

## Evaluation of lab scale constructed wetlands to treat the toddy distillery effluent with different aquatic plants

Bama, P., Thushyanthy, M., Alvappillai, P. and Pirabhaharan, M.

Department of Agricultural Engineering, Faculty of Agriculture, University of Jaffna, Sri Lanka

### Abstract

Effluent 'coda' originating from palmyrah toddy distillery units is the major source of environmental pollution in the Jaffna district of Sri Lanka. Spent wash produced from distilleries is rich in organic material and characteristically less toxic. The study was aimed to assess the potentiality of constructed wetlands for treating of distillery spent wash in lab scale with various configurations treatments, before discharge to the land. Effluent was collected from Thikkam distillery in Jaffna. The effluent was diluted with groundwater as different series. The aquatic plants, *Eichhornia sp*, *Lemna sp*, *Pistia sp* and *Lemna minor sp* were selected. Constructed wetland was designed and fabricated in lab scale. Initial parameters of the effluent were measured. Samples from inlet and outlet of the artificial wetland were collected on two days interval for one week and analyzed for pH, BOD, COD, Turbidity,  $\text{NO}_3^-$ ,  $\text{PO}_4^{3-}$ , TDS and EC using standard methods with replicates with hydraulic retention time of 2, 4 and 6 days. Even diluted effluents were often above the permissible standards specified by the Central Environmental Authority (CEA) for the discharge of industrial effluents into land. The aquatic plants, *Eichhornia sp*, *Lemna sp*, *Pistia sp* and *Lemna minor* were used successfully to treat the spent wash. Complete death of *Pistia* was observed in dilution of five. Constructed wetlands were successfully removed TDS, nitrate, phosphorus, BOD, COD, Turbidity, EC and change the pH. The maximum removal rates of EC, TDS, COD, BOD, nitrate and phosphate in constructed wetland were 50.14%, 48.42%, 45.5%, 56.3%, 35.3% and 54% respectively. It was found constructed wetland shows highly significant removal efficiency of all tested components by *Lemna minor*. The hydraulic retention time of six days was showed the highest removal efficiency and maximum reduction rate of all tested components. The hydraulic retention time of four days which is more possibility to keep, because the values of constituents of distillery waste are moreover reached the permissible standards specified by the CEA to discharge to land or irrigation. After treated effluent through, construction of wetlands could be used as a liquid fertilizer for cultivating field.

### Keywords

Distillery effluent, Constructed wetland, Dilution factor, Hydraulic retention time, Removal efficiency

Bama, P., **M Thushyanthy**, P Alvappillai, M Pirabhaharan (2013). Evaluation of lab scale constructed wetlands to treat the toddy distillery effluent with different aquatic plants. Archives of Applied Science Research, 2013, 5 (5):213-219.