

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.