

Revision report

Title

Mechanisms of enhancing soil fertility without obviously elevating global warming potential under an optimal rice straw incorporation rate in a paddy soil

Authors

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Reference

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In my opinion, the paper entitled “Mechanisms of enhancing soil fertility without obviously elevating global warming potential under an optimal rice straw incorporation rate in a paddy soil” is well written and approaches a subject that is both scientifically relevant and well within the journal’s scope.

My main concerns are related with the interpretation of results under the light of statistical analysis. In my opinion, the authors should be more strict while inferring the possible effects of treatments on the response variables. My specific comments are detailed below.

Introduction

L77 - I believe that the authors meant “a soil microcosm experiment” (or something equivalent).

Materials and methods

L178 – What were the main reasons behind this selection?

Results

Error bars should be included in the figures. Additionally, the authors stated repeatedly in each figure legend that “Data are given in average $\pm$ standard error”, which obviously does not apply to a figure.

Subsection 3.1 Influence of straw incorporation on soil fertility (L192-209)

This subsection should be reformulated considering the following aspects:

The influence of treatments on response variables should rely mainly on ANOVA + Tukey HSD (or equivalent tests) and not on Spearman correlations. The latter should be used to evaluate possible relationships/correlations among response variables.

No influence of treatments on response variables should be inferred in the absence of significant statistical differences. For example, the authors stated that (L195-197) “Concerning the detected

soil chemical properties, except for TP, TK, and Olsen P, which were not clearly influenced by straw incorporation, the rest properties were positively related to the straw application rate.” However, the ANOVA results only indicate significant differences among treatments in BD, CEC, AvK and AvZn.

Related to this (L198-199) the authors stated that “When compared with CK, even the least amount of straw input (ST1) induced the decrease of BD by 2.76%.” However, the letter in Table 1 indicate that no significant differences can be found between the effect of those 2 treatments on BD”.

Figure and table legends should include more information.

L231-232 – Fertilisation events should be included on the plot.

L233-234 – The authors referred that “During the first peak, CK emitted most N₂O (..)”. However, the CO₂ flux emitted by CK during that period is much higher than N₂O flux. I believe that what the authors meant was that during the 1st peak, CK was the treatment emitting the highest N₂O flux.

Subsection 3.3 – I would suggest that the authors test the effects of treatments on cumulative emissions and GWP.

L261 – Similarly to what I referred above, the authors should only consider significant differences among treatments to order them. Apart from this, the authors statement is not applicable to days 28, 42 and 70.

L262 – Please change numbers to scientific notation (e.g. 3.92×10^{12})

Subsection 3.4.1 should be expanded.

Figure 4 – Abbreviation meanings should be included in the legend.

L272-273; L274-276; L277-278 – In what day(s)?

Figure 5 – Information regarding flooding and drying events should be included in the plots or, at least, in the legend.

L297 – Where are the results referring to the variable “nosZI”?

Discussion

L308-309 – I believe that the authors are comparing their results to those presented by Xing et al. (2025). However, the sentence is not accurately formulated.

L311-312 – If the soil properties under treatment ST1 were not statistically different from those under CK, the authors should not infer that the soil properties were improved.

L314 – The authors did not evaluate soil porosity or soil organic matter. Additionally, not all nutrient-related variables were significantly affected by treatments.

Conclusions

Conclusions should be more focused on the main results and their implications.

L365 – This sentence is too vague.