INVESTIGATING THE POSSIBILITY OF THE USE OF PADDY HUSK CHARCOAL ADSORPTION METHOD FOR THE TREATMENT OF EFFLUENT ORIGINATING FROM SOAKING THE PADDY

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Rice is the staple food in Sri Lanka, and the consumption of parboiled rice is estimated to be 70% of the total rice consumption. Making of parboiled rice involves cleaning, soaking, steaming, drying and milling the paddy. The process of soaking paddy generates most of the effluent of the rice milling industry. Most of the mills in Sri Lanka use cold soaking and that generates more effluent than what hot soaking generates. Even though rice mill effluents are not toxic, they contain high levels of biochemical oxygen demand (BOD) and chemical oxygen demand (COD), low pH, objectionable colour and bad odour.

In this research work, we propose a new, low-cost effluent treatment method to the Sri Lankan rice mill industry. The proposed method, experimented at the departmental laboratory is the use of paddy husk charcoal as an adsorbent to reduce the strength of rice mill effluent passed through a column containing paddy husk charcoal. A vertical adsorption bed having 9 cm diameter and 45 cm height was constructed. Effluent generated at the laboratory by soaking the paddy in water was passed through the adsorption bed. The effluent fed to the adsorption bed was acidic and had a pH of about 5.0.

The liquid collected from the bottom of the adsorption bed at the very beginning of the adsorption process was colourless and odourless indicating that the paddy husk charcoal bed was successfully adsorbing the waste material present in the rice mill effluent, and this liquid had a pH value of about 7.7 which is permissible by the environmental standards. The pH of the treated liquid leaving the adsorption column reduced with time, reaching a pH of 6.0 in about two and a half hours. By this time, 17.7 litres of effluent had been treated by the 2.7 litre volume adsorption bed containing 126 g of paddy husk charcoal. It was of interest to note that the pH of the treated liquid leaving the adsorption bed continued to remain at the pH of about 6.0 for another two and a half hours, at which point the experiment was discontinued owing to the lack of fresh effluent to be fed to the adsorption column.

Experiments are carried out at present with adsorption beds having smaller residence time in an attempt to quantitatively model the adsorption characteristics of the paddy husk charcoal when used with the soaking effluent with the view of scaling up the adsorption bed for industrial use. One of the major problems faced in the use of adsorption process in wastewater treatment is the cost of regenerating the adsorption media. In the case of paddy husk charcoal, regeneration is not necessary since the saturated paddy husk charcoal could be used as fertilizer directly or after composting. Moreover, paddy husk charcoal is freely available at all rice mills as a waste generated from boiler operations, which use paddy husk as the fuel.