



REVIEWER'S REPORT

Manuscript No.: IJAR- 57975

Title: STRATEGIES FOR OPTIMIZING THE BIOCHAR CONTENT OF WOOD CHIPS, PEANUT SHELLS, AND RICE HUSKS IN CEMENTITIOUS MATERIALS

**Recommendation:
Accept**

Rating	Excel.	Good	Fair	Poor
Originality	Yes			
Techn. Quality		Yes		
Clarity	Yes			
Significance		Yes		

Reviewer Name: Dr. Ashish Yadav

Detailed Reviewer's Report

Reviewer's Comment for Publication.

Acceptance Comment are mentioned below suitable for the paper titled "STRATEGIES FOR OPTIMIZING THE BIOCHAR CONTENT OF WOOD CHIPS, PEANUT SHELLS, AND RICE HUSKS IN CEMENTITIOUS MATERIALS"

Reviewer Comments: Accept

Reviewer Comments –

1. Introduction

The introduction adequately highlights the environmental concerns associated with cement production, particularly greenhouse gas emissions arising from clinker manufacturing and fossil fuel consumption. The significance of utilizing biochar derived from wood chips, peanut shells, and rice husks as sustainable alternatives is well established. However, the section would benefit from including quantitative statistics on global cement-related CO₂ emissions and the carbon reduction potential of biochar incorporation. Furthermore, the novelty of the review and the specific research gaps addressed by the study should be more explicitly stated to better position the manuscript within existing literature.

2. Literature Review

The literature review presents a broad overview of factors influencing the performance of biochar in cementitious materials, including biochar fineness, porosity, pretreatment methods, and curing techniques. The discussion successfully identifies the contradictory findings reported in previous studies and attempts to explain these inconsistencies. Nevertheless, the review remains largely descriptive and requires a more systematic and critical analysis of previous investigations. The inclusion of comparative tables summarizing biomass type, pyrolysis conditions, biochar dosage, and corresponding mechanical and durability outcomes would substantially improve the comprehensiveness and readability of the review.

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3. Solution Approach

The manuscript proposes several optimization strategies, including particle size refinement, pretreatment methods, and accelerated carbonation curing to enhance biochar incorporation in cementitious composites. The recommendation of combining these factors into a standardized protocol represents a valuable contribution to the field. However, the methodology adopted for selecting and reviewing the literature is not sufficiently described. The authors should provide details regarding database selection, inclusion and exclusion criteria, and the rationale for proposing the integrated optimization framework to enhance the scientific rigor and reproducibility of the review.

4. Results and Discussion

The results and discussion section effectively demonstrates that biochar additions exceeding 1% generally lead to reductions in mechanical properties due to the porous nature of biochar. The manuscript also highlights that pretreatment and accelerated carbonation curing can increase biochar incorporation up to 5–10% while maintaining acceptable performance levels. However, the discussion should include more quantitative comparisons regarding compressive strength, water absorption, shrinkage reduction, and durability improvements. A deeper explanation of the underlying mechanisms, including internal curing, pore refinement, and hydration enhancement, would further strengthen the scientific contribution of the manuscript.

5. Conclusion

The conclusion appropriately emphasizes the importance of optimizing biochar characteristics and processing techniques to achieve higher incorporation levels in cementitious materials without compromising performance. The recommendation to combine multiple optimization strategies into a standardized protocol is particularly noteworthy and has practical implications for sustainable construction practices. However, the conclusion should provide more specific recommendations regarding optimal biochar percentages, suitable pyrolysis conditions, and preferred pretreatment methods. Additionally, future research directions, including long-term durability studies, life cycle assessment, and industrial-scale implementation, should be more clearly articulated.