

Variability of Moisture Retention and Hydrophobicity Among Biochars.

Gray Myles¹, Markus Kleber¹, Maria Ines Dragila¹, Mark Johnson⁴ and Bridget Guildner¹

¹Crop and Soil Science, Oregon State University, Corvallis, OR

²National Health and Environmental Effects, U.S. Environmental Protection Agency,
Corvallis, OR

This research identifies factors and mechanisms that control changes in moisture retention when biochars produced from different feedstocks and under different heat treatment temperatures are mixed with fine sand. While substantial experimental research has been conducted on the impact of biochar on soil fertility and crop yield, little research has investigated the effect of biochar additions on soil moisture retention, which is an important component of soil quality. Given the high degree of variability noted in different biochars, it will be critical to determine how moisture retention varies among biochars and to determine the mechanisms responsible for these differences. Biochars produced from 2 feedstocks (hazelnut shells and Douglas fir) at 3 heat treatment temperatures (370, 500, and 620 °C) were mixed with fine sand at 10% by volume. Moisture retention data, as determined by dew point meter analysis near wilting point (-15 bars) and pressure plate analysis at field capacity (-0.033 bar), -1 bar, and -3 bar, will be presented. Data for potential controlling factors will be presented including BET-N₂ surface area determination, Fourier transform infrared spectroscopy, proximate analysis (ash, volatile, and fixed carbon content), and powder contact angle determination. We show how this information can be used to optimize production of biochar products intended to increase available water storage in water deficient sandy soils.