Nitrogen and Carbon Leaching in Repacked Sandy Soil with Added Fine Particulate Biochar - DTU Orbit (08/12/2018)

Nitrogen and Carbon Leaching in Repacked Sandy Soil with Added Fine Particulate Biochar

Biochar amendment to soil may affect N turnover and retention, and may cause translocation of dissolved and particulate C. We investigated effects of three fine particulate biochars made of wheat (Triticum aestivum L.) straw (one by slow pyrolysis and two by fast pyrolysis) on N and C leaching from repacked sandy soil columns (length: 51 cm). Biochar (2 wt%), ammonium fertilizer (NH$_4^+$, amount corresponding to 300 kg N ha$^{-1}$) and an inert tracer (bromide) were added to a 3-cm top layer of sandy loam, and the columns were then irrigated with constant rate (36 mm d$^{-1}$) for 15 d. The total amount of leachate came to about 3.0 water filled pore volumes (WFPVs). Our study revealed a high mobility of labile C components originating from the fine particulate fast pyrolysis biochar. This finding highlights a potential risk of C leaching coupled with the use of fast pyrolysis biochars for soil amendment on sandy soil. By contrast, C components from the slow pyrolysis biochar were fully retained in the topsoil. Contrary to our expectations, there were no overall effects of biochar amendment on the cumulative leaching of mineral N (NH$_4^+$ plus NO$_3^-$), that is, the biochars did not increase the N retention capacity of the soil. All three biochars caused a slight increase of NH$_4^+$ leaching, while NO$_3^-$ leaching was slightly decreased by addition of the fast pyrolysis biochars.

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