

## **Application of *Elaeis guineensis* Leaves in Palm Oil Mill Effluent Treatment**

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### **ABSTRACT**

Palm Oil Mill Effluent (POME) is a highly polluting wastewater that pollutes the environment if discharged directly Owing to its high Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) concentration. This study utilizes *Elaeis guineensis* leaves in POME treatment to reduce the COD, BOD, and to remove colour and comply with the Department of Environment (DOE) discharge standard limit. Batch biosorption experiments were carried out for the removal of Azo dye, (AO52) using *E. guineensis* leaves as a potential biosorbent. The effects of various parameters, such as pH, mass of biosorbent, initial concentration, and contact time were studied to evaluate and optimize the biosorption process condition. The optimum conditions were fixed at pH 2, 90 minutes of contact time, 80ppm of initial concentration, and 1.0g amount of biosorbent. This optimum condition was then applied for COD, BOD and colour removal in POME. Under the optimum condition, maximum percentage reduction of COD, and BOD was found to be 82% and 44% respectively, and percentage of colour removal stood at 91.6%. While no standard discharge limit is stipulated for COD, the result shows that the final concentration of BOD does not comply with the standard discharge limit, specified by Environment Quality (Prescribed Premises) (Crude Palm Oil) regulations, 1977. Langmuir and Freundlich models were applied to describe the experimental data. Experimental data fitted very well with the Langmuir isotherm model. It indicates that the biosorption mechanism of *E. guineensis* occurs on a homogenous surface through monolayer biosorption. Further, this study reveals that *E. guineensis* can effectively, be used as biosorbent as the the alternative treatment of COD, BOD and color removal in POME.

**KEYWORDS:** Agricultural Waste, Biosorption, BOD, COD, Colour, POME