

REVIEWER'S REPORT

Manuscript No.: IJAR-56215

Title: AMELIORATIVE ROLE OF BIOCHAR AND NANODAP IN MITIGATING SEWAGE SLUDGE INDUCED CADMIUM STRESS IN PRAECITRULLUS FISTULOSUS

Recommendation:

Accept after minor revision.....

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

Reviewer Name: Faheem Abdul Muneeb

Reviewer's Comment

This manuscript investigates the impact of sewage sludge-induced cadmium (Cd) stress on *Praecitrullus fistulosus* (tinda) and evaluates the ameliorative potential of rice husk biochar (RHB) and Nano-DAP, individually and in combination. Using a controlled pot experiment with eight treatments under a completely randomized design, the study assesses morphological and physiochemical responses at 60 DAS. The topic is highly relevant in the context of sustainable sludge utilization, heavy metal remediation, and safe crop production. The integration of biochar and nanofertilizer strategies reflects an emerging and important area in soil remediation research.

Scientific Contribution and Empirical Strength

The principal strength of the manuscript lies in its clear experimental structure and statistically supported findings. Cadmium stress (SS + Cd) significantly reduced plant height, leaf area, biomass, pigment content, and fruit weight, confirming the phytotoxic impact of Cd. The combined treatment (SS + Cd + RHB + Nano-DAP) demonstrated the strongest recovery, improving growth parameters and reducing Cd accumulation in shoots by approximately 50%.

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The inclusion of detailed morphological and physiochemical data (Tables 1, 4, and 5; Figures 1 and 2) strengthens the empirical grounding of the study. Two-way ANOVA results showing highly significant treatment effects ($p < 0.0001$) provide robust statistical validation. The manuscript successfully demonstrates the synergistic potential of immobilization (biochar) and nutrient-enhancement (Nano-DAP) mechanisms.

However, some descriptive repetition appears in the results section, particularly in narrating trends already evident in tables and figures. Moderate condensation would enhance analytical precision.

Methodology and Analytical Approach

The completely randomized design (CRD) with eight treatments and three replicates per treatment is appropriate for controlled assessment of Cd stress and remediation effects. Treatment composition, soil preparation, and amendment application are clearly described. The inclusion of spectrophotometric pigment estimation, nutrient analysis formulas, and SPSS-based statistical evaluation adds methodological transparency.

Nevertheless, certain procedural details—such as justification for selecting 50 ppm Cd concentration and clarification of Cd bioavailability assessment—could be more explicitly explained. Additionally, while Cd accumulation in shoots is mentioned, the analytical method used for quantifying Cd in plant tissues should be clarified. These remain minor methodological refinements.

Structure, Style, and Presentation

The manuscript is logically organized, progressing from background and rationale to materials, results, statistical analysis, and conclusion. Tables and graphical representations effectively summarize treatment effects and enhance readability.

However, the introduction is relatively lengthy and contains repeated statements regarding cadmium toxicity and sewage sludge risks. Streamlining this section would improve focus. Minor grammatical inconsistencies and formatting issues (spacing, repetition of references, typographical errors) should be corrected during revision.

The title accurately reflects the experimental scope and does not require modification.

Final Recommendation

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This manuscript provides a relevant and experimentally sound contribution to the field of soil remediation and sustainable agriculture. The findings demonstrate the synergistic efficacy of biochar and Nano-DAP in mitigating cadmium stress in *Praecitrullus fistulosus* and offer practical implications for safe sewage sludge utilization.

With **minor revisions** focused on condensation, clarification of certain methodological details, and editorial refinement, the manuscript is suitable for publication.

Decision: Accepted with minor revisions.