

H43P-1097 On the Effect of Biochar Application on the Hydraulic Properties of Salt-affected Green Stormwater Infrastructure



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Hall B-C (Poster Hall) (Convention Center)

Abstract

Soil salinization is an increasing global problem, especially in agricultural, coastal, and roadside environments. The increasing intensity of precipitation events due to climate change may be exacerbating these effects, such as through larger pulses of deicing salts entering roadside green stormwater infrastructure (GSI) and stronger coastal storms bringing seawater further inland. Although soils are often amended with biochar to remove pollutants and improve hydraulic properties, it may also mitigate the impact of salinity. Here, we compared the water retention properties and unsaturated hydraulic conductivities of both biochar-amended and unamended GSI soil media with varying salinity levels (1-25 dS m⁻¹, using Na⁺ salts). The effects of salinity on both matric and osmotic potential included shifts in the plant-available water range, with the magnitude depending on the salt concentration and biochar content. Overall, biochar addition decreased the salinity and improved plant water availability in salt-affected soils. There was an increase in the integral water capacity (which describes the total amount of water the soil media can hold and release to a plant) for biochar-amended saline soils, demonstrating that biochar can reduce the total osmo-matric stress. On a macro scale, the high density of pores in biochar appears to increase soil hydraulic conductivity while reducing osmotic potential by adsorbing salt ions. On a micro scale, the negative surface charge of biochar likely counteracts the impact of the electric double layer of saline soils, reducing the total osmo-matric force on water molecules in soil solution. In effect, this helps the plant's osmotic potential to overcome the forces holding water molecules to soil grains. As soils become more saline due to ongoing climate-

related snow events, biochar application might be an effective management technique for roadside and other saline soils.

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