

Response to Reviewer 3 Comments		
1. Summary		
Thank you very much for taking the time to review this manuscript. Please find the detailed responses below and the corresponding corrections in track changes in the re-submitted files.		
2. Questions for General Evaluation	Reviewer's Evaluation	Response and Revisions
Does the introduction provide sufficient background and include all relevant references?	Yes/Can be improved/Must be improved/Not applicable	/
Are all the cited references relevant to the research?	Yes/Can be improved/Must be improved/Not applicable	/
Is the research design appropriate?	Yes/Can be improved/Must be improved/Not applicable	/
Are the methods adequately described?	Yes/Can be improved/Must be improved/Not applicable	/
Are the results clearly presented?	Yes/Can be improved/Must be improved/Not applicable	/
Are the conclusions supported by the results?	Yes/Can be improved/Must be improved/Not applicable	/
3. Point-by-point response to Comments and Suggestions for Authors		
Comments 1: Some doubts such as the reliability of considering only 2mL to determine total extractive matter. Considering 250 mL of solvent and 25 g of sample, 2 mL of extract is not representative of the sample.		
Response 1: We appreciate your observation regarding the reliability of considering only 2 mL of extract to determine the total extractive matter. However, we would like to clarify that the extract obtained during our procedure is homogenous due to the thorough mixing and extraction process applied. The 2 mL aliquot accurately reflects the composition of the total extract, ensuring the reliability and reproducibility of the results.		
Comments 2: During maceration, was the temperature monitored and maintained at 25°C for 120 min?		
Response 2: Yes, the temperature was monitored and maintained at 25°C throughout the entire extraction process.		
Comments 3: Explain more about the solvomodule;		
Response 3: Thank you for your comment regarding the discussion of solvomodule, and if you believe this aspect requires further elaboration, we kindly ask for guidance on where and how to expand this discussion.		
Comments 4: And statistical analysis? For comparing treatments before using the model		

mathematics.
Response 4: Thanks for this suggestion. We have added the statistical analysis, page[6] which was applied at the beginning of the manuscript (tables 1 and 2). When it comes to antioxidant tests, they all have different mechanisms although the comparison of activities is done based on the same parameters such as EC ₅₀ values. So ANOVA in this case would not be reliable for all tests, only if it were used for each test individually.
Comments 5: To determine the extraction kinetics, were several extractions conducted for each time considered?
Response 5: The extraction kinetics were monitored for all extraction techniques in triplicate to ensure accuracy and reproducibility. However, the modeling extraction kinetics was performed without incorporating standard deviations.
Comments 6: The reflux (up to 180 min) and Soxhlet (240 min) methods are obsolete and are too expensive economically, energetically and in terms of time considering the sustainability of the research;
Response 6: The primary factor we monitored and used to select the optimal extraction technique was the yield of total extractive matter. According to the literature, classical extraction techniques often result in higher yields of total extractive matter. However, this does not necessarily imply that these extracts are always of higher quality compared to those obtained using modern extraction techniques.
Comments 7: Gallic no galic; rutin no routine;
Response 7: Thank you. We corrected this throught the text in track changes.
Comments 8: Implement the description of DPPH and ABTS and define how the results were expressed;
Response 8: We have revised and expanded this section of the methods for determining antioxidant activity, specifically describing the DPPH and ABTS assays and defining how the results were expressed.
Comments 9: Arrange table 1 as well as table 2
Insert statistical analysis between samples; insert multivariate statistical analysis to check the effect of different variables (extraction method, time etc.).
Response 9: We would like to clarify that classical optimization of extraction conditions was not conducted in this study. Instead, the focus was on evaluating the TEM yield under various experimental conditions. As such, multivariate analysis would not be applicable in this case due to the absence of systematically designed experiments for optimization. However, we have conducted a statistical comparison of the TEM yields using one-way ANOVA and post-hoc tests, which allowed us to identify significant differences between the tested conditions. These results are reflected in the tables, where statistical groups (e.g., a, b, c) have been included for clarity.
Comments 10: The results should be commented and described better. Comments are very small and without explanation and discussion.
Response 10: Thank you for your feedback regarding the comments on the results. The core findings are briefly outlined in the "Results" section, while detailed explanations, interpretations, and comparisons with existing literature are thoroughly addressed in the "Discussion" section.

Comments 11: Do not state in the header of the table (Tab 7 +- sd).Insert in materials and methods the explanation of the replications conducted and that the data are reported as mean + ds;
Response 11: Thank you for your comment. This suggestion has been accepted, and the changes have been implemented accordingly.
Comments 12: Improve the conclusion
Response 12: This has been accepted and conclusion is corrected in track changes. “Applied extraction techniques have an impact on TEM yield, kinetics and activity. The extract obtained by Soxhlet extraction yielded the highest total extractive matter (TEM), due to its continuous solvent circulation. Ultrasonic extraction significantly reduced time by disrupting cell walls and enhancing mass transfer. The application of kinetic extraction models as a novelty when it comes to ethanolic extracts of black pepper was significant for this research. The extract obtained by reflux extraction at boiling point temperature showed the highest antioxidant activity according to all applied tests, except for the reducing power method, where the extract obtained by ultrasonic extraction showed the higher activity. The correlation between phenolic and flavonoid content and antioxidant activity was presented for each test, leading to the conclusion that the antioxidant activity of BPFEEs does not only originate from these compounds but is also a result of synergistic effects with other extracted components.rTherefore, future analyzes will focus on determining the chemical composition of BPFEEs, in order to better understand the antioxidant activity of the obtained extracts.”
Comments 13: There are too many self-citations;
Response 13: We appreciate this observation. The self-citations reflect our team's extensive research in this field and are included to provide relevant context and build upon our prior findings. We will ensure all references are balanced and justified in their relevance to the study.
4. Response to Comments on the Quality of English Language
Point 1: Revise English form (many mistakes and form) (the results was expressed as...);
Response 1: This suggestion has been accepted, and we have made efforts to address the issues and correct the errors accordingly.
5. Additional clarifications
/