

EFFECT OF DIRECT DISPOSAL OF REVERSE OSMOSIS CONCENTRATE ON SOIL CHEMICAL CHARACTERISTICS IN DISPOSAL SITES

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Reverse Osmosis (RO) is one of the most effective methods to provide safe drinking water for chronic kidney disease affected areas in the North Central Province, Sri Lanka. The rejected water or the concentrate of many RO plants is about 75% of the feed water volume. The concentrate disposed from RO plants includes all the removed through RO membrane. Direct disposal of RO concentrate into the soil may create long term environmental issues. Hence, this study was conducted to analyse the soil chemical characteristics of RO concentrate disposal sites. Ten community-based RO plants were selected to collect soil samples. Reference soil samples were also collected from non-affected locations of the same sites to compare soil characteristics. Both soil samples were analysed using standard methods for chemical characteristics. Soil analysis revealed that disposal of RO concentrate has significantly enhanced ($p < 0.05$) pH, EC, available N, P, K, Ca, Mg, Na, and Cu of the soil compared to the reference soil samples in all 10 locations. Studied four locations had remarkably higher percentages of EC, available Na, Mg and Ca (i.e: 87%, 96%, 90%, 80% respectively) than the reference soil. However, Cd, As and Pb accumulation in concentrate disposal sites was not significantly different ($p > 0.05$) compared to reference samples. Water quality analysis showed significantly higher ($p < 0.05$) levels of EC, TDS, NO_3^- , PO_4^{3-} , Pb, Na, K, Ca, Cl, F and Mg contents in the concentrate compared to feed water in all the tested RO plants. However, no significant difference was reported in Cd, As, and Zn between feed water and the concentrate. Hence, there is a potential to build up salinity and sodicity in RO concentrate disposal sites and deteriorate soil health in the long term. However, this study should be continued to confirm long term effects.

Keywords: Concentrate, Direct disposal, Reverse osmosis, Soil characteristics, Water quality