefore the *Aloe barbadensis miller* was more efficient. In the future, *Aloe barbadensis miller* can be used as a method for decreasing Mn^{2+} ion concentrations and *Opuntia ficus-indica* can be used as an oil dispersion agent.