An Eco-friendly Approach to Purify Reject Water from Reverse Osmosis Treatment Plant

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The usage of Reverse Osmosis (RO) treatment plants has been increased worldwide with the increasing demand for safe drinking water. The waste water consists of potential contaminants rejected from the RO treatment, referred as RO reject water. Purifying RO reject water before releasing into the environment is one of the challenges faced by industries. The study focuses on phytoremediation technology where aquatic plants have been used to absorb contaminants in RO reject water. The water hyacinth (*Eichorrnia crassipes*) and water lettuce (*Pistia stratiotes*) were selected as floating aquatic plants. The change in water quality before and after being exposed to plants and phytoaccumulation capacity of plants after eight weeks were investigated in the study. The contaminants of RO reject water including iron were successfully removed by aquatic plants within first four weeks (phase I). A higher reduction in concentration of total hardness, calcium hardness, alkalinity and ions was identified in treatment tanks compared to control which was filled with RO product. The removal of ions decreased with time within phase I, except for chloride and calcium hardness. Although, the removal of total hardness, chloride, iron, magnesium, potassium and sodium in RO reject water was significantly ($p < 0.5$) greater in treatment tanks after first two weeks, only total hardness, alkalinity, iron and sulphate removal were significantly ($p < 0.5$) higher compared to control with the period of exposure to plants within phase I. However, capacity of plants to reduce contaminants of water was not detected in second four weeks. Both aquatic plants accumulated ions in their biomass especially with a higher accumulation for magnesium, sodium and potassium compared to control. Therefore, the proposed water treatment system can be used to treat RO reject water, with regular harvesting of plants and new replacement at every four weeks to maintain the effectiveness of phytoremediation process.

Keywords: Reverse osmosis, RO reject water, Phytoremediation, Phytoaccumulation capacity, Floating aquatic plants