

Point-by-Point Response to Reviewer's Comments

Dear Editors,

Thank you and the anonymous reviewers for your constructive comments and suggestions, and for allowing us to resubmit our manuscript (egosphere-2024-2498) entitled “Status and influential factors of soil nutrients and acidification in Chinese tea plantations”. We have now made careful modifications and responses according to the suggestions. The revised text is marked in red in the “Soil nutrient status in China-Soil - with tracks” file. We hope that the revised manuscript can meet the standards of *Soil*. Our responses to your comments and suggestions are provided below.

We are looking forward to hearing from you.

Yours Sincerely,

Wanqin Yang et al.

Here are our responses to all the comments one by one.

Reviewer #1

This paper systematically analyzes the contents of organic matter (SOM), nitrogen (N), potassium (K), phosphorus (P), and pH levels in tea plantation soils. It explores the spatial variations and influencing factors, offering suggestions for mitigating soil acidification and recommending potassium fertilizer application strategies for tea plantations in southern and/or high-altitude regions to support sustainable management. The article has a clear structure, detailed data, and comprehensive analysis, making it highly valuable academically and practically. However, during the review process, I believe the following aspects need further improvement:

Response: Many thanks for your positive comments and valuable suggestions. The manuscript has been revised according to your valuable comments and suggestions.

Comment 1

The title should be revised to "Status and Influential Factors of Soil Nutrients and Acidification in Chinese Tea Plantations: A Meta-Analysis," as it is based on data from literature searches.

Response: Many thanks for your suggestion. The title has been revised as you suggested.

Comment 2

All major figures should not be placed in the appendix, especially those representing national-level meta-analyses of tea research; additionally, some tables could be selected as supplementary tables.

Response: Many thanks for your suggestion. Figures originally in the appendix were moved to the manuscript after revision by integrating information in Table 3 into Figures 2-6. Then, Table 3 was deleted from the main text. Figure S1 originally in supplementary material was also moved to the manuscript after enlarged to only contain the study areas. For detailed revision refer to the newly added Figures 1 – 6 in the revised manuscript.

Comment 3

The format of all tables needs to be modified and adjusted.

Response: Many thanks for your suggestion. The tables were revised. In the original manuscript, the contents of some tables were long making it difficult to present in portrait format as required by *Soil*. In this case, Tables 5 and 6 in the original manuscript were split into four tables in the revised manuscript, please see the revised Tables 4 – 7.

Comment 4

The second and third paragraphs of the Introduction discussing the research progress on pH and nutrients can be improved—either merged into one paragraph or separated into distinct sections.

Response: Many thanks for your comment and suggestion. The second and third paragraphs of the Introduction were merged into one paragraph. For detailed revision refer to the revised content in Lines 42 – 55 in the revised manuscript.

Comment 5

The arrangement of figures and text in the Results section needs to be organized properly, such as in Table 6.

Response: Many thanks for your comment and suggestion. Table 3 was removed from the manuscript after integrating its information into Figure 2–6. Tables 5 and 6 in the original manuscript were split into four tables in the revised manuscript, please see the revised Tables 4 – 7. As suggested earlier by

the editor, only one decimal digit of values was kept in both tables and the main text to improve the readability. Detailed revision refers to the revised tables and values.

Comment 6

Section 4.1 in the Discussion is overly lengthy; I recommend streamlining the language.

Response: Many thanks for your comment and recommendation. Section 4.1 has been revised to be more concise. For detailed revision please refer to the revised content in Lines 266 – 280 and 287 – 294 in Section 4.1 in the revised manuscript.

Comment 7

It would be beneficial to include a section on the limitations of this study

Response: Many thanks for your suggestion. A section discussing the limitations, uncertainties and future outlooks were added in the revised manuscript. For detailed revision please see the newly added section 4.4. in the revised manuscript.

Comment 8

In-depth research on mechanisms: While the article highlights various environmental factors and management practices affecting tea plantation soils, further investigation into the specific mechanisms and pathways of these influences is necessary. For instance, research should focus on how different fertilizer amounts and application methods impact the dynamic changes in soil nutrients.

Response: Many thanks for your comments and suggestions. To investigate the mechanisms of the environmental factors and management practices affecting tea plantation soils, more detailed data, especially from controlled experiments, containing physical, chemical and biological interaction processes in soil and rhizosphere is needed. However, at this stage, the available data we collected cannot sufficiently support the investigation of these interaction processes at a national level, and we acknowledged this limitation in the newly added section 4.4 in the revised manuscript. Even though, investigating the amount and methods fertilizers applied is our next research topic. We already conducted an experiment on the effect of different amounts and application methods of organic and compound fertilizer on the physiochemical and biological characteristics of soil in tea plantations. We also started to collect data from the literature to explore how different management practices, such as intercropping patterns and fertilizer modes, influenced soil fertility in tea plantations. Hopefully, our following research can fill these gaps.

Reviewer #2

Wang et al. reviewed the status and influential factors of soil nutrients and acidification in Chinese tea plantations. Overall, this is an interesting and useful study. The methods employed for data collection and analysis are robust. I have a few comments that may enhance the quality of the paper:

Response: Thank you very much for the positive comments and invaluable suggestions. The manuscript has been revised accordingly.

Comment 1

The authors propose several effective management practices. However, there are trade-offs between fine management and costs. I strongly recommend conducting a brief economic analysis, or at the very least, including a discussion on whether the benefits of these practices outweigh the associated costs.

Response: Many thanks for your suggestion. Assessing trade-offs between fine management and cost can be conducted from a life cycle perspective. The processes and results of life cycle cost analysis will be another story of the performance of tea plantations. Besides, the cost of fine management is influenced by the market of products, price of materials, fertilizers and labour, which vary among regions due to the variations of economic development, society and culture among regions. It's difficult to unify them at a national level. Therefore, we added a paragraph to discuss the trade-offs between fine management and costs and the achievements of both environmental and economic sustainability. Details refer to the Lines 371 – 379 in section 4.4 in the revised manuscript.

Comment 2

L16: Please specify why you use data pairs. What are the two components that you are comparing?

Response: Many thanks for your comments. In this study, multiple indicators (e.g. AN, AP, AK, TN, TP, SOC, etc.), geological and climatic factors and management practices were recorded in the database to evaluate the status and influential factors of soil nutrients and acidification, therefore, there were several values within a data group. So we used data pairs. After checking the meaning of “data pairs” and “datasets” we misused them in the original manuscript and changed “data pairs” to “datasets” in the revised manuscript. Detailed revision refers to Lines 16, 50 and 105 in the revised manuscript.

Comment 3

L19: What is the difference between geolocation and location?

Response: Many thanks for your comment. In this study, we used longitude, latitude and elevation as geographic factors influencing soil nutrients, so “geolocation” was used to highlight the geographical position of study sites. We checked the meaning of “geolocation” and “location”, and there seems no

difference. So we changed “geolocation” to “location” in the revised manuscript. Detailed revision refers to Lines 19, 57 and 58 in the revised manuscript.

Comment 4

L20: Please specify how you calculated the stoichiometric ratios, e.g., C:N, C:P...

Response: Many thanks for your suggestion. In this study, the stoichiometric ratios were calculated in mass of SOC, TN, TP and TK for consistency and comparability with other meta-analyses research and the literature where we collected data. We also indicated this in the revised manuscript. Detailed revision refers to Lines 130 – 133 in the revised manuscript.

Comment 5

L21: Perhaps consider deleting "life"?

Response: Many thanks for your suggestion. The word “life” was deleted, same expressions in the main text were also revised.

Comment 6

L52: soil pH rather than soil pHs.

Response: Many thanks for your suggestion. The mistakes were corrected.

Comment 7

L108: This is printed in Chinese. For the soil types mentioned in this study, could you please add a brief comparison table of the Chinese classification and the international classification, e.g., WRB?

Response: Many thanks for your suggestion. We used the Chinese soil classification system for consistency and comparability with literature because most studies where we collected data used the Chinese soil classification system, and it was challenging to translate soil types between different soil classification systems due to their difference in scientific basis, classification principles and hierarchy. The explanation and a table comparing the soil classification systems were added in the revised manuscript. Detailed revision refers to Lines 111 – 114 and Table 1 in the revised manuscript.

Comment 8

L. 130: Is there a composite index that assigns different weights to various indicators?

Response: Many thanks for your comments. All the indicators of soil nutrients were assumed to share the same importance according to the literature.

Comment 9

L220: Large C stock does not necessarily mean a large C sequestration capacity. This does not make sense. Please delete.

Response: Many thanks for your comment and suggestion. We claimed the large C sequestration capacity in Chinese tea plantations because of the wide range of SOC concentrations rather than its high SOC concentrations. This might lead to controversy. Therefore, we delete this expression in the revised manuscript.

Comment 10

L250: Please specify in what context did Yan et al., (2020) reported the value 4.68.

Response: Many thanks for your comment and suggestion. Yan reported the soil pH in tea plantations in China at the national level. We mention this in the introduction in both the original (Lines 50 – 51 in the original manuscript) and revised (Lines 49 – 52) manuscript. We also added more details about the number of datasets and sources and coverage of study areas of Yan's study in the revised introduction.

Comment 11

L261: I suggest checking the soil parent material. Is it possible that carbonate rocks contributed to the high pH values?

Response: Many thanks for your suggestion. We checked the distribution of soil parent material in China and their influence on soil pH. We found that soils developed from limestone and river alluvium often exhibit high pH (>7), and these soil parent materials were widely distributed in north and south Yangtze zones. We added these arguments in the revised manuscript as well. Detailed revision refers to Lines 287 – 289 in the revised manuscript.