Effects of biochar on organic matter dynamics in unamended soils and soils amended with municipal solid waste compost and sewage sludge

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Biochar is a loosely-defined C-rich solid byproduct obtained from biomass pyrolysis, which is intended for use as a soil amendment. A full understanding of the agronomic and environmental potential of biochar, especially its potential as a C sequestration strategy, requires a full understanding of its effects on native soil organic matter, as well as of its interactions with other organic amendments applied to soil.

Here we determined the organic C distribution in an arable soil amended with biochar at rates of 0 and 20 t ha-1 in a factorial combination with two types of organic amendment (viz. municipal solid waste compost and sewage sludge) in a field experiment under Mediterranean conditions.

The analysis of variance revealed that biochar and organic amendment factors increased significantly total organic C and mineral-associated organic C contents, and had little effect on intra-macroaggregate and intra-microaggregate organic C pools. Free soil organic C content was significantly affected by biochar application, but not by the organic amendments. Especially noteworthy were the interaction effects found between the biochar and organic amendment factors for mineral-associated organic C contents, which suggested a promoting action of biochar on C stabilization in organically-amended soils.