

Effectiveness of Phytoremediation Treatment of Pre-Treated Domestic Wastewater

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ABSTRACT

Wastewater contamination which causes health, environmental and economic impacts is one of the most common environmental issues. Several methods have been used for the upgrade of the existing wastewater treatment facilities, nevertheless, the application of phytoremediation treatment is a promising and environmentally friendly method to avoid the secondary contaminations posed by the treatment dosage in other advanced treatment methods. The current work aimed to assess the phytoremediation treatment of the pre-treated domestic wastewater using the *Salvinia molesta* and water hyacinth plants. The water quality tests were performed in the current research to evaluate the effects of the phytoremediation treatment using the *Salvinia molesta* and water hyacinth plants on the responses of the water quality parameters. The study focused on varying two main parameters, namely the pH and the hydraulic retention time (HRT), while the removal rate was determined based on the reduction in the chemical oxygen demand (COD), total dissolved solids (TDS), total nitrogen (TN) and turbidity. The optimal removal of COD, TDS, TN and turbidity in the current study was 56.47, 83.00, 52.12, and 79.98% for *Salvinia molesta* as well as 48.81, 24.00, 13.56 and 19.89% for water hyacinth.

Keywords: phytoremediation, wastewater, *salvinia molesta*, water hyacinth

INTRODUCTION

Domestic wastewater generation is strongly associated with the development and population growth, where the growing production and industries contribute to increased generation (Hülßen *et al.*, 2016). The generated domestic wastewater is one of the most troubling issues around the world, as many countries have resorted to various methods of treatment, including the chemical, physical and biological methods to dispose of this type of waste safely to the environment (Corbella & Puigagut, 2018). Wastewater could be classified into three types, including domestic, industrial and stormwater wastewater. Many countries intensify their efforts to monitor industrial wastewater due to the seriousness of its contents, which may lead to an environmental and health disaster if it is discharged into the environment without

treatment (Fahad *et al.*, 2019), while they tolerate other sources of wastewater, which are usually disposed of to the natural sources directly or after pre-treatment (Powley *et al.*, 2016). All types of wastewater are characterized by their physico-chemical diversity in terms of the high contents of chemical oxygen demand (COD), biochemical oxygen demand (BOD), total dissolved solids (TDS), turbidity, total phosphorus and other characteristics (Choi *et al.*, 2017).

The domestic wastewater contains a high ratio of organic and nutrient matters where pre-treatment processing is not enough to remove it (Choi *et al.*, 2017). The pre-treatment process usually involves the technologies of the bar screen, grit chamber, and sedimentation tank, in which the characteristics of wastewater are optimized before the disposal stage (Moharram *et al.*, 2016). Moreover, some large domestic facilities use

