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Adsorption of Methylene blue on leaves of Guinea Grass (*Panicum maximum*)

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Massive amounts of industrial pollutants released to the environment because of industrial expansion, which is needed to fulfil the demands of the ever-increasing population, have become a global threat. Consequently, the use of effective treatment methodologies is a necessity, and such methodologies should not only be economical, but also be environmentally friendly. In this respect, biosorption has become a sound alternative for removing toxic industrial dyes. Although many biosorbents have been researched, attempts on their practicability have not been much attended to. This study focuses on the use of Guinea grass (*Panicum maximum*) leaves, a biosorbent that has not been extensively investigated, for the removal of methylene blue (MB), a common dye used in textiles and other industries. The fibrous nature of this biosorbent would make it suitable for surface modification as needed. Biosorbent for this investigation was prepared by mature leaves of guinea grass, collected randomly from Kandy district, cut into 1.0 – 2.0 cm lengths followed by thorough washing with tap water and deionised water, and then crushing followed by thorough washing again with deionised water until the supernatant became colourless. Samples were then dried at 120 °C for 2.0 h. Parameter optimisation was conducted using 50.0 mL of 10 ppm MB solutions, with one parameter varied at a time while keeping the others unchanged. This process led to optimal values of 0.25 g of adsorbent dosage, 20 minutes of shaking time, 20 minutes of settling time, and a pH of 5.66, based on absorption measurements recorded at 664 nm, achieving an excellent removal rate of 97.5% is obtained. Moreover, this biosorption system reaches equilibrium in a very short time owing to the fibrous nature which is advantageous for extension of bench work toward large-scale removal of MB from contaminated industrial effluents. It is further determined that the transfer of MB from solution to the biosorbent surface follows the pseudo second-order kinetics model with a high correlation coefficient (R^2) of 0.9889.

Keywords: Adsorption, Guinea grass, Kinetics, Methylene blue, Parameter optimization