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IMPACT OF BIOCHAR APPLICATION ON SOIL PROPERTIES AND HERBICIDE SORPTION

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ABSTRACT

Biochars are the byproduct of anaerobic combustion (pyrolysis) of organic materials. Three biochars (switchgrass, cornstover, and Ponderosa pine wood-chip) were created by burning the materials under anaerobic conditions for four hours at maximum temperatures of 850 °C (fast pyrolysis). Biochar samples were sorted by size (< 2 mm, 2-4 mm, and > 4 mm) and electrical conductivity (EC) and pH characteristics were determined in 1:5 (w/v) water and 0.01M CaCl₂. Each biochar type and size was added at 1 and 10% (w/w), to two South Dakota soils, Barnes (loamy) or Maddock (loamy fine sand). Atrazine sorption and changes in soil pH and EC were measured in slurry experiments (1:2 w/v). Biochar pH values were higher than soil pH values; however, the addition of biochar had minimal influence on soil pH. Biochar size affected soil EC values; the smallest sized chars at the 10% addition increased the soil EC. Atrazine sorption from solution increased from about 35% in soil only to almost 99% with each biochar treatment. Targeted biochar addition to soil may be warranted. If atrazine carryover is suspected, addition of biochar may reduce unwanted affects; however, higher sorption may require higher application rates to provide weed control similar to that of nonamended soil.