

*Review Article*

DOI 10.20527/twj.v7i1.102

The Potential of Constructed Wetlands for Liquid Waste Management in Small and Medium-Scale Tannery: A Literature Review

Febriani Purba

Department of Agro-industrial Technology, Faculty of Agriculture, Lambung Mangkurat University, 70714 Indonesia

Correspondence: febriani.purba@ulm.ac.id

Received: 24 February 2021; Accepted 17 June 2021; Published 30 June 2021

ABSTRACT

The leather tanning industry or tannery, mainly in the small and medium scale (SMEs), is not environmentally friendly. Limited capitals drive the SMEs-scale tanneries to dispose of liquid waste directly into water bodies without proper treatment. It might cause serious environmental problems due to the high content of COD, BOD, chromium, and dyes. Treatment of liquid waste using constructed wetlands has been widely used because it is efficient, cheap, and powerful. This review discusses the latest studies in the wastewater treatment of tanneries using phytoremediation techniques and constructed wetlands and their potential applications in the SMEs tanneries.

Keywords: Liquid waste, Tannery, Phytoremediation, Constructed wetland, SMEs

1. Introduction

In general, the small and medium scale (SMEs) tannery is far from environmentally friendly. It is due to a high amount of solid and liquid waste produced. The leather tanning industry requires 50 - 150 liters of water to process every 1 ton of raw leather.

During the production process, the leather tanning industry uses many chemicals such as chromium, sulfate, sodium sulfate, lime, ammonium sulfate, sodium chloride, and sulfuric acid formaldehyde, pigments, dyes, and antifungal agents. Chromium is the most widely used tanning material in Indonesia because it is cheap, the tanning process is fast, and the leather is stable. These chemicals can increase the intensity of the toxicant produced per unit output (Khan 2001).

SMEs tannery has low financial capacity. Water treatment of liquid waste requires a relatively expensive cost and might reduce the profits. Purba et al. (2020) found that the SME tanneries disposed of the liquid waste directly into water bodies without prior treatment. This practice can cause serious environmental problems because the wastewater contains high COD levels, BOD, chromium, and dyes (Song et al. 2000). The tannery's wastewater contains about 500-1000 ppm of chromium (Aravindhan et al. 2004). Chromium can poison animals and plants (Chidambaran et al. 2009).

The processing costs for the liquid waste of tannery are expensive. It has led many developing countries to use primary and (or) secondary processing in biological and physicochemical processes such as ion exchange, reverse osmosis, electrolysis systems, precipitation, coagulation, and adsorption (Kacaoba et al. 2002, Hafez et al. 2002). However, this management system is usually expensive and produces secondary pollutants. It is not economically practical for SME tanneries. According to data from the Indonesian Tanned Leather Association, 75% of the leather tanning industry in Indonesia is a small and medium scale industry. Therefore, a practical and cheaper liquid waste management technology is needed.