COMPARATIVE STUDY TO IMPROVE THE QUALITY OF REVERSE OSMOSIS CONCENTRATE USING PHYTOREMEDIATION TECHNIQUES

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Reverse Osmosis (RO) plants have been introduced by many organizations to Chronic Kidney Disease of Unidentified Etiology (CKDu) affected areas as an effective drinking water treatment method. Reverse Osmosis concentrate is normally released to the environment without any treatment. This study was conducted to identify the possibility of improving the quality of RO concentrates using phytoremediation techniques. Four plant species; Vetiver (*Vertiveria zizanioides*), Cattail (*Typha augustifolia*), Cannas (*Canna indica*) and Bulrush (*Scirpus californicus*) were planted in plastic containers (60 x 30 x 30 cm) and soil without amendments was served as the control. The experimental units were treated with concentrates obtained from RO plant installed in girls' hostel, Faculty of Agriculture at a rate of 2.3 mls^{-1} for two months. The hydraulic retention time was 3h. Water samples were collected from inlets and outlets of the each experimental unit by two weeks interval and analyzed for pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), concentration of Na^{+}, K^{+}, Ca^{2+}, Mg^{2+}, NO_3^{-}-N, PO_4^{3-}-P and NH_4^{+}-N. The experiments were conducted in a Completely Randomized Design with three replicates. The results revealed that Removal Efficiencies (RE) of all pollutants were increasing with time. Cattail and Bulrush plants showed significantly ($p<0.05$) higher RE for EC, TDS, NO_3^{-}-N and NH_4^{+}-N by 9.6%, 10%, 8.2% and 16% respectively. Cannas showed significantly ($p<0.05$) higher RE for EC and TDS by 9.6% and 10% respectively. Also the RE of PO_4^{3-}-P was significantly ($p<0.05$) higher in Cattail (12%). Sodium Adsorption Ratio of all treatment plants were under the low sodium (0-10) water quality class. Therefore, it can be concluded that the quality of RO concentrate can be improved using phytoremediation techniques. However, further studies are vital to identify the most effective plant species.

Keywords: CKDu, Phytoremediation, Removal efficiency, Reverse osmosis, RO concentrate