Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 40 2024

Colloquium on Applied Sciences 2024
19-21 January 2024, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

The Effect of Initial Biomass of Fungal Mycelium *Aspergillus tamarii* on Dye Decolourisation of Methylene Blue

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Structured Abstract

Background: Azo dyes are a class of synthetic dyes that are widely used in a variety of industries. However, azo dyes can be harmful to the environment and human health. *Aspergillus tamarii* is a fungus that can be used to biosorb azo dyes, meaning that it can bind to the dyes and remove them from solution. The objectives of this research are to investigate the effect of initial biomass of *Aspergillus tamarii* on the efficiency of azo dye removal and to develop a first order model to predict the removal of azo dye at different initial biomass of *Aspergillus tamarii*.

Methods: The initial biomass of *A. tamarii* has a significant effect on the removal of azo dyes. Higher initial biomass leads to higher dye removal. This is likely due to the increased surface area of the biomass, which allows for more dye molecules to be absorbed. This study suggests that *A. tamarii* can be a promising biosorbent for the removal of azo dyes from wastewater. The use of higher initial biomass can lead to more efficient dye removal.

Results: This study shows that initial biomass can affect the amount of the degradation over time. The colour was turn from diluted blue to brownish colour. All samples were observed to show a significant degradation of methylene blue dye including control sample. The samples were analysed through UV-Vis spectrophotometer to determine the absorbance. The data was taken at different intervals for different treatment. After the results were obtained, a straight-line graph was generated to determine the different initial biomass fungal mycelium absorbance. The dependency of the degradation reaction towards the concentration of the methylene blue dye also aligns with the principle of first-order kinetics.

Conclusion: In conclusion, this study has shown that the initial biomass of *A. tamarii* has a significant effect on the removal of azo dyes. Higher initial biomass leads to higher dye removal, and the optimum initial biomass is 10% (v/v). These results suggest that *A. tamarii* can be a promising biosorbent for the removal of azo dyes from wastewater.

Keywords: Azo dyes, *Aspergillus tamarii*, First-order Kinetics, Biodegradation, Wastewater

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