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Biochar as a soil amendment: Effects on heat and water movement in soil

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The presence of thermal gradients in soil can cause water to flow in the liquid and vapor phases. Biochar, a product of the pyrolysis process, has been identified as a soil amendment and a potential tool for climate change mitigation through the sequestration of carbon in soil. The application of biochar, a black, low density material, could potentially impact heat and water transfer near the soil surface due to changes in the energy balance at the soil surface and soil physical properties. The effect of biochar on soil water redistribution and soil temperature distributions due to imposed temperature gradients is a topic that has not been studied. The objective of this experiment was to compare soil water redistribution and temperature distributions for a highly weathered soil amended with different amounts of biochar. A closed column experiment was performed to evaluate coupled heat and water movement in a non-amended soil and a biochar amended soil. Different conditions (non-amended and amended with biochar) will be applied to one soil (fine sandy loam). A $125\text{ }^{\circ}\text{C m}^{-1}$ thermal gradient will be applied to the soil columns for 28 days. Soil water content and temperature distributions will be obtained at various depths within the soil columns and reported. This experiment will allow for comparison of the effect of biochar on soil water redistribution in closed soil columns with the same initial conditions and similar boundary conditions.

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