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Coal char mitigates nutrient loss from soil

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Lead author Jennifer Cooper extracting fatty acids for methyl esters for microbial fingerprinting. Photo by Ryley Thomas.

Manure can serve as a more sustainable substitute for synthetic fertilizer but may elevate greenhouse gas emissions and nutrient leaching. Large-scale biochar application may ameliorate nutrient losses but is hindered by high cost; therefore, incomplete coal combustion residue (char), a minimum-cost alternative, may provide a more viable option to farmers.

In an article recently published in the *Journal of Environmental Quality*, researchers compare the performance between char and high-temperature pine biochar for nutrient losses via soil leachate, microbial biomass, plant yields, and greenhouse gas emissions in two contrasting soils amended with dairy or swine slurry.

The study found up to 26% less leaching losses for phosphate and up to 9% less leaching losses for dissolved organic carbon in char amended soil compared with biochar-amended soil. However, plant yields were significantly higher with biochar, maybe due to the greater nitrate retention in the soil compared with the char-amended soils.

Depending on soil characteristics, char may outcompete biochar with respect to reduction of phosphate and dissolved organic carbon leaching. Unlike biochar, some char N seems to be available, and this should be accounted for when considering application rates.

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Cooper, J.A., Drijber, R.A., Malakar, A., Jin, V.L., Miller, D.N., & Kaiser, M. (2022). Evaluating coal char as an alternative to biochar for mitigating nutrient and carbon loss from manure-amended soils: Insights from a greenhouse experiment. *Journal of Environmental Quality.* **https://doi.org/10.1002/jeq2.20327**

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