



Priming potential of field aged pyrogenic carbon during land-use transition

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Contrasting results in recent literature relating to the priming effects of pyrogenic carbon (PyC) amendment to soils demonstrate uncertainty on the nature of interactions between PyC and native soil organic carbon (SOC). Evidence for both positive and negative priming effects has been reported, suggesting that in certain circumstances alteration of the mineralisation dynamics of native SOC pools may cause an accelerated or reduced rate of decomposition. The direction, magnitude, and mechanisms responsible for these effects are unclear and require improved understanding for the development of future carbon (C) abatement strategies. Most studies aiming to investigate priming use fresh PyC; few have assessed longer term effects that occur with field aging. This study assessed the priming potential of field aged PyC on SOC during land-use transition. Land-use change (LUC) has a major effect on the soil C balance with significant C losses often occurring after disturbance. However, the potential for PyC to reduce such a loss has not yet been investigated. PyC produced at 800 °C from Miscanthus straw (pH 10) was applied at a rate of 16 t ha⁻¹ and incorporated into the soil surface at eight field sites in Britain, ranging in clay content from 14 to 38 %. All study sites are in transition to willow short rotation coppice (SRC). Soil from amended and control plots were sampled and incubated ~2 years later. To compare CO₂ flux from the amended and control plots and accurately determine the priming potential, hydrogen pyrolysis (hypy) was used to quantify the black carbon present in each sample and CO₂ was expressed as a percentage of non-pyrolytic carbon (nPyC). Preliminary results demonstrate a net positive priming effect with increased CO₂ emissions up to 40 % greater from soils from the amended plots compared to the control plots. This indicates that a sustained long term positive priming effect occurred in addition to any C losses directly resulting from LUC.