ABSTRACT

The sanitation control of pathogens in the tropical effluents needs much more attention to ensure ecosystem health integrity and the safety of human health. The common use of chemicals in achieving this in wastewater treatment has remained unsustainable due to much health concern. Indeed, based on the numerous challenges associated with faecal pathogenic bacteria in wastewaters, the focus is now on achieving higher purification efficiencies in the elimination of the human pathogens from wastewater through eco-sustainable systems such as constructed wetlands (CWs). Hence, the need to explore the application of constructed wetlands in wastewater treatment under specific local environmental conditions for accurate understanding and improved treatment efficiency. This study therefore aimed at monitoring constructed wetlands faecal bacteria purification efficiency through integrated non-molecular membrane filtration technique and molecular quantitative polymerase chain reaction (MFT-qPCR) technique. The results showed some shortfall in the treatment system and also proved that integrating MFT-qPCR in faecal bacterial purification monitoring within a constructed wetland system provides a more accurate and reliable outcome. Additionally, the wetland purification efficiency was low (<80%) with the dissolved oxygen posing the strongest influence on faecal pathogenic bacterial purification trend across the wetland. Hence, the need to regularly carry out dredging and macrophyte harvesting as well as the use of holistic and more integrative approaches such as MFT-qPCR in managing and monitoring the performance of CWs in faecal pathogen eradication for improved CWs purification efficiency.