Biochar – A multi-beneficial and cost-effective amendment to clay soil

Abstract

Highways are considered a major source of pollution to stormwater and its runoff can introduce various contaminants including nutrients, Indicator bacteria, heavy metals, chloride, and phosphorus compounds, which can have negative impacts on receiving waters. This study assessed the ability of biochar for contaminants removal and to improve the water retention, saturated hydraulic conductivity and unsaturated hydraulic conductivity of soil biochar mixture. For this, ten commercially available biochar has been strategically selected. Lab scale batch testing was done at 3% and 6% by the weight of the soil to find the preliminary estimate of contaminants removal along with hydraulic conductivities, and water retention capacity. Furthermore, from the above conducted studies, six best performing candidate and application rate of 6% has been selected for the column studies. Soil biochar mixture was filled in 3in assembled column up to a fixed height of 30in based on hydraulic conductivity. Total eight column experiments have been conducted for nutrient, heavy metal and indicator bacteria analysis over a period of one year, which includes a drying as well as a deicing period. The saturated hydraulic conductivity was greatly improved which is attributed to high porosity of biochar soil mixture. The column effluents were examined and the data demonstrate that most of the biochar successfully removed up to three logs for the indicator bacteria and up to 90% nutrients removal efficiency has been found with three biochar. These results demonstrate that biochar could be efficiently applied with clay soil to improve the soil hydraulic characteristic was well as remove the pollutants from the stormwater runoff.

References;

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