

## Application of Selected Floating Aquatic Plants for Phytoremediation of Textile Dye Effluent from Batik Industry

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Batik industry in Sri Lanka releases a large volume of waste effluent containing toxic chemicals to the aquatic environment. Such chemical compounds negatively affect the physicochemical properties of water such as the color, pH, Electrical Conductivity (EC), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and concentration of total, dissolved and suspended solids (TS, TDS and TSS). Thus, it is highly important to treat effluent generated from the batik industry before being released into the aquatic environment. This study aimed to find out the possibility of applying aquatic floating plants *Azolla pinnata* (mosquito fern), *Salvinia molesta* (giant Salvinia), and *Lemna minor* (common duckweed) for the phytoremediation of initially treated effluent from a dyeing plant of batik industry. The Batik effluent samples released from the “Leka Batik Center” Matara were collected from the effluent outlet of the treatment plant. Experiments were conducted in the laboratory using diluted and pH adjusted wastewater in glass tanks separately using known biomass of floating aquatic plants open to the indoor light condition at room temperature. During the experiment process, physicochemical parameters of water were recorded at 05-day time intervals. Totally 12 glass tanks in three series where each series consisted of three replicates of plants (separately for three species) system and 01 control set without adding plants were used. Three plant species showed clear evidence in colour removing, and decreasing EC, TS, TDS, TSS, COD, BOD, and  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$  concentrations. *Salvinia* sp. showed the drastic decline in above parameters occurred during 20 days with the efficiency of 94.19% of color removal, 78.81% of EC, 71.58% of TS, 66.67% of TDS, 64.80% of TSS, 81.53% of COD, 62.367% of BOD, 94.62% of  $\text{NO}_3^-$ , and 80.41% of  $\text{PO}_4^{3-}$ . There are some reported evidence for treatment of domestic waste and other type of waste water in using *Salvinia* sp., but no clear evidence is available for treatment of batik dye wastes using that aquatic plants. This study clearly shows that *Salvinia* sp. is the most suitable floating aquatic plant comparing with *Azolla pinnata* and *Lemna minor* in remediation of textile dye effluent released from Batik industry. As a one practical problem it was found that all three types of plants grown in the laboratory system without adding nutrients during study period have limited their growth in wastewater. However, the results of this study would be useful to design giant Salvinia grown in constructed ponds to further treat effluent released from wastewater treatment plants in Batik industries.

**Keywords:** Wastewater, Phytoremediation, *Azolla pinnata*, *Salvinia molesta*, *Lemna minor*