ABSTRACT

Population growth and the associated demand for meat products is creating an increasing concern on water over slaughterhouse associated pollution of aquatic environments in Sub-Saharan Africa. In Kenya, increasing volumes of strong slaughterhouse wastewater being discharged either untreated or partially treated has necessitated ardent research into sustainable technologies. Vertical sub-surface flow constructed wetlands offer a promising solution. A study investigating the effect of depth, time and substrate variation on organic matter removal from slaughterhouse wastewater was conducted using vertical sub-surface flow constructed wetlands. Experimental out-door mesocosms designed as cylindrical metal tanks of variable depth and substrate were set up at Egerton University, Kenya. Results showed that organic matter removal was highest at 5 day retention time, with removals of about 50%, 55% and 82% for BOD5, COD and TSS respectively. Deeper (0.8 m depth) mesocosms were noted to have significant differences in treatment for TSS and NH4–N compared to shallow (0.65 m) mesocosms. Sand substrate was observed to perform better in BOD5 and TSS reduction compared to quarry dust and gravel. Increase in substrate size was observed to increase removal efficiency of NH4–N at longer retention time. However, effluent concentration of NH4–N fluctuated with removal efficiency averaging at 26.5%. The study demonstrated that vertical sub-surface flow constructed wetlands operated at a longer retention time of 5 days; with intermittent wastewater feeding, facilitated over 50% removal of organic matter in slaughter house wastewater.