ABSTRACT

Bioretention or rain gardens is widely used as stormwater best management practice (BMP) and have been long implemented as a part of low impact development (LID) because of its ability to remove nutrients from stormwater runoff. A major concern in water quality problem is eutrophication which is caused by the nutrients, namely nitrogen and phosphorus. The objective of this study is to examine and evaluate the efficiency of rain garden in nitrogen and phosphorus removal by varying the types of the mulch layers in a bioretention column and further select the best to be used in rain garden design. Three (3) bioretention columns with size of 46mm in diameter and a height of 400mm were is used for this study where the inflow and outflow runoff will be collected and analyzed to measure the nutrient concentration. Filter media at the depth of 200mm consisted of river sand with soil mix of 80% fine sand and 20% coarse sand were used. Three different types of mulch layer wood chip, tea waste and coconut fibres were applied at the top of filter media at a height of 50mm. Phosphorus concentration in the bioretention column was reduced by 73.9% using woodchip, 23.1% using tea leaves and 50% using coconut fibres. Lower removal efficiency was seen for nitrogen where 24.4% using woodchip, 0% for tea leaves and 4.4% using coconut fibre. Woodchip was seen to be favourable compared to the other two mulch layer due to its removal efficiency in removing both phosphorus and nitrogen from the incoming stormwater runoff. The absorption capacity was seen as the main factor that affects the removal rate. Further research can be conducted by adding a vegetative layer inside the bioretention column or by changing the filter media depth and configuration to further enchance the removal rate of pollutant from the stormwater runoff.