



Soil column studies on the performance evaluation of engineered soil mixes for bioretention systems

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ABSTRACT

The type of filter media in bioretention systems plays an important role in influencing treated run-off quality. Sand and planting soil that are commercially available in the local market vary considerably in their physicochemical properties, thereby resulting in variable hydraulic conductivity and effluent run-off quality. An engineered soil with consistent properties is therefore advantageous as a filter media as it ensures that pollutant (total suspended solids [TSS], total nitrogen [TN] and total phosphorus [TP]) removal guidelines are met. Small column tests were therefore conducted on various soil mixes as a rapid evaluation tool for the optimum engineered soil mix. Amendments such as compost, coconut fibre, water treatment residues (WTR) and recycled concrete aggregate (RCA) were incorporated at various proportions and homogeneously mixed with sand. Results indicated that column 3 with sand, WTR and compost could satisfy pollutant removal guidelines with TSS, TN and TP removals averaging at 93.4, 59.8 and 92.7%, respectively. Coconut fibre could also potentially be used as an alternative organic source but RCA was not suitable as an amendment for the enhancement of P removal due to its influence on the effluent pH levels which was notably high.

Keywords: Bioretention systems; Engineering soil mix; Nitrogen; Phosphorus; Stormwater run-off; Total suspended solids

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