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Organic soil amendments as a tool to increase biological activity and C sequestration in clay soil

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Soil C sequestration through improved agricultural management practices has been suggested to be a cost-efficient tool to mitigate climate change as increased soil C storage removes CO₂ from the atmosphere. In addition, improved soil organic carbon (SOC) content has positive impacts on farming through better soil structure and resilience against climate extremes through e.g. better water holding capacity. In some parts of the world, low SOC content is highly critical problem for overall cultivability of soils because under certain threshold levels of SOC, soil loses its ability to maintain essential ecosystem services for plant production. Soil organic amendments may increase soil C stocks, improve soil structure and boost soil microbial activities with potential benefits in plant growth and soil C sequestration. Additional organic substrates may stimulate microbial diversity that has been connected to higher SOC content and healthy soils.

We performed a two-year field experiment where the aim was to investigate whether different organic soil amendments have an impact on soil microbial parameters, soil structure and C sequestration.

The experiment was performed in Parainen in southern Finland on a clay field where oat (*Avena sativa*) was the cultivated crop. Four different organic soil amendments were used (two wood-based fiber products that were leftover side streams of pulp and paper industry; and two different wood-based biochars). Soil amendments were applied in 2016. Soil C/N analysis was performed in the autumns 2016-2018 and soil aggregate in the summer and autumn 2018, as well as measures to estimate soil microbial activity: microbial biomass, soil respiration, enzymatic assays, microbial community analysis with Biolog® EcoPlates and litter bag decomposition experiment. The relative share of bacteria and fungi was determined using qPCR from soil samples taken in the autumns 2016, 2017 and 2018.

Data on how the studied organic soil amendments influence soil structure and C content, as well as soil microbial parameters will be presented and discussed.

