

Performance Evaluation of Different Cost Effective Leachate Treatment Methods Suitable for Developing Countries

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Leachate has a number of environmental problems and it is characterized by high concentration of organic matter, nitrogen, heavy metals, and chlorinated organic and inorganic salts. Organic content of leachate is generally measured in terms of biological oxygen demand (BOD₅) and chemical oxygen demand (COD). Higher concentrations of pollutants in leachate are the potential source of contamination of both ground and surface waters. Therefore, it necessitates the proper treatment of landfill leachate prior to discharge into natural water sinks. However, on-site “high-tech” treatment systems are unsustainable to low income countries due to large constructional and operational cost. Hence, there is a particular need for low-cost and low-maintenance leachate treatment systems.

The main purpose of this study was to identify the efficiency of different cost effective methods to remove pollutants in leachate. A constructed wetland with an area of 16 m² planted with *typhalatifolia* was used to assess its efficiency in removing pollutants. In addition, column study was conducted to evaluate efficiency of low-cost filter materials as a new method to treat leachate. Different mixtures of sand, clay and activated carbon were tested by loading columns with leachate. The efficiencies of column study and wetland were assessed and constructed wetland was found to perform best and it showed good removal efficiency for COD (88.3%), BOD₅ (92.1%) and NO₃-N (66.7%) while 75.1% of COD, 71.2% of BOD₅ and 49.3% of NO₃-N were removed by the mixture of activated carbon, clay and sand (1:1:1 by volume). The results showed that the wetland and mixture of activated carbon, sand and clay filter materials could be used as low-cost alternatives for the treatment of landfill leachate.

Keywords: Activated carbon, Landfill leachate, Filter materials, Constructed wetland