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 Mn2+ 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 Mn2+ biosorption were treated with 100mL of a 100ppm Mn2+ solution made from manganese chloride. Each group was exposed to the ions for three days. Then, the concentration of Mn2+ 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 Mn2+ 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 Mn2+ ion concentrations and Opuntia ficus-indica can be used as an oil dispersion agent.

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