EGU2020-5344
https://doi.org/10.5194/egusphere-egu2020-5344
EGU General Assembly 2020

Tea Bag Index as potential indicator for soil microbial activity.

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Worldwide there is an enormous interest in microbial indicators for soil quality, since this reflects the potential capacity for soil ecosystem functions i.e. nutrient cycles, carbon storage, biodiversity and resilience to climate change. Farmers are anxious to measure the effects of different soil management practices in order to improve soil quality and attain sustainable food production. Despite the rapid developments in (molecular) measurement techniques, adequately validated and affordable methods for field measurements on soil microbial activity are still lacking. Nowadays, farmers participate in campaigns to bury cotton undies in order to measure biological activity in their fields (Soil your undies). If there's not much left of the undies after a couple of months, this supposedly indicates good soil health. Of course this is by no means a quantitative nor validated indicator.

An elegant, cheap and simple method to measure biological activity in soil is the Tea Bag Index (TBI). This method was developed to determine the global variation in decomposition rate of organic matter by the soil microflora as influenced by abiotic circumstances. The TBI consists of two parameters describing decomposition and stabilization of organic matter by measuring weight loss of green tea and rooibos tea bags that have been buried in the soil for three months. The method is designed to discriminate contrasting ecosystems and, within ecosystems, differences in factors such as soil temperature and moisture content (Keuskamp et al. 2013, doi: 10.1111/2041-210X.12097).

Our research aimed to assess the possibility to use the TBI as an indicator for soil microbial activity, considering its sensitivity and robustness to discriminate between agricultural soil management practices that are known to have a significant impact on soil microbial diversity and activity. The responsiveness to soil pasteurization and organic amendments was investigated under both controlled and field conditions. The TBI decomposition rate differed significantly between both tea varieties (green tea > rooibos tea). Organic amendments had little or no effect. The TBI-results were plotted against some more established biochemical indicators which are sensitive to soil management and often related to microbial biomass, i.e. hot water extractable carbon, potentially mineralizable nitrogen and fungal biomass. Results are discussed, as well as factors which complicate the interpretation of TBI data with respect to soil microbial activity.