Environmental Engineering and Management Journal

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DEVELOPMENT AND EVALUATION OF A SUITABLE FILTERING TECHNIQUE FOR REUSING LAUNDRY WASTEWATER FOR IRRIGATION

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Abstract

Household wastewater and especially greywater can be used as a source of irrigation water for homesteads if appropriate treatment systems are in place. Laboratory analysis of key parameters in laundry wastewater, such as pH (8.40-9.40), Residual Sodium Carbonate (RSC) (3.10-4.60 meq L^{-1}) and Sodium Absorption Ratio (SAR) (26.90-29.80) indicated its unsuitability for irrigation due to exceedance of established limits. To address this issue, a multi-layer filter was developed to treat laundry wastewater, effectively reducing pH to 6.90-7.80, RSC to 0.50-0.80 meq L^{-1} and SAR to 3.90-6.50, all within safe limits for irrigation. A field experiment involving okra crop, utilizing various irrigation water sources including untreated laundry wastewater (T_1), treated laundry wastewater (T_2), normal irrigation water (T_3), and a mixture of 50% T_2 and 50% T_3 (T_4), was conducted to assess the crop performance. Growth parameters and crop yield did not show any significant differences across all treatments. Soil analysis following the cropping period revealed that soil irrigated with treated laundry wastewater (T_2) maintained more favourable chemical properties than untreated wastewater (T_1), with significantly lower pH (6.85 Vs 7.02) and reduced heavy metal accumulation. While all treatments exhibited elevated nutrient levels, T_2 provided a better balance of essential nutrients without the potential long-term risks associated with untreated wastewater. Furthermore, levels of N, P, K and heavy metals in the edible portion of the crop remained within safe thresholds across all treatments. These findings suggest that treated laundry wastewater can be safely utilized for irrigation purposes, offering a sustainable alternative to freshwater that maintains soil health while supporting comparable crop productivity.

Key words: agricultural reuse, greywater treatment, multi-layer filtration, okra cultivation, resource conservation, soil quality, sustainable irrigation, water recycling

Received: May, 2024; Revised final: July, 2025; Accepted: August, 2025

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