

We thank the reviewer for the feedback. We improved the readability of the manuscript, shortened all the sections, and focused more on the important aspects of the research. Below we addressed all comments in detail. The comments by the reviewer are in red; our reply is in black

This manuscript (soil-2022-28) explored the effects of agricultural managements on soil aggregates and associated organic carbon fractions based on the analysis of long-term experiments in Europe. Also, authors collected a valuable dataset, including soil aggregate stability, aggregate-associated organic carbon fractions, and crop yield in 79 experimental plots under 26 treatments.

Thank you very much for appreciating the value of the dataset

Although it is meaningful research, there is not clear enough what we can expect to do on the basis of the results, especially what is the relationship between aggregate-associated organic carbon and crop yield.

Indeed, we do not focus on a possible direct relationship between the different organic carbon fractions and crop yield.

In the general literature study and discussions with the long-term experiments' owners, colleagues and stakeholders within the SoilCare project (<https://www.soilcare-project.eu/>), it was clear that there are no consistent differences in crop yield in function of organic carbon to be expected.

Nevertheless, we checked the crop yield for all the experiments where we sampled and found confirmation as we could not observe significant correlations with the total SOC changes in these experiments. However, we are convinced that good soil quality eventually reflects in many advantages, including a more stable crop yield by between other causes better infiltration and rooting and also less environmental negative impacts, like less erosion as an example, which we cannot prove though within our research.

Therefore, we consider information on crop yield important but not the objective. We focussed on the effects of the practices on the soil properties and did not elaborate further in this manuscript on the yield.

Very important is, however, that no significant effects on yield caused by the different practices is relevant to our research from a practical point of view. As it is mentioned in the Discussion section on the very positive side, the fact that different soil improving practices do not affect negatively in the longer term the yield stimulates their adoption from the farmers without the fear of yield loss. In the context of the SoilCare project, we often saw as a negative point an extra cost/workload to implement a new practice. Also transition requires a few years with some extra costs. Having to invest to improve the quality of the soil without yield increases requires specific support to the farmers.

My main concerns are as follows:

1. Abstract section is written roughly without key information and data. In addition, authors should clarify the study area (countries). Are these countries representative of Europe as a whole?

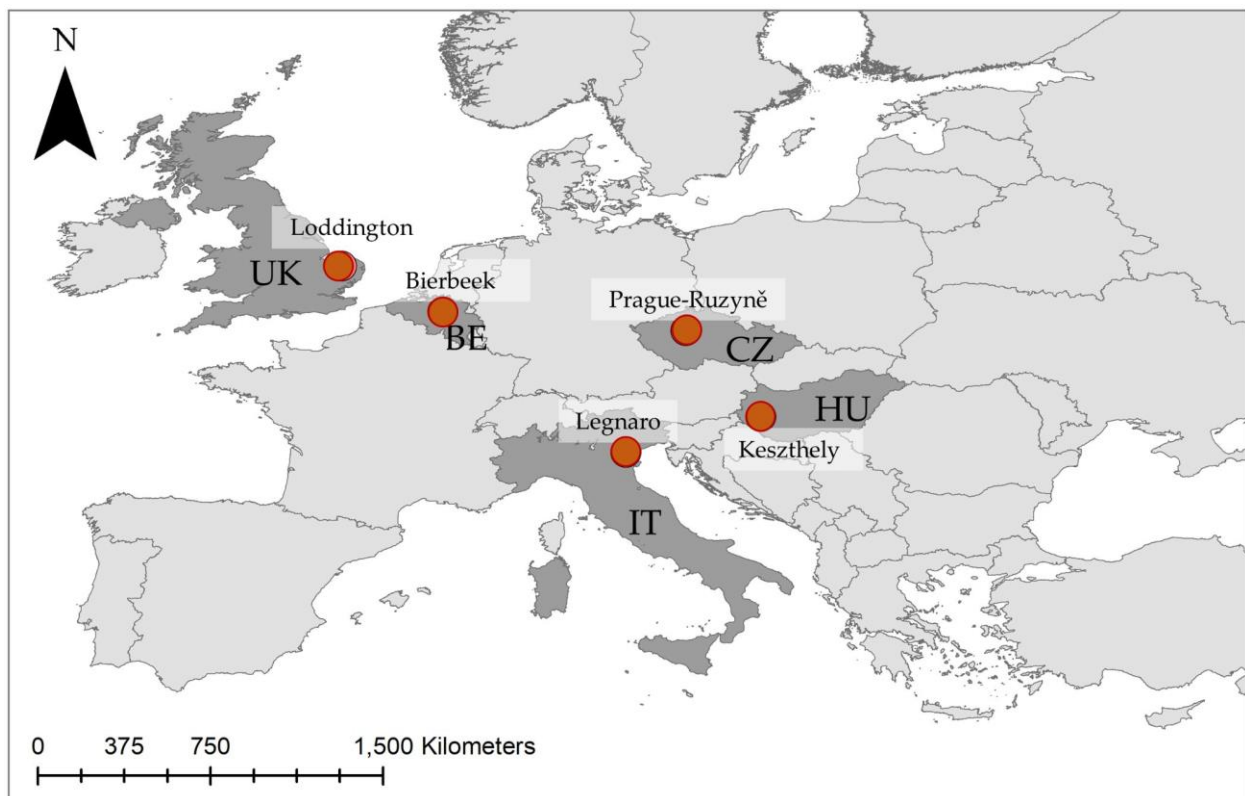
We need to limit the length of the abstract according to the guidelines of the journal but will include a list of the countries where we sampled and a short sentence on the type of data.

2. Introduction section is too long and unfocused, especially some sentences are too long to understand (L 23-25, 43-46, and 82-84...).

Thanks for this observation and in line with reviewer 1. The specific sentences were rephrased and shortened as well as several other sentences were shortened or split to make the manuscript easier to read, also considering the comments of Reviewer 1.

3. Methodology section should contain a distribution map of sample points. Whether soil properties (aggregate stability and organic carbon) and crop yield are affected by latitude or climate?

The map shown below, presenting the experiments' spatial distribution has been included in the Methodology section to visualize the European gradient of the study sites as also suggested to be highlighted by Reviewer 1. Indeed, several soil properties and especially SOC are climate dependent. The decomposition of SOM is strongly controlled by temperature and soil moisture. In this research, we compare mainly the soil improving practices with the local control practice which in most cases is the business-as-usual practice and not among the different countries. We generalize only when the same trends and observations occur in each management category in all the different study sites.



4. Results section is too lengthy, please simplify and focus on the key points. The figures look very blurred, and please readjust your figures.

Considering all your comments and the comments of reviewer 1, the yield results section will be removed and presented in the appendix. Only one paragraph about the practical implications of not having yield differences will remain in the discussion and will refer to

the appendix for more details. Other parts of the results section will be more focused on the significant finding to reduce the length and make the manuscript more focused.

The pictures will change according to the journal's specifications to become more readable.

5. Discussion section is in-depth enough, but the authors seem to ignore the differences in organic carbon fractions among different sized aggregates and the relationship between aggregate-associated organic carbon and crop yield.

We will elaborate more on the first point you mention. More focus will be given in the discussion to the differences in the organic carbon fraction among the different aggregates and the interpretation of these differences. The second point as mentioned before will not be further elaborated on as that was not the focus of this research.

6. Conclusion section should contain the limitations and prospect of your present research.

The main limitation of the research is that for logistic reasons as is mentioned in the methodology section is that we had to restrict the sampling depth to the top 15 cm. Sampling in 5 different countries and analysing the samples in our laboratory for among others water retention, carbon, aggregates and stability was a major operation. We also preferred to have enough replicates, so that statistical analysis remained feasible and consistent across the long-term experiments. The possible implications and limitations in the interpretation of the results are presented in the discussion section. We will make it more explicit that our sampling focussed on the topsoil.