

### Review Form 3

Journal Name:	<a href="#">International Journal of Plant &amp; Soil Science</a>
Manuscript Number:	Ms_IJPSS_126719
Title of the Manuscript:	Clay-Humus Complexes: A Key Driver of Soil Organic Matter Stabilization in Diverse Indian Soil Orders
Type of the Article	

#### General guidelines for the Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound. To know the complete guidelines for the Peer Review process, reviewers are requested to visit this link:

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#### PART 1: Review Comments

Compulsory REVISION comments	Reviewer's comment	Author's Feedback <i>(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)</i>
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimum of 3-4 sentences may be required for this part.	This manuscript contributes valuable insights to the scientific community by advancing our understanding of soil organic carbon (SOC) stability within different soil orders, specifically through the examination of clay-humus complexes in Indian paddy soils. Its findings, particularly on the role of clay mineralogy in SOC stabilization, offer a foundation for targeted soil management strategies that could improve carbon sequestration and support sustainable agriculture practices. The use of Fourier-transform infrared (FTIR) spectroscopy and NaOCl oxidation presents a robust methodological approach, yielding data that elucidates the interaction between clay minerals and organic carbon. Overall, this research holds significant relevance for soil science, especially in regions dependent on agricultural productivity under varying soil types.	
Is the title of the article suitable? (If not please suggest an alternative title)	The title, <b>"Clay-Humus Complexes: A Key Driver of Soil Organic Matter Stabilization in Diverse Indian Soil Orders,"</b> is mostly suitable, as it captures the focus on clay-humus complexes and their role in soil organic matter stabilization across different soil orders. However, to enhance clarity and specificity, a revised title could provide more context on the study's emphasis on soil organic carbon (SOC) and the regional focus on paddy soils in India. Here is an alternative title suggestion:  <b>***Role of Clay-Humus Complexes in Soil Organic Carbon Stabilization across Paddy Soils in Diverse Indian Soil Orders***</b>  This title emphasizes the study's focus on SOC, the specific agricultural context, and the geographical relevance to India, making it more precise for potential readers.	

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<p>Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.</p>	<p>The abstract is generally comprehensive, covering the aims, methodology, key findings, and the study's implications for soil management and carbon sequestration in Indian paddy soils. However, it could be strengthened by including a few additional details and clarifications to improve its completeness and focus. Here are some specific suggestions:</p> <ol style="list-style-type: none"> <li><b>Clarify the Study's Novelty</b>: Briefly state the unique aspects of this study, such as the combination of FTIR spectroscopy with NaOCl oxidation to assess clay-humus interactions in stabilizing SOC. This would emphasize the study's methodological innovation or research gap it addresses.</li> <li><b>Highlight Key Findings</b>: While the results section mentions that different soil orders exhibit varying levels of carbon stability, specific findings—such as the higher stability in Vertisols or the impact of specific clay minerals like smectite and kaolinite—could be highlighted for a clearer impact.</li> <li><b>Refine the Implications</b>: The implications could be more specific to outline how the findings might influence practical soil management recommendations. For instance, adding a sentence on how the results could guide practices in carbon sequestration tailored to soil types in agricultural regions would strengthen the abstract's relevance.</li> <li><b>Condense the Methodology</b>: The methodology section could be shortened slightly to allow space for expanding the results and implications.</li> <li><b>Improve Flow and Precision</b>: Reordering the sentences slightly to first state the aim, then summarize methods, key findings, and end with implications, would improve readability and ensure a smooth flow.</li> </ol> <p>### Revised Abstract (suggestion)</p> <p><b>*Aims:</b> This study investigates the mechanisms of soil organic carbon (SOC) stabilization within clay-humus complexes across diverse soil orders in Indian paddy soils. By employing FTIR spectroscopy and NaOCl oxidation, it examines how different clay mineral compositions, such as smectite-rich Vertisols, influence SOC stability. *</p> <p><b>*Methodology:</b> Soil samples were collected from paddy-growing regions across four Indian soil orders: Entisol, Inceptisol, Vertisol, and Alfisol. SOC stabilization was analyzed through X-ray diffraction (XRD) for mineral composition, total and NaOCl-resistant carbon measurements, and FTIR spectroscopy to characterize functional groups in humic acids and clay-humus complexes. *</p> <p><b>*Results:</b> The study found that Vertisol soils, with higher smectite content, showed the highest total and stable carbon, while Alfisols, dominated by kaolinite, exhibited lower stability. FTIR analysis indicated strong aromaticity in Vertisol's humic acid, suggesting enhanced stability through complex mineral interactions. *</p> <p><b>*Conclusion:</b> This research highlights the crucial role of soil mineralogy in SOC stabilization, with significant implications for carbon sequestration strategies in Indian paddy soils. These findings could support targeted soil management practices for enhancing SOC retention and promoting sustainable agriculture. *</p> <p>This revision incorporates the suggestions for a more structured and detailed abstract.</p>	
<p>Are subsections and structure of the manuscript appropriate?</p>	<p>The manuscript appears to follow a logical structure with appropriate subsections that enhance clarity and provide a thorough framework for presenting the study's objectives, methods, results, and conclusions. Here's an assessment of the current structure and suggestions for minor improvements:</p> <p>### Current Structure Assessment</p> <ol style="list-style-type: none"> <li><b>Abstract</b>: Provides a concise overview of the study, though, as noted earlier, minor adjustments could make it more impactful.</li> <li><b>Introduction</b>: The introduction effectively lays out the importance of soil organic carbon (SOC) and the role of clay-humus complexes. It might be helpful to make the research gap more explicit early on to strengthen the rationale for the study.</li> <li><b>Materials and Methods</b>: This section is well-structured with clear subsections (e.g., soil sampling, clay</li> </ol>	

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	<p>mineralogy study, clay-humus complex analysis). Each methodological step is described in detail, making it easy to follow the process. A subsection on statistical analysis is appropriately included, indicating how the data were analyzed.</p> <p>4. <b>Results</b>: The results section is comprehensive and segmented into distinct analyses (e.g., clay mineralogy, total and NaOCl-resistant carbon, humic acid characterization, FTIR spectra). This structure helps readers clearly differentiate between the various types of data collected and the findings associated with each. The results could be further enhanced with summary tables or bullet points for complex data.</p> <p>5. <b>Discussion</b>: The discussion is well-structured, with subsections corresponding to key findings in the results (e.g., stability of carbon, elemental and functional characterization of humic acids). This parallel structure between results and discussion is effective, as it allows readers to connect findings with interpretations.</p> <p>6. <b>Conclusion</b>: The conclusion section effectively synthesizes the key findings and implications. If possible, adding specific recommendations for future research or practical applications could make it more impactful.</p> <p>7. <b>References</b>: Appears to be well-organized and includes relevant literature to support the study.</p> <p><b>### Suggestions for Improvement</b></p> <ul style="list-style-type: none"> <li>- <b>Addition of a Theoretical Framework or Background Section</b>: Before the methodology, a brief background on the mechanisms of SOC stabilization and clay-humus interactions could be included as a standalone subsection. This would provide theoretical context for the methods chosen.</li> <li>- <b>Reordering for Flow in the Results and Discussion Sections</b>: For readability, the structure of results could be reordered to present the findings from broad to specific (e.g., starting with total carbon measurements, then NaOCl-resistant carbon, and finally humic acid analysis). This would provide a smoother flow and clearer linkage between different components.</li> <li>- <b>Enhanced Use of Visuals</b>: Consider adding more summary tables, flowcharts, or conceptual diagrams, especially in complex sections like the FTIR spectroscopy analysis. These could enhance understanding and provide quick reference points for readers.</li> <li>- <b>Practical Implications Subsection</b>: In the discussion or conclusion, adding a subsection specifically on practical implications for soil management would reinforce the study's applicability to real-world agricultural practices.</li> </ul> <p>Overall, the manuscript's structure is sound and facilitates a clear presentation of research. Minor adjustments to enhance readability and add context would make it even more effective for the scientific community.</p>	
<p>Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimum of 3-4 sentences may be required for this part.</p>	<p>This manuscript demonstrates scientific rigor through its methodical approach to investigating SOC stabilization mechanisms, using well-established analytical techniques such as FTIR spectroscopy, NaOCl oxidation, and X-ray diffraction. The authors have carefully selected diverse Indian soil orders and systematically analyzed clay mineralogy and humic substances, providing robust data on the role of clay-humus complexes in SOC stabilization. The statistical analysis further reinforces the findings, supporting the validity of the observed differences in carbon stability across soil types. By linking clay mineral composition to carbon sequestration potential, this study offers technically sound insights that are valuable for both scientific understanding and practical soil management applications.</p>	
<p>Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. :</p>	<p>The manuscript includes a comprehensive set of references, covering foundational studies on soil organic carbon (SOC), clay-humus complexes, and soil mineralogy. Most of the cited works are highly relevant and provide a strong theoretical foundation, such as studies on clay mineral interactions, SOC stabilization mechanisms, and the role of humic substances. However, a few suggestions for strengthening the reference list with recent works include:</p> <ol style="list-style-type: none"> <li>1. <b>Recent Advances in SOC Sequestration</b>: Including recent studies from the past 3–5 years on SOC dynamics and sequestration mechanisms in agricultural soils could add more contemporary insights, especially given the current emphasis on climate change mitigation through soil management.</li> </ol>	

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	<p>2. <b>**Latest Methodological Advances in FTIR and NaOCl Oxidation**</b>: Adding a recent review or research paper that discusses advanced techniques in FTIR spectroscopy or NaOCl oxidation for SOC analysis would enhance the methodological relevance. This could support the robustness of the chosen methods and demonstrate alignment with the latest scientific practices.</p> <p>3. <b>**Studies on Indian Soil Carbon Management**</b>: Additional recent studies focusing specifically on carbon management in Indian soils under various cropping systems could provide context for the study's regional focus and implications.</p> <p><b>Overall, while the references are largely adequate and relevant, incorporating some of these recent studies could further solidify the manuscript's scientific foundation.</b></p>	
<p>Minor REVISION comments</p> <p><b>Is the language/English quality of the article suitable for scholarly communications?</b></p>	<p>The language and English quality of the manuscript are generally suitable for scholarly communication, as it clearly presents complex scientific information in an accessible manner. However, minor revisions could improve readability and precision:</p> <ol style="list-style-type: none"> <li><b>**Sentence Structure**</b>: Some sentences are lengthy and complex, which can make them challenging to follow. Breaking these into shorter sentences would enhance clarity.</li> <li><b>**Technical Terms and Definitions**</b>: Certain technical terms, such as "NaOCl-resistant carbon" and "FTIR spectroscopy," could be briefly clarified upon first use to ensure accessibility for a broader audience.</li> <li><b>**Grammar and Word Choice**</b>: There are occasional grammatical issues and word choices that could be refined. For example, phrases like "the highest total and stable carbon" could be revised to "the highest levels of total and stable carbon" for precision.</li> <li><b>**Consistency**</b>: Ensure consistent use of scientific terms and abbreviations throughout the manuscript to maintain flow and prevent confusion.</li> </ol> <p>Overall, the manuscript would benefit from a language review focused on simplifying complex sentences, ensuring grammatical accuracy, and maintaining a scholarly tone.</p>	
<p><b>Optional/General</b> comments</p>	<p>This manuscript provides valuable insights into soil organic carbon stabilization mechanisms across diverse Indian soil orders, a topic of growing importance in sustainable agriculture and climate resilience. The study's robust analytical approach and detailed results make it a meaningful contribution to soil science, particularly in the context of region-specific soil management. While the manuscript is scientifically sound, minor improvements in language clarity and reference updates would enhance its readability and contemporary relevance. Overall, it holds potential to guide further research and inform effective soil carbon sequestration strategies.</p>	

**PART 2:**

	Reviewer's comment	Author's comment (if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)
<p><b>Are there ethical issues in this manuscript?</b></p>	<p><i>(If yes, Kindly please write down the ethical issues here in details)</i></p>	

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