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REVIEWER'S REPORT

Manuscript No.: IJAR-55827

Title: Potentiel de Sequestration de Carbone dans le Systeme Sol-Plante : Evaluation dans les Sols du Systeme Oasien du Manga (Sud-Est Nigerien)

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 Name: Prof. Dr Dillip Kumar Mohapatra

Detailed Reviewer's Report

1. Strengths

Strong relevance and originality

The study addresses **carbon sequestration in arid and oasis systems**, which is *rarely investigated* in West African contexts.

Focuses on **heterogeneous land cover types** (cuvettes, dunes, rangelands), adding **novel comparative value**.

Robust methodological approach

Use of **Walkley & Black**, **soil bulk density**, and **allometric equations** is appropriate for accurate carbon stock assessment.

Sampling across **five soil depths** (0–100 cm) enhances reliability and vertical carbon profile understanding.

Inclusion of **both soil carbon and woody biomass carbon** gives a **complete carbon budget**.

Clear statistical analysis

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Application of **Shapiro-Wilk, ANOVA, Duncan, and Kruskal-Wallis** tests increases scientific rigor.

Significant differences between land uses are well documented.

Well-structured results

Provides **comparative carbon stocks** across land types with strong interpretation.

Presents meaningful patterns such as:

High carbon in **cuvettes**

Intermediate in **parcours naturels** and **dunes traitées**

Very low in **dunes vives**

Strong practical implications

Findings support **restoration strategies**, **dune stabilization**, and **sustainable land management** under climate change initiatives (e.g., *4 pour 1000*).

2. Weaknesses (Faiblesses du Manuscrit)

Limited description of sampling design

Number of samples per layer, replication details, and spatial variability management are not fully described.

Lack of uncertainty estimate

No confidence intervals or error propagation for carbon stock calculations.

Biomass equations may need justification

The allometric equations used (Chave 2005, Cairns 1997) were developed for forests, not arid shrublands; you should justify their applicability.

Absence of maps or figures

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Spatial maps of land cover, sampling points, and carbon distribution would strengthen clarity.

Discussion could be strengthened

Needs deeper comparison with:

Sahelian ecosystem carbon stocks

Global dryland carbon sequestration literature

The role of root biomass, soil moisture, and microaggregation is not elaborated.

English abstract has minor grammatical issues

Needs language polishing for international journals.

3. Significance

High scientific value

Provides rare quantitative data on carbon sequestration in oasis ecosystems of the Sahel.

Enhances understanding of land use impacts on soil carbon in extremely fragile environments.

High policy relevance

Useful for:

National programs on land restoration

UNCCD initiatives on combating desertification

Climate mitigation commitments

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Sustainable oasis management

Carbon credit and climate financing projects

High ecological relevance

Demonstrates that **restored dunes and natural rangelands can significantly store carbon**, supporting nature-based solutions.

4. Key Points

Cuvettes à eau profonde show the **highest soil carbon stock** (≈ 397 Mg C ha^{-1}).

Dunes vives have extremely low carbon stocks due to **poor vegetation cover**.

Prosopis juliflora plantations (19 years) produce **maximum woody biomass carbon**.

Acacia radiana rangelands maintain strong **tree-level carbon sequestration**.

Carbon distribution is **highly dependent on soil texture, moisture, and vegetation density**.

Restoration and dune stabilization significantly **enhance carbon sequestration over time**.

The **soil-plant system combined** reveals highest stocks in:

DT (19 years): ~235 Mg C ha^{-1}

PN: ~218 Mg C ha^{-1}

Younger dunes: ~160 Mg C ha^{-1}

Study supports **"4 pour 1000" initiative** and climate-smart land management.