

Answers to the Editor

Dear Dr. Ingrid Lubbers,

I am pleased to submit the revised version of our manuscript entitled **“Evaluating the Tea Bag Index approach for different management practices in agroecosystems using long-term field experiments in Austria and Sweden”**, for consideration to be published in **SOIL**.

We now modified and justified the minor topics you have pointed out.
Please see the answers below:

Editor’s comments:

“Dear authors,

I think the manuscript is ready, but I have two small final question/comments. It concerns the conclusion in the abstract and the conclusions:

There is a sentence in the abstract and conclusions where it would make sense to make a comparison: "The results showed that in Austria, incorporation of crop residues and high N fertilizer application increased k." My comments are: compared to what? The next sentences are much clearer because comparisons are made.”

R: We added the comparison and improved the sentence.

“The next point in the abstract and conclusions is the very last sentence: "... which of the management practices can best promote a higher soil C sink." My comments are: so small k and large S? to store C the S needs to be high and the k low. or? How does the TBI relate to the soil C sink?

Both points come back in the conclusions. Here I commented: Good to mention this here, to relate the TBI in the Austrian and Swedish LTEs to the timely issue of the potential (or not) to store C in arable soils. However, it is not clear how k and S may indicate a potential contribution to the C sink function of arable soils.

Would it be possible to give a direction to the C storage potential and the TBI outcomes of this study? Or why not?

I have attached my comments in the ms file.”

R: We completely understand your perspective, and generally speaking, we can assume that a low *k* and a high *S* would imply a higher carbon storage in the soil. However, carbon storage is influenced by numerous factors, making it challenging to directly correlate TBI parameters with carbon sequestration. We felt hesitant about linking our findings to the carbon sink because we did not directly assess this aspect in our study. After discussing among the co-authors, we decided against going deeper into this topic, as it would involve speculation. As you suggested, we have revised both the abstract

and the conclusion to provide a more general statement. We believe our rationale is reasonable. Please, see the modifications below:

Lines 47-50: “It would be appropriate to apply the TBI approach in a more large-scale network on LTEs for agroecosystems, in order to improve its usefulness as an indicator for the effect of management practices on litter decomposition dynamics, particularly linking it with the potential for C storage.”

Lines 561-564: “This also suggests that the TBI k and S parameters could serve as indicators of how different agricultural management practices influence the global carbon cycle via decomposition, a matter requiring further in-depth investigation.”

We thank very much all the Editorial Board.
We are looking forward to receive your new comments.

Kind regards,
Maria Regina Gmach