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**Potential of Phytoremediation Techniques to Improve the Quality of Reverse Osmosis Concentrate**

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**Abstract**

The byproduct of Reverse Osmosis (RO) system known as RO concentrate is normally released to the environment without any treatment. RO concentrate is considered as major environmental and economic drawback of RO process. Main objective of this study was to investigate the potential of phytoremediation techniques for RO concentrate through pilot scale constructed wetlands (CWs) with low-cost in chronic kidney disease of unknown etiology (CKDu). Four plant species; Vetiver (*Vertiveria zizanioides*), Cattail (*Typha augustifolia*), Cannas (*Canna indica*) and Bulrush (*Scirpus californicus*) were planted in small plastic containers 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  $2.3 \text{ mls}^{-1}$  for three months period. The hydraulic retention time was 52h. Water samples were collected from inlets and outlets of each experimental unit by two weeks interval and analyzed for pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), concentration of  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{NO}_3^-$ -N,  $\text{PO}_4^{3-}$ -P and  $\text{NH}_4^+$ -N. The results revealed that removal efficiencies (RE) of all pollutants were increasing with time. Cattail plants showed highest removal efficiencies for  $\text{PO}_4^-$ -P,  $\text{NO}_3^-$ -N and  $\text{NH}_4^+$ -N by 45%, 30% and 39% respectively. Sodium Adsorption Ratio of all treatment plants were within the usual range (0-15) of irrigation water. Therefore, it can be concluded that the quality of RO concentrate can be improved using phytoremediation techniques.

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