RETASTE Conference Abstracts
RETASTE-AWR-1502-In-person Poster
Rethymno, September 16-18, 2026
© Author(s) 2026 CC BY 4.0 License
DOI:10.5281/zenodo.23678093

Reusing Hospital Onsite Treated Effluent: Water Quality, Safety and Agronomic Performance in the LIFE-HIPPOCRATES Pilot Study

F. Galliou, E. Maragkaki, A. Papadaki, C. Bouki, S. Dokianakis, E. Viskadouraki, M. Dragasaki, G. Markakis, N. Katsarakis, N. Vidakis, D. Papadimitriou and T. Manios

Hellenic Mediterranean University, Greece

Abstract

Hospital wastewater represents a critical hotspot for contaminants of emerging concern (CECs), antibiotic-resistant bacteria (ARBs) and antibiotic resistance genes (ARGs), owing to the elevated concentrations of pharmaceutical residues and pathogens it carries prior to dilution within municipal sewage networks. Within the framework of the LIFE-HIPPOCRATES project (101113941, LIFE22-ENV-EL-HIPPOCRATES), an on-site demonstration treatment unit has been installed and is in continuous operation at the Venizeleio General Hospital of Heraklion, Crete, targeting the removal of CECs, ARBs and ARGs directly at source, before the effluent enters the main sewage system.

As part of the pilot unit's systematic operational monitoring, the treated effluent is continuously assessed across a broad range of physicochemical parameters (pH, electrical conductivity, BOD_5, COD, TKN, TP, among others), as well as microbiological indicators, including pathogenic bacteria, antibiotic-resistant bacteria and resistance genes, thereby ensuring comprehensive characterisation of effluent quality throughout the operational period.

Beyond regulatory compliance monitoring, the suitability of the treated effluent for agricultural reuse was specifically investigated by the Hellenic Mediterranean University (HMU) through controlled hydroponic cultivation trials of leafy vegetable crops (lettuce and spinach). This agronomic evaluation sought to establish not only the microbiological and chemical safety of the reused effluent, but also its potential value as an alternative irrigation resource, through assessment of plant growth performance, yield and crop quality under real reuse conditions.

The experimental trial produced highly encouraging results, demonstrating that the on-site treated hospital effluent fully satisfies the safety limits required for agricultural reuse, while sustaining agronomic performance in hydroponic vegetable production comparable to that achieved with conventional water sources. These findings provide compelling evidence for the feasibility of exploiting alternative irrigation water sources, such as specially treated hospital effluent generated by the LIFE-HIPPOCRATES treatment system, as a safe, reliable and sustainable option, of particular relevance to water-scarce regions such as Crete and the broader Mediterranean basin.

Taken together, this pilot study reinforces the case for wider adoption of decentralised, on-site hospital wastewater treatment coupled with agricultural reuse as a sustainable circular-

ACCEPTED

economy solution, contributing simultaneously to the reduction of environmental contaminant loads and to the diversification of irrigation water resources in agriculture.

Keywords: hospital wastewater, on-site treatment, alternative irrigation water sources, hydroponic cultivation, antibiotic-resistant bacteria, LIFE-HIPPOCRATES

Acknowledgments: This research was co-funded by the EU LIFE+ project with name “A Holistic Approach towards onsite hospital wastewater treatment”, project number 101113941 and project acronym “LIFE22-ENV-EL-HIPPOCRATES”

ACCEPTED