

Answers to the Editor and the Reviewers

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 all the minor topics you have pointed out and checked our conclusions, as you asked. We also have reviewed the English grammar and the text formatting.

We thank you very much, all the Editorial Board and the Reviewers for their feedback. We are looking forward to receive your new comments.

The answers to the Reviewers appear below:

Reviewer #1:

Overall, the article improved a lot and is easier to digest now. The effort to simplify the manuscript is greatly appreciated. I understand that challenge of summarizing such a large data set and I think you did a good job at simplifying it.

I can understand your argument why you did not want to include the moisture and temperature scalars into the TBI to make it comparable with other studies, even if I think it could make the results a bit more interesting. I see it was not the main focus of that manuscript, but just as food for thought: You could probably even write another small article, just focusing on how management/soil properties affect a temperature/moisture normalized TBI.

One last thing: It seems to me now, that you removed the time series data completely from your analysis to simplify it and you only used the last data point. Would it then not make sense to also remove the description of the time series in M&M to avoid confusion? Or did you use the time series in the RF?

Dear Referee #1, thank you very much for your comments which were very valuable for the improvement of this manuscript. We will think about writing another small paper focusing in your suggestion, which seems quite interesting.

We did not remove all the descriptions about time series from the manuscript, since it explains the rationale behind how we decided to use (i.e., to combine) the datasets from Sweden and Austria and it is also part of our reply to reviewer #4. It should be clear that we have not used the time series in RF or any other analysis.

Reviewer #2:

The manuscript “Evaluating the Tea Bag Index approach for different management practices in agroecosystems using long-term field experiments in Austria and Sweden» has been substantially improved by the authors. I am completely satisfied by how they changed the draft and replied to my previous comments. May be, it would be useful to fit S and k values to the PCA axes and show them also at the Fig.6.

Dear Referee #2, thank you for your suggestion which help us to improve this manuscript. Regarding the PCA, we carefully considered your suggestion. In our analysis, the PCA was included only to examine similarities between the sites. We are considering the correlations between S and k with other variables using the other methods, which also allows us to better discriminate between the relative impact (which is proportional to correlation) on the two variables separately with different models. A RF model, although in a completely different way, does in practice something not too dissimilar that PCA finding the path of least variance (minimizing the residuals) in a multivariate variable space, as any multivariate regression technique would do including multiple linear regression. RF (as other machine learning algorithms such as ANN) is even more similar, since it is a nonlinear (actually even non-parametric) model. Although it is feasible including S and k in the PCA, we believe it would be redundant and, most importantly, would make the PCA less clear when it comes to understand the differences between the sites.

Reviewer #4:

Unfortunately, it appears that the authors have not adequately revised the manuscript. My previous comment may have been unclear.

The most important problem of the TBI stems from the unfounded assumption that S is uniform across both green and rooibos teas. This assumption (1) lacks theoretical grounding and (2) has been disproven by prior incubation studies. Consequently, this is not merely a minor discrepancy; rather, the calculated results are predicated upon erroneous assumptions, thereby leading to misleading outcomes.

Furthermore, the authors' justification for the acceptability of the correlation analysis between S and k , based solely on its prevalence in prior literature, is flawed. This rationale disregards theoretical objections, making it an unsound scientific approach to continue employing this methodology.

Dear Referee #4, your comments are very clear and we understand your criticism regarding the TBI method. We have specifically mentioned the issues that you raised in the materials and methods section, making these concerns available to the readers. However, as we also mentioned, it was beyond the scope of this manuscript to address these criticisms. We contend the TBI methodology is a well-known approach and suitable for the purpose of our study.