

Interactive comment on “Phosphorus fertilisation under nitrogen limitation can deplete soil carbon stocks – evidence from Swedish meta-replicated long-term field experiments” by C. Poeplau et al.

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We agree that increases in P availability can also increase SOC decomposition in N-rich soils. One indication for that might be the results of Cleveand et al. (2006), who found higher respiration when N+P was added as compared to N alone. We therefore added the following sentence at the end of the hypothesis 4 section: “Furthermore, Cleveland et al. (2006) found higher respiration when adding glucose with N+P as compared to the addition of glucose and N. This indicates that the stimulating effect of P on heterotrophic respiration is not restricted to N-poor soils.”. The experimental design of this study does however hamper such an investigation. We have checked

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SOC stock changes with increasing PK fertilization also with N (and different N levels) as a reference (instead of taking the unfertilized treatment as a reference). However, the combination of N+PK did always strongly increase net primary production and thus carbon inputs, which did most likely override the effects of PK on decomposition (because we find higher stocks under NPK than under N). Therefore, we cannot confirm this hypothesis with the data we have. We only found this net negative effect of PK fertilization when compared to the unfertilized controls. We agree that the paper was lacking some thoughts about the implications of our findings. We therefore added the following sentence to the conclusions: “It (the finding) might be helpful to model SOC stock changes after sudden stoichiometric imbalances in ecosystems as induced by fires, atmospheric deposition or enhanced soil P extraction by legumes.” We do not think that it makes much sense to develop even more on this aspect in the discussion because that issue lies beyond the scope of the manuscript.

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