

The Potential Use of Reverse Osmosis Concentrate as Water Source for Irrigation

G.I.T. Godage¹, D.T. Udagedara¹ and H. M. T. S. Ritigala^{2*}

¹ *Department of Applied Earth Sciences, Uva Wellassa University, Badulla, Sri Lanka*

^{2*} *Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China*

Reverse Osmosis (RO) membrane technology is one of the promising techniques used to provide safe drinking water to the community, particularly chronic kidney disease of unknown etiology (CKDu) affected areas in the dry zone of Sri Lanka. The rejected water from the RO plant is known as the RO concentrate, which is generally released to the environment without any beneficial use. The main objective of this study was to identify the potential use of RO concentrate as irrigation source water. Therefore, water samples were collected from different capacities of RO plants varying from household to commercial, and the selected area was the North Central province and North Western province, the total number of RO plants were fifty. The essential irrigation water quality parameters for agriculture were tested to determine the characteristics of RO concentrate. pH, electrical conductivity, total dissolved solids, alkalinity, carbonate, bicarbonate, nitrate, and phosphate were measured. Furthermore, the concentration variation maps were plotted (using ArcGIS 10.5) to identify the spatial variation of RO concentrate. Finally, the findings were compared with existing irrigation water quality standards provided by the United States Food and Agriculture Organization (FAO), and Agriculture Department of Sri Lanka. As the obtained results average values of, pH was 7.25, electrical conductivity was 1.48 dS m^{-1} , total dissolved solid was 725.4 mg L^{-1} , alkalinity was 104.66 mg L^{-1} as CaCO_3 , bicarbonate was 1.05 meq L^{-1} , nitrate was 1.78 mg L^{-1} , phosphate was 0.96 mg L^{-1} and carbonate was not identified. According to the results, this study revealed that RO concentrate water quality complies with the requirement of both water quality standards for agriculture, and there is a potential of using the RO concentrate as a water source for irrigation.

Keywords: Reverse osmosis, RO concentrate, Irrigation, Agricultural water