

## REVIEWER'S REPORT

Manuscript No.: IJAR-52371

Date: 21-06-2025

**Title: ESTIMATION DU STOCK DE CARBONE DES SYSTEMES AGROFORESTIERS DANS LA COMMUNE DE N'DALI AU NORD-EST DU BENIN**

### Recommendation:

Accept as it is.....**YES**.....  
 Accept after minor revision.....  
 Accept after major revision .....  
 Do not accept (*Reasons below*) .....

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

**Reviewer's Name:** Tahir Ahmad

**Reviewer's Decision about Paper:** Recommended for Publication.

**Comments** (*Use additional pages, if required*)

### Reviewer's Comment / Report

#### General Overview:

This study presents a rigorous and contextually significant assessment of carbon stock within various agroforestry systems (SAF) in the commune of N'Dali, located in northeastern Benin. By quantifying the biomass and carbon storage potential of different SAF types, the research contributes meaningfully to the broader discourse on climate change mitigation and ecological sustainability through land-use strategies in West Africa.

#### Scientific Relevance and Originality:

The topic is highly relevant in the context of global climate change efforts, particularly within the framework of carbon sequestration and sustainable agriculture. This work stands out by providing detailed empirical data on carbon stocks across different SAF configurations—agroforestry parks, fallows, home gardens, hedgerows, and plantations (Taungya systems)—using a robust methodological framework. The study fills a critical knowledge gap in regional carbon dynamics and offers valuable insights for environmental planning and policy in Benin and the broader sub-Saharan region.

#### Methodological Soundness:

The methodology is clear, scientifically sound, and appropriately detailed. The use of floristic inventories following the sigmatiste method of Braun-Blanquet across 150 circular plots demonstrates

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comprehensive field sampling. The estimation of above- and below-ground biomass, followed by carbon stock calculations with analytical software (Excel, SPSS), is methodologically consistent and aligns well with established protocols in ecological and environmental science. The statistical rigor is evident in the significance levels and determination coefficients reported, lending strong credibility to the findings.

### **Data Quality and Analysis:**

The data are well-organized and analyzed with attention to statistical reliability. Key findings include the significant variability in carbon stocks among different SAF types, with agroforestry parks having the highest carbon storage potential. The strong correlation between carbon stock and ecological importance of species, as well as the positive relationship between tree diameter and carbon accumulation, are particularly noteworthy. These results are clearly communicated and contribute valuable ecological insights.

### **Structure and Clarity:**

The manuscript is clearly written, logically structured, and scientifically coherent. The abstract provides a concise yet thorough overview of the objectives, methodology, and key findings. Terminology is used accurately and consistently, and the argumentation is fluid throughout the text. The inclusion of specific statistical values enhances the transparency and interpretability of the results.

### **Environmental and Practical Implications:**

The study underscores the role of agroforestry systems as effective carbon sinks and their strategic value in climate resilience planning for rural communities. Its emphasis on the ecological and socio-economic benefits of SAFs makes the work particularly relevant for stakeholders in sustainable land management, carbon offset programs, and rural development initiatives.

### **Scholarly Merit:**

This is a scientifically valuable and well-executed study. It demonstrates a high level of academic rigor and field expertise, supported by empirical evidence and thoughtful analysis. The study contributes to both theoretical understanding and practical decision-making in agroecology, climate policy, and land-use planning.

### **Conclusion:**

This research provides a robust and impactful estimation of carbon stocks in agroforestry systems in N'Dali, highlighting their significance in climate change mitigation and ecological resilience. The integration of ecological variables with carbon metrics makes it a noteworthy contribution to environmental science and sustainable agriculture.