

16 June 2025

Dear Katerina,

egosphere-2024-4029

Physical Protection of Soil Carbon Stocks Under Regenerative Agriculture

Please find attached a revised copy of the manuscript. In the tables below we account a summary of our major changes to the manuscript in line with your and the reviewers' comments, and a more detailed table of the reviewers' comments and subsequent actions we have taken.

In addition, both a tracked and clean version of the revised manuscript are attached.

Table 1 - Summary of the Headline Changes

Comments and Suggestions	Actions taken
Provide further clarity regarding experimental details.	Further clarity given in the methods section regarding the arable control field management, including cultivation depth. Details of the fallow and cover crops mix has been given in the supporting information with a link to table SI 1 in text. Dates for soil sampling have been clarified in the methods. Further information regarding fertiliser type, use and quantities has been given in the text for both the arable control and the blackcurrant fields.
Figure 1 from the supplement should be included within the main text for clarity.	This figure has been moved from the supplementary material to Figure 1 of the main manuscript.
If required, an additional table within the supplementary section can be included which details each type of carbon discussed in the investigation and their origins. A glossary of terms if you will.	An additional table as a glossary of terms has been added to the supplementary section (Table SI2) defining key terms and their origins
Better balance the content between the introduction and discussion sections, being mindful of content that may be repetitive or inappropriately placed within the discussion section. With further in-depth thought given to the content of the manuscript in accordance with the suggestion of the editors and reviewers.	Text has been reviewed to remove unnecessary literature from the discussion section into a relevant part of the introduction to improve context, irrelevant literature and discussion– or that which is repetitive has been removed. Furthermore, where necessary to improve clarity further context has been given, or ambiguous phrasing removed.
Further clarity requested as to the statements of 'insight towards the mechanisms of soil carbon stabilisation', given the lack of data regarding additional soil and microbial properties and their potential influence.	This section of text within the abstract has now been edited to remove reference to the mechanisms of soil carbon stabilisation, removing this ambiguity, with a renewed focus placed upon the importance of soil physical protection of carbon for potential long-term carbon storage – as such this is more in line with the concept of the manuscript more broadly.

Review grammar, spelling and readability of the text.	Typos and missing text have been checked and amended where necessary throughout the manuscript, and units have been standardised.
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We hope that the amendments outlined above, in addition to the changes made to the text of the paper, are satisfactory to correcting the identified limitations of the previous manuscript version. We highlight that the changes better justify the purpose of the study, while removing ambiguities and conjecture in the discussion.

We sincerely thank you for your insights and your time.

Kind regards,

Sam G. Keenor, and Brian J. Reid

Reviewers Comments and Actions Taken

Reviewer 1	
Comment	Actions Taken
First, the methods were not introduced clearly in the current manuscript, making it difficult to judge the results. For example, what were the management practices (fertilizer, tillage, and so on) that were used for the conventional farming? What were the grazing cover crops that were planted on the alleyways? What were the amount and nutrient content of the sprays of compost tea and organic fertilizer? Which year was the soil sample collected? There were many different soil carbon types in this manuscript (e.g. labile and recalcitrant carbon, occluded carbon, stabilised carbon, WSA, and NWSA); however, the authors failed to separate them clearly. It is hard for me to digest so many different terminologies.	- <i>Text has been cleaned up to ensure that section headings are appropriately placed above the text and not on adjacent pages.</i> - <i>More information has been presented detailing the management practices of both the arable control field and the blackcurrant fields</i> - o <i>This is inclusive of fertiliser types and treatments</i> - o <i>The types and quantities of cover crops planted</i> - <i>Further clarity on the dates of soil sampling has been included in the text</i> - <i>Issues pertaining to the separation of specialist terms and carbon/aggregate types and their definition and use have been further clarified. The text has been combed to ensure that only one specific title be given to each carbon type or aggregate type to improve clarity. In addition, further explicit explanation of the different terms is given in the text as well as a supplementary table (table SI 1) to provide a glossary of terms and better define the specific term used and its origin/purpose in the study.</i>
Second, the main text should be improved seriously. For example, many parts in the Results and Discussion section were not about “results and discussion” but were about “background”, which should be moved to the introduction section. In addition, more information about the field design and methods should be included in the abstract; otherwise, it is difficult for readers to know the meaning of “alley soil and bush soil”.	- <i>Results and discussions section have been reviewed and edited to remove unnecessary background content, or repetitive content. Some of this remaining content has been moved to the introductory section, or within the discussion to re-balance the text and place this in better context, improving the flow and direction of the discussion.</i> - <i>Additional information regarding the field design and methods has been given in brief in the abstract, improving clarity, and in more depth in the methods section, aligning with the actions taken regarding the reviewer’s previous comments.</i> - <i>Clarity provided in the abstract for “alley soil and bush soil” with greater contextual relevance.</i>

Third, in the abstract section, the authors stated that “This research provides valuable insights into the mechanisms of soil carbon stabilisation under regenerative agriculture practices.” However, I am not sure if they really unravel the mechanisms because they did not measure other soil variables (e.g. soil nutrient content and soil microbial parameters), which can be used to explain the results. Moreover, the “Results and Discussion” section was mainly introducing background and describing the results. Instead, more deep discussions and measurements should be included to explain the interesting results (e.g. when compared to control treatment, why did total carbon stock decreased in the short term and then increased to the similar level like the control treatment in the long term). Does this mean regenerative agriculture must be conducted for a long time? Otherwise, croplands would lose soil carbon?	- <i>This sentence has been removed from the abstract, following consideration from the authors in agreement with the reviewer. In its place and edit has been made to better justify the importance of stable aggregates for soil carbon stabilisation, while removing a point of conjecture.</i> - <i>Results and discussion section has been rebalanced as noted above.</i> - <i>Further in-depth discussion regarding some of the measurements has been given where relevant, including where the reviewer notes changes in the carbon stock in the short term, and the subsequent impacts of regenerative agriculture.</i>
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Reviewer 2

Comment	Actions Taken
The article lacks clarity regarding crucial details such as the experimental set-up (number of fields, number of samples and replicates, etc.) and the presentation of results. Figure 1 from the supplement should be included in the article to provide a clearer picture of the set-up; a map of the experiment could also bring some clarity. It would also be interesting to discuss the prior presence of blackcurrant fields in years 5 and even 3: did the introduction of new plants lead to a return to a state of conventional management, thereby 'resetting' the regenerative agriculture counter to 0 years?	- <i>Further details regarding the methods and experimental set up have been included to improve the clarity of the investigation</i> - o <i>this has included explicit reference to the number of fields and their age, the number of samples and replicates.</i> - <i>Figure 1 from the supplement has now been included in the main body of text for additional clarity of the cropping history and experimental set up.</i> - <i>Discussion of the prior presence of blackcurrants in the year 5 field has been made, along with a detailed explanation as to its valid inclusion within the context of the wider investigation (no soil disturbance), and the importance of the intrinsic soil disturbance during replanting has initiated a 'new cycle' of regenerative management. However, the phrasing of “reset” has been purposefully avoided so as to not be misconstrued.</i>

The results should be discussed further, and the text should be better organized between what is general introduction of the topic, results, and discussion. Even if results and discussion can be addressed altogether, they should be clarified and strengthened.	- <i>Results and discussions section have been reviewed and edited to remove unnecessary background content, or repetitive content. Some of this remaining content has been moved to the introductory section, or within the discussion to re-balance the text and place this in better context, improving the flow and direction of the discussion.</i>
Overall, the article is not easily readable. Check for typos, missing verbs or parts (abrupt end L.631 for example). Indications regarding p-values appear repeatedly throughout the text (as you defined two levels of confidence) without really bringing relevant information; the p-values could appear on your graphs but not in text for instance, with only mentions to 'significant' or 'not significant'.	- <i>The manuscript has been reviewed for errors and typos, missing verbs and erroneous sentences, and corrected where necessary.</i> - <i>No changes have been made to the presentation of statistical data, while the authors appreciate the viewpoint of the reviewer, our view is for improved clarity that these should remain in place. Additionally, further clarity regarding the two levels of significance used within the study has been provided in the methods section.</i>

Appendix – Reviewer Comments as received

Reviewer 1 Comment:

This manuscript aims to determine the effects of regenerative agriculture on soil carbon stocks. The authors found that regenerative agriculture did not increase recalcitrant carbon stocks but did significantly increase labile carbon stocks. A lot of work has been done, and some results are interesting. However, I do not think the current version is suitable for publication in SOIL because of several weaknesses. Please see below for my main concerns:

First, the methods were not introduced clearly in the current manuscript, making it difficult to judge the results. For example, what were the management practices (fertilizer, tillage, and so on) that were used for the conventional farming? What were the grazing cover crops that were planted on the alleyways? What were the amount and nutrient content of the sprays of compost tea and organic fertilizer? Which year was the soil sample collected? There were many different soil carbon types in this manuscript (e.g. labile and recalcitrant carbon, occluded carbon, stabilised carbon, WSA, and NWSA); however, the authors failed to separate them clearly. It is hard for me to digest so many different terminologies.

Second, the main text should be improved seriously. For example, many parts in the Results and Discussion section were not about “results and discussion” but were about “background”, which should be moved to the introduction section. In addition, more information about the field design and methods should be included in the abstract; otherwise, it is difficult for readers to know the meaning of “alley soil and bush soil”.

Third, in the abstract section, the authors stated that “This research provides valuable insights into the mechanisms of soil carbon stabilisation under regenerative agriculture practices.” However, I am not sure if they really unravel the mechanisms because they did not measure other soil variables (e.g. soil nutrient content and soil microbial parameters), which can be used to explain the results. Moreover, the “Results and Discussion” section was mainly introducing background and describing the results. Instead, more deep discussions and measurements should be included to explain the interesting results (e.g. when compared to control treatment, why did total carbon stock decreased in the short term and then increased to the similar level like the control treatment in the long term). Does this mean regenerative agriculture must be conducted for a long time? Otherwise, croplands would lose soil carbon?

Reviewer 2 Comment:

This paper explores the impact of regenerative management on soil aggregates and carbon pools. The samples originate from blackcurrant fields (bushes and alleys) with duration from 1 to 7 years, and a control plot still under conventional management. Many analyses were conducted (soil bulk density, stable and non-stable aggregate contents, soil carbon contents and stocks, and carbon stability). The main observation is a shift towards more stable aggregates and an increase of the labile carbon pool under regenerative management, with little effect on the recalcitrant pool.

The aim of this research and the results are interesting. Although I think the article is not acceptable at this stage, I would recommend resubmitting the manuscript after significant

changes and thorough proofreading to enhance the work that has been conducted. Some of the elements that should be reconsidered follow.

The article lacks clarity regarding crucial details such as the experimental set-up (number of fields, number of samples and replicates, etc.) and the presentation of results. Figure 1 from the supplement should be included in the article to provide a clearer picture of the set-up; a map of the experiment could also bring some clarity. It would also be interesting to discuss the prior presence of blackcurrant fields in years 5 and even 3: did the introduction of new plants lead to a return to a state of conventional management, thereby 'resetting' the regenerative agriculture counter to 0 years?

The results should be discussed further and the text should be better organized between what is general introduction of the topic, results, and discussion. Even if results and discussion can be addressed altogether, they should be clarified and strengthened.

Overall, the article is not easily readable. Check for typos, missing verbs or parts (abrupt end L.631 for example). Indications regarding p-values appear repeatedly throughout the text (as you defined two levels of confidence) without really bringing relevant information; the p-values could appear on your graphs but not in text for instance, with only mentions to 'significant' or 'not significant'. Also, a genuine thought: could some results be non significant due to the small numbers of samples? Would other tests be better at handling this issue?