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Can char application restore soil carbon and productivity?

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Application of char with about 30% C changed the color of the soil. Photo courtesy of Michael Kaiser.

Intensively tilled soils have lost up to 50% of their original C with the attendant degradation in soil properties and productivity. Restoring the C lost with current conservation practices often takes decades. Applying high-C coal combustion residue from sugar beet (*Beta vulgaris* L.) processing factories, known as char, may rapidly restore soil C and productivity in degraded croplands.

In a recent *Journal of Environmental Quality* article, researchers in the Nebraska High Plains evaluated soil and crop response to char containing about 30% C applied at different rates ranging from 0 to 67.3 Mg ha^{-1} to two relatively low-C soils (< 1.1% C) and one relatively high-C soil (1.7% C). After two years, char application, particularly at the highest rate, increased soil C, sulfate, Ca, Mg, and Na concentrations in all soils but did not affect soil physical properties nor crop yields.

These findings suggest that char can be a potential strategy to rapidly restore C in degraded agricultural soils, but additional long-term research with char application exceeding 67.3 Mg ha^{-1} under different soils and climates is needed to fully understand the impact to soil properties and crop yields.

Dig deeper

Blanco-Canqui, H., Kaiser, M., Hergert, G.W., Creech, C.F., Nielsen, R., Bijesh, M., Easterly, A.C., & Lawrence, N.C. (2020). Can char carbon enhance soil properties and crop yields in low-carbon soils? *Journal of Environmental Quality*, *49*. **https://doi.org/10.1002/jeq2.20111**

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