COMPARISON OF EFFECTIVENESS OF REMOVING NITRATE IN TWO DIFFERENT WASTEWATER TREATMENT PROCESSES USED AT CREPE RUBBER FACTORIES IN SRI LANKA

A dissertation submitted

by

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to

The Center for Environmental Studies and Sustainable Development

in partial fulfillment of the requirements

for the degree of

Master of Science in Environmental Science

of

THE OPEN UNIVERSITY OF SRI LANKA

NAWALA, NUGEGODA

Abstract

Sri Lankan natural crepe rubber industry is one of the leading industries in export agriculture sector. However, the industrial production process of natural rubber results in generating a large amount of wastewater that leads to several issues in the treatment. Notably, a great possibility is there to increase the nitrate nitrogen in treated water. Biological Oxygen Demand (BOD) is a key element in water quality, and the increment of the nitrate level tends to increase the BOD concentration in wastewater. Therefore, the present study aims to study the effectiveness of the methods during wastewater treatment, to identify the most effective treatment processes for removing nitrate from wastewater in crepe rubber industries and to develop a model to predict the amount of nitrate nitrogen in wastewater based on BOD.

Two different crepe rubber effluent treatment plants at Hanwella region in Sri Lanka have been selected for this study. They have a pond/lagoon treatment system and activated sludge systems. BOD, Total Suspended Solids (TSS) and pH measurements are higher in the untreated wastewater than the treated wastewater. Further, Nitrate, Total Dissolved Solid (TDS), Electrical Conductivity (EC) and Ammonical Nitrogen in treated wastewater are higher than the untreated wastewater in both treatment plants. The average of BOD is 49 mg/l and 27.6mg/l of treated wastewater in pond/lagoon treatment system and activated sludge treatment system respectively. Analysis of nitrate has evidenced that neither of the mentioned treatment methods able to remove nitrate efficiently from the wastewater. The efficiency of ammonical nitrogen and nitrate removal have negative percentage. The correlation analyzing was conducted to find some relationship between BOD and nitrate. The analyzed data shows that there is significant correlation between BOD and nitrate. The regression model is "Nitrate value= 0.63 + (0.035) BOD_5" and it can be used for predicting the nitrate value in the future based on BOD.