

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.

C. Poeplau et al.

christopher.poeplau@slu.se

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1. We agree, deleted the sentence and replaced it by the following: “How did long-term N and PK fertilization in absence of the respective other influence SOC stocks and how did pedo-climatic factors affect those responses?” 2. We agree that the sample preparation was not described in sufficient detail. A) soils were air-dried and sieved to 2 mm. B) Unfortunately, there is no good technical documentation on that issue. However, we know that two of the earlier methods (LOI and Walkley-Black) have been used in the past for SOC analysis. In our case, we are looking at relative differences between treatments. Therefore, the possible bias induced by methodological consid-

C8978

erations should be insignificant or very small. C) Samples with pH (H₂O) exceeding 6.7 were pre-treated with 2 M HCl to remove carbonates. We complemented the M+M section accordingly. 3. We have now added the 1NPK, 2NPK and 3NPK treatments as a “positive reference” for the reduced fertilisation treatments. However, the focus of this manuscript should remain the comparison of only PK vs. only N. Therefore we have only added those treatments in Figure 1 and present the results in the results section shortly as follows: “The effect of NPK fertilisation on NPP was synergistic, thus higher as the sum of the increases after PK and N fertilisation alone (Fig. 1 (a)). This strong increase in C input did also positively affect SOC stocks.” 4. We agree that the discussion was relatively weak regarding the explanatory variables. But due to the inconsistency in the models (different explanatory variables), the discussion of these models is not straightforward. However, we now added the following sentences: “Surprisingly, SOC dynamics of the PK0N fertilised treatments were independent from relative yield increase and thus carbon input, while the variability in SOC dynamics in 1N0PK was partly explained by differences in relative yield increase. This fits the observation, that carbon dynamic in the PK0N treatments was decoupled from above-ground NPP, while it was positively correlated with aboveground NPP in the N0PK treatments.” 5. The presentation of Figure 2 was chosen to better visualise that the SOC/yield relation is completely opposing between the two fertilisation treatments. As such, the graph carries a clear message. High regression coefficients (although only for 3 points) is “nice to have”, but not extremely important for the message. We have now added error bars in both directions. 6. We did not understand the suggestion with the datapoint size, since all datapoints represent a combination of the explanatory variables used. We however understand the criticism that the figure might not be of much value and that the statistical results could also be presented in a table. It might be a matter of taste, but we think that visualising the model fits helps the reader to directly get an idea of how good the used variables could explain the data and how the different experiments distribute around the 1:1 line. We prefer graphs, and the manuscript is not overloaded with graphs (only 2 others). Therefore, we do not think that it is absolutely

C8979

necessary to change it into a table. Specific comments: 1. We agree and added a reference 2. The reference was missing. We now added it to the reference list. 3. We changed this accordingly. 4. We changed this accordingly. 5. We changed this into SOC stock changes. 6. We agree that this sentence belongs to M+M and also added the N and NPK treatments, which have not been accounted for in this sentence (which was from an earlier manuscript version). The sentence now reads: “A total of 88 pairs of unfertilised vs. fertilised was investigated, with 3PK0N only being present in 8 experiments, while all other treatments were present in all 10 experiments.” We also had to change the next sentence, which now reads: “As expected, we observed an average increase in yields of 1% (1PK0N), 10% (2PK0N) and 15% (3PK0N) (Fig. 1A) following PK fertilisation.” 7. We changed that accordingly.

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C8980

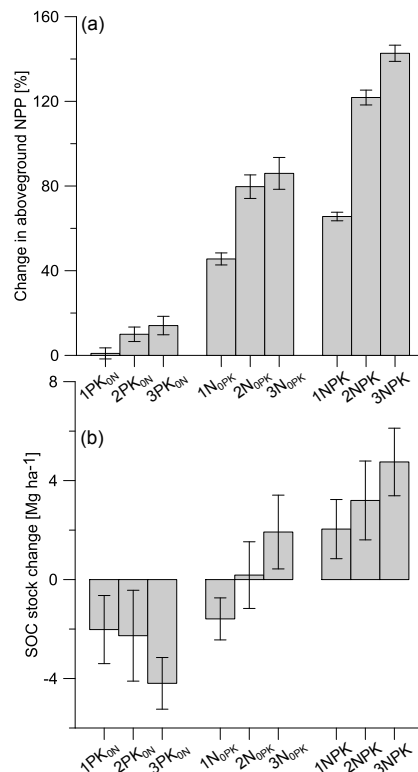


Fig. 1. New Figure 1

C8981