

## Phytoremediation of Palm Oil Mill Effluent (POME) Using *Eichhornia crassipes*

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### Abstract

The inefficiency and lengthy treatment process of conventional open ponding method has posed challenges to palm oil industry in treating highly polluting palm oil mill effluent (POME), thus there is a need to look for a more efficient and sustainable alternative solution. Phytoremediation has been recommended as a potential method for wastewater treatment due to its economical and environmental advantages. However, research on phytoremediation of POME using *Eichhornia crassipes* (*E. crassipes*) is still limited. This study aims to determine the feasibility of applying phytoremediation using *E. crassipes* for POME treatment by investigating the effects of pH, plant:POME ratio and retention time on the biochemical oxygen demand (BOD), chemical oxygen demand (COD) and total suspended solid (TSS) in POME. The highest BOD removal of 92.78% was achieved after 21 days retention time at pH 4 with plant:POME ratio of 1:20 kg/L. The highest COD removal of 25.24% was achieved after 14 days retention time at pH 6 with plant:POME ratio of 1:20 kg/L. Phytoremediation using *E. crassipes* was shown to be a promising eco-friendly technique for POME treatment, considering the shorter treatment time required and its effectiveness in reducing the BOD in POME to meet the discharge standard of 20 mg/L.

**Keywords:** Phytotechnology; Water hyacinth; Palm oil mill effluent (POME); Wastewater treatment.

## 1. Introduction

High global demand of edible oil has led to the rapid growth and development of palm oil industry [1]. As the second largest global palm oil producer, Malaysia also plays significant role as the worldwide supplier of palm oil, which accounts for about 39% of world palm oil manufacturing and 44% of worldwide exports [2,3]. During crude palm oil manufacturing process, the generation of vast volume of highly polluting palm oil mill effluent (POME) poses challenges to the wastewater treatment of palm oil industry. In order to process one ton of crude palm oil, it requires approximately 5-7.5 tons of water input, however, over half of this water volume would turn out to be wastewater [4]. Liquid effluent is mostly formed from the sterilization and clarification processes in palm oil mill where huge amount of hot water, saturated as well as superheated steam are being used. Hydro-cyclone operation is a process where the broken shells are separated from the kernels resulting in another source of waste. POME is formed from the mixing between both effluents [5]. It is a common

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