



ADVANCING CIRCULAR RESOURCES MANAGEMENT: EXPERIMENTAL EVALUATION OF NUTRIENT RECOVERY TECHNOLOGIES FROM WASTEWATER

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Wastewater management poses a significant challenge in many developing regions, especially in peri-urban areas where standard centralized treatment systems are impractical. In this context, the recovery of nutrients from wastewater is a key strategy for advancing circular economy principles [1]. Through a rigorous decision-making analysis [2] three promising nutrient recovery technologies (NRTs) were identified as the most cost-effective for low-concentration of nutrients in domestic wastewater. This study presents a comparative evaluation of these NRTs at laboratory scale applied to waste streams with different physicochemical characteristics, including anaerobic treatment effluents from Bucaramanga (Colombia) and sludge-derived matrices from Sabadell (Spain). Results demonstrated that Adsorption allowed the simultaneous recovery of Nitrogen (N) and Phosphorus (P), offering a balanced approach for dual nutrient removal and valorisation. Ammonia stripping was a highly efficient technology, achieving N recovery efficiencies above 90%[w/w] under controlled pH and temperature conditions. In contrast, struvite precipitation achieved high phosphorus recovery efficiencies (75–94%[w/w]) in matrices with elevated PO₄-P concentrations (>40 mg/L), being dependent on phosphorus availability. These results highlight the context-dependent performance of NRTs and the importance of coupling decision-support tools with experimental validation to enhance implementation feasibility.

References:

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Acknowledgments:

This work was supported by General Royalties System (SGR) of Colombia - BPIN project 2021000100536. V. Quintero-Prada, H. Escalante, L. Castro, M. E. Suárez-Ojeda and D. Nabarlatz are members of the CYTED Biofuturo Network (424RT157).