

## **Biochar - A Multi-Beneficial and Cost-Effective Amendment to Clay Soil for Stormwater Runoff Treatment**

**Authors :** Mohammad Khalid, Mariya Munir, Jacelyn Rice Boyaue

**Abstract :** Highways are considered a major source of pollution to storm-water, 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 holding capacity 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 conductivity and water retention capacity. Furthermore, from the above-conducted studies, six best performing candidate and an application rate of 6% has been selected for the column studies. Soil biochar mixture was filled in 7.62 cm assembled columns up to a fixed height of 76.2 cm based on hydraulic conductivity. A total of 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 the high porosity of the biochar soil mixture. Initial data from the column testing shows that biochar may have the ability to significantly remove nutrients, indicator bacteria, and heavy metals. The overall study demonstrates that biochar could be efficiently applied with clay soil to improve the soil's hydraulic characteristics as well as remove the pollutants from the stormwater runoff.

**Keywords :** biochar, nutrients, indicator bacteria, storm-water treatment, sustainability

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