

REVIEWER'S REPORT

Manuscript No.: IJAR- 59077

Title: *Farmers' perspectives on intensive rice cultivation: a participatory diagnosis of practices, constraints, and co-constructed solutions in the middle Senegal River Valley.*

Recommendation:

Accept as it is

Accept after Major revision.....

Accept after Minor revision

Do not accept (*Reasons below*)

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

Reviewer Name: **Dr. ANAPANA GOPAL**

Reviewer's Comment for Publication.

General Comments

The manuscript presents a participatory diagnosis of irrigated rice production systems in six villages of the middle Senegal River Valley (SRV), Senegal. The study combines participatory workshops involving farmers and researchers with individual farmer surveys to identify production constraints, document current agricultural practices, and co-construct potential solutions. The study was conducted during 2020–2021 and covered six villages: Niangua Diéri, Ndiawar, Guia, Kodith, Niandane, and Ngaolé.

The manuscript addresses an important and highly relevant issue for agricultural development in the Senegal River Valley. Its participatory orientation is a major strength because it attempts to integrate farmers' perceptions and local knowledge into the identification of constraints and development of potential interventions. The study identifies poor irrigation infrastructure, high irrigation costs, soil degradation, weed infestation, water-management problems, and input-management issues as important constraints.

However, in its current form, the manuscript requires **minor revision**. The principal concerns relate to the methodological description of the participatory approach, sampling strategy, statistical treatment of survey data, interpretation of percentages and participatory scores, insufficient quantitative analysis, organization of the Results and Discussion, some unsupported causal statements, inconsistencies in reporting, and substantial language/editorial problems.

1. Content and Originality

The manuscript has a relevant applied focus and provides useful information on rice-production constraints in the middle SRV. The combination of participatory workshops and individual surveys is potentially valuable because it allows farmers' priorities to be compared with more detailed information on production systems.

The manuscript states that the study aimed to:

1. identify the main constraints perceived by farmers;

REVIEWER'S REPORT

2. document existing farming practices; and
3. co-construct consensus-based solutions with farmers.

These objectives are appropriate, but the **scientific novelty should be articulated more clearly**.

The authors should explain:

- What new knowledge this study provides compared with previous studies of rice production in the Senegal River Valley.
- What specifically distinguishes the middle SRV from other parts of the valley.
- What new insight is generated by combining participatory workshops with individual surveys.
- Whether the principal contribution is methodological, agronomic, socioeconomic, or policy-oriented.
- How the proposed solutions differ from recommendations already available through SAED and previous research.

At present, the manuscript sometimes reads more like a descriptive development report than a fully developed scientific research article.

2. Abstract

The Abstract provides a clear overview of the objectives, study area, general methods and principal findings. It identifies the major constraints and summarizes the proposed interventions.

However, the Abstract should be strengthened by including more quantitative information.

The authors should report:

- number of workshop participants;
- number of surveyed farmers;
- number of villages;
- principal percentages for the most important constraints;
- one or two key findings from the production-system survey;
- the main implication of the study.

For example, the Abstract could state that **60 farmers were surveyed and 23 farmers participated in the workshops**, rather than simply describing the study as a participatory approach.

The distinction between workshop participants and survey respondents should also be clear.

3. Introduction

The Introduction provides a useful rationale based on Senegal's dependence on rice imports and the importance of the Senegal River Valley for rice production. It also identifies known agronomic constraints including weeds, bird damage, water management, soil fertility, mechanization and input access.

Nevertheless, several aspects require revision.

Specific concerns:

1. The opening section contains numerous national production statistics, but their relevance to the specific research question should be better connected.
2. Some statistics and their cited years appear potentially mismatched. For example, a 2022 production estimate is associated with **DAPSA (2020)**. The authors should verify the source and year of every national statistic.

REVIEWER'S REPORT

3. The research gap is not sufficiently explicit.
4. The Introduction should end with a clearly formulated research question and/or hypothesis.
5. The relationship between **participatory diagnosis** and **sustainable intensification** should be developed more explicitly.

A stronger final paragraph could clearly state why participatory diagnosis is necessary despite the existence of previous studies on rice productivity in the SRV.

4. Study Area

The study area is described as the middle Senegal River Valley extending from Waoundé to the confluence of the Senegal and Doué rivers, with six villages selected as study sites.

The study-area description should be expanded.

The authors should provide, where available:

- geographic coordinates of each village;
- map showing all six sampling sites;
- size of irrigated areas;
- major irrigation schemes;
- soil types;
- annual rainfall;
- temperature;
- water source;
- major cropping systems;
- socioeconomic characteristics relevant to rice farming.

Figure 1 is referenced as the study-area map, but the figure should be improved to clearly show the locations of all six villages and their relation to the Senegal River and irrigation schemes.

5. Participatory Workshop Methodology

The participatory component is one of the most important elements of the manuscript. The authors report that **23 rice farmers** participated in workshops across six sites. Farmers identified constraints through brainstorming and scored them on a five-point scale. The majority score was retained as the final score.

However, the methodology needs substantially more detail.

The authors should clarify:

1. How many participants were present at each village.
2. How farmers were selected.
3. Whether women and younger farmers were represented.
4. Whether participants were cooperative members, individual farmers, scheme managers, or other stakeholders.
5. Whether the same workshop procedure was followed in every village.
6. How brainstorming responses were grouped into categories.
7. How the five-point scores were calculated.
8. Whether individual scores or group consensus scores were recorded.
9. How disagreement among participants was handled.
10. Whether facilitators influenced the final ranking.

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

REVIEWER'S REPORT

The statement that **“the score assigned by the majority of participants was retained as the final score”** requires more explanation because this approach loses information about variation in perceptions.

6. Workshop Sample Size

The manuscript uses 23 farmers for the participatory workshops across six villages. This is potentially appropriate for qualitative/co-constructive research, but the authors should explain why this number was considered sufficient.

The distribution of participants should be presented, for example:

Village	Number of participants
Niangua Diéri	—
Ndiawar	—
Guia	—
Kodith	—
Niandane	—
Ngaolé	—
Total	23

This would allow readers to assess the representativeness of the participatory process.

7. Individual Farmer Survey

The study subsequently surveyed **60 farmers**, with 30 respondents focusing on organization/collective irrigation management and 30 focusing on plot-level water management and rice production practices.

This division requires clarification.

It is unclear whether:

- all 60 farmers answered the same questionnaire;
- two separate samples of 30 farmers were used;
- respondents were randomly assigned to the two survey components;
- there was overlap between the two groups.

The authors should clearly explain the sampling framework.

8. Sampling Strategy

The authors explicitly state that a **homogeneous purposive (judgemental) sampling strategy** was used because of financial constraints.

This is acceptable for an exploratory participatory study, but it has important implications for interpretation.

The manuscript should explicitly acknowledge that the findings **cannot necessarily be generalized to all rice farmers in the middle SRV**.

Potential selection bias should be discussed because purposive sampling may overrepresent:

- more active farmers;
- cooperative members;
- farmers accessible to researchers;
- farmers interested in project activities;
- farmers with particular irrigation experiences.

The authors should therefore replace broad statements such as “farmers in the middle SRV” with more precise wording where appropriate.

REVIEWER'S REPORT

9. Questionnaire Development and Validation

The questionnaire was designed using Sphinx 4.5 and pre-tested with five farmers. This is useful, but insufficient information is provided about questionnaire development.

The authors should explain:

- how questionnaire questions were developed;
- whether questions were translated into local languages;
- who conducted the interviews;
- whether interviews were face-to-face;
- average interview duration;
- how interviewer bias was controlled;
- whether the five pre-test participants were included in the final sample.

If the questionnaire is available, it would be useful to provide it as supplementary material.

10. Data Analysis

This is one of the **minor weaknesses** of the manuscript.

The authors state that collected data were processed and analyzed using **Microsoft Excel 2016**, which was also used to produce tables and figures.

The analysis is largely descriptive.

For a scientific research article, the authors should consider providing more rigorous statistical analysis, depending on the nature of the data.

For example:

- frequencies;
- percentages;
- means/medians where appropriate;
- confidence intervals;
- cross-tabulations;
- comparisons among villages;
- associations between farm characteristics and reported practices;
- variation between irrigation-scheme types.

If inferential statistics are inappropriate because of the purposive sampling, the authors should explain this explicitly and emphasize the exploratory/descriptive nature of the analysis.

11. Interpretation of Percentages

Table 1 provides constraint scores and percentages of farmers reporting each constraint.

The table is useful, but the relationship between the **five-point importance score** and the **percentage of farmers reporting the constraint** needs to be explained.

For example:

- Weed infestation was reported by 100% of farmers but assigned an importance score of 3.
- Soil degradation was reported by 91% and assigned a score of 5.
- Poor land levelling was reported by 100% but received a score of only 2.

This is actually an interesting finding, but the manuscript does not sufficiently analyze it.

REVIEWER'S REPORT

The Discussion should explain why **frequency of reporting and perceived severity are not necessarily equivalent**.

12. Prioritisation of Constraints

The manuscript identifies three priority constraints:

- high irrigation costs;
- weed infestation;
- soil degradation.

However, the method used to move from the broader list of constraints in Table 1 to the three “priority constraints” in Table 3 should be explained more clearly.

Was prioritization based on:

- percentage of farmers;
- workshop score;
- project intervention scope;
- researcher judgment;
- consensus among participants?

The manuscript currently states that prioritization was influenced partly by the **scope of the project's intervention**, which introduces potential researcher influence into what is presented as a farmer-led prioritization.

This needs to be transparently described.

13. Co-Constructed Solutions

The co-construction component is a strong feature of the manuscript.

The study identifies solutions including:

- pump-operator training;
- irrigation scheduling;
- improved pumping technologies;
- organic manure;
- plot compartmentalization;
- field re-levelling;
- soil testing;
- improved fertilizer management.

However, the manuscript should distinguish clearly between:

Farmer-generated solutions

and

Solutions proposed by the WAGRINNOVA project/researchers.

The current wording indicates that the solutions incorporated both farmer proposals and project suggestions.

The authors should identify the origin of each recommendation.

14. Table 2 Interpretation

Table 2 reports percentages of farmers proposing particular solutions. Some percentages are very low, including:

- potassium fertilization: 9%;
- recommended herbicide rates: 9%;
- recommended water depth during herbicide application: 4%.

These are potentially important findings.

REVIEWER'S REPORT

The authors should discuss why farmers proposed these solutions at such low frequencies.

Possible explanations could include:

- lack of awareness;
- perceived cost;
- labor requirements;
- disagreement with technical recommendations;
- limited access to inputs;
- insufficient extension support.

However, these explanations should not be presented as established causes unless they were actually measured.

15. Irrigation Scheme Classification

The manuscript identifies three main types of hydro-agricultural schemes:

- large-scale irrigation schemes (GA);
- village irrigation schemes (PIV);
- private irrigation schemes (PIP).

This is useful, but the classification should be defined.

The authors should explain:

- criteria used to classify schemes;
- area ranges;
- management structure;
- ownership;
- water source;
- pump type;
- number of schemes surveyed within each category.

Figure 2 should also provide sample sizes, not only percentages.

16. Condition of Irrigation Infrastructure

The finding that **75% of irrigation schemes and 60% of pumps were reported to be in poor operating condition** is important.

However, the manuscript needs to clarify whether “poor condition” was:

- objectively assessed by researchers;
- self-reported by farmers;
- reported by scheme managers;
- based on a predefined technical classification.

If it is based on farmer perception, the wording should state **“reported as being in poor condition”** rather than implying an objective engineering assessment.

17. Irrigation Costs

The study reports irrigation costs ranging from **90,000 to 140,000 CFA francs/ha**, with an average of approximately 100,000 CFA francs/ha.

This is a valuable economic indicator.

However, the manuscript should provide additional information:

- cost components;
- fuel costs;
- maintenance;
- pump depreciation;

REVIEWER'S REPORT

- labor;
- water fees;
- differences between scheme types;
- differences between wet and dry seasons.

If these data were not collected, the limitations should be acknowledged.

18. Land Preparation

The manuscript reports that disc-harrow tillage is used and that 58.3% of surveyed farmers pay for a second tillage pass.

This is useful descriptive information, but its implications for rice productivity should not be overstated.

The manuscript should clarify whether:

- second tillage improves measured yield;
- second tillage is associated with soil characteristics;
- farmers using two passes have different farm sizes/resources.

Otherwise, the finding should remain descriptive.

19. Demographic Findings

The manuscript reports that farmers aged 40–60 dominate in several villages, while farmers aged ≥ 60 are particularly prominent in Guia and Niandane.

The manuscript then refers to an “**ageing population**” as a constraint.

This is potentially important but requires more careful analysis.

The authors should distinguish:

- age distribution of respondents;
- actual aging of the agricultural workforce;
- youth migration;
- succession problems;
- labor availability.

If the study did not collect data on youth participation or migration, the conclusion should be moderated.

20. Cropping Systems

The survey provides useful information on rice, onion, tomato, okra and other crops. Rice was cultivated by 100% of respondents, while onion and tomato were also important.

However, the manuscript should provide a more analytical interpretation of crop diversification.

For example:

- Are vegetables grown mainly for income?
- Does diversification occur within the same plot?
- Is crop rotation practiced?
- Does diversification differ among irrigation schemes?
- Does diversification reduce or increase rice production?

Some of these questions are discussed later, but the Results section does not provide sufficient quantitative evidence.

21. Fertilizer Use

REVIEWER'S REPORT

The manuscript reports urea application rates of **191–500 kg/ha** and DAP rates of **0–161 kg/ha**.

These data are potentially valuable.

However, the analysis should go beyond reporting ranges.

The authors should provide:

- mean;
- median;
- standard deviation;
- minimum;
- maximum;
- distribution by village;
- distribution by season;
- comparison with recommended rates.

The manuscript should also clearly distinguish **farmer-reported application rates** from independently measured rates.

22. Herbicide Application

The manuscript reports propanil–Weedone application rates ranging from **0.75 to 8.33 L/h**.

The unit “**L/h**” is ambiguous and should be corrected.

Does it mean:

- litres per hectare (L/ha)?
- litres per hour (L/h)?

Given the agricultural context, L/ha may be intended.

This should be corrected throughout the manuscript.

The active ingredients and formulation of “Weedone” should also be specified.

23. Water-Depth Management

The study reports water depths of 0–20 cm during fertilizer application, with 73% of farmers maintaining 6–15 cm and only 4% maintaining 15–20 cm.

This is potentially an important agronomic finding.

However, the Results should clearly indicate:

- sample size;
- number of farmers in each category;
- whether measurements were observed or reported;
- differences among villages;
- differences among seasons.

The Discussion appropriately relates water depth to irrigation efficiency, but some causal interpretations should be presented more cautiously.

24. Discussion

The Discussion covers most of the major findings and connects them with previous literature. It addresses:

- farmer participation;
- infrastructure degradation;
- soil fertility;
- weed infestation;
- bird damage;

REVIEWER'S REPORT

- cropping seasons;
- irrigation management;
- irrigation costs;
- fertilizer use.

The Discussion is generally relevant but is **too lengthy and sometimes repetitive**. A more effective structure would be:

4.1 Major farmer-perceived constraints

4.2 Irrigation infrastructure and water management

4.3 Soil fertility and fertilizer management

4.4 Weed, bird and pest constraints

4.5 Co-constructed solutions

4.6 Implications for sustainable intensification

4.7 Study limitations

This would make the argument easier to follow.

25. Unsupported Causal Statements

Several statements in the Discussion move from observed associations to causal explanations without sufficient evidence.

For example, the manuscript states that soil degradation results from insufficient amendments, continuous rice cultivation and removal of crop residues.

These mechanisms are plausible and supported by literature, but they were not necessarily directly measured in this study.

The authors should distinguish between:

what farmers reported

and

what the authors infer from previous literature.

This distinction is particularly important in a participatory diagnostic study.

26. Bird Damage

Bird damage is reported as an important constraint, and the Discussion identifies the red-billed quelea as a major rice-feeding bird. The manuscript cites an estimate of yield losses of up to 13.2%.

However, if bird damage was not quantitatively measured in this study, the Discussion should not imply that the cited percentage represents the present study area.

The wording should clearly distinguish **published estimates** from **current farmer perceptions**.

27. Irrigation Cost Analysis

The Discussion states that irrigation represents approximately 25–29% of total rice production costs and discusses diesel consumption and pump efficiency.

This is potentially useful, but these figures appear to come from previous studies rather than the present survey.

The manuscript should clearly distinguish:

- current study findings;
- literature-derived values;
- authors' interpretation.

A table comparing current findings with previous studies would be helpful.

REVIEWER'S REPORT

28. Recommendation of the ZS 1115 Engine

The manuscript repeatedly recommends coupling irrigation pumps with a **ZS 1115 engine** as a means of reducing irrigation costs.

However, the present study does not appear to have experimentally evaluated this engine.

Therefore, the recommendation should be framed as:

“a proposed option identified during the participatory process”
rather than as a demonstrated intervention.

If the authors want to claim that it “could meaningfully cut fuel consumption,” quantitative supporting evidence should be provided.

29. Distinction Between Farmer Perception and Objective Measurement

This is a central issue for the manuscript.

The study is explicitly based on **farmers' perspectives**, yet some statements are presented as objective assessments.

For example:

- poor infrastructure;
- soil degradation;
- water-management inefficiency;
- high irrigation costs;
- fertilizer non-compliance.

The manuscript should consistently indicate whether each finding represents:

(a) farmer perception,

(b) researcher observation, or

(c) quantitative measurement.

This distinction would greatly improve scientific rigor.

30. Study Limitations

A dedicated **Limitations** subsection is strongly recommended.

It should acknowledge:

1. purposive rather than probability sampling;
2. relatively small workshop sample;
3. relatively small survey sample;
4. concentration on six villages;
5. reliance on self-reported farming practices;
6. potential recall bias;
7. lack of independent verification of fertilizer and irrigation quantities;
8. predominantly descriptive data analysis;
9. possible facilitator influence during participatory workshops;
10. inability to generalize directly to all farmers in the Senegal River Valley.

The absence of a limitations section is a significant weakness for a participatory survey study.

31. Conclusion

The Conclusion provides a concise summary of the principal constraints and proposed solutions. It also appropriately notes that field validation is necessary and that a pilot trial has been implemented.

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

REVIEWER'S REPORT

However, the Conclusion should be more closely tied to the actual evidence.

The statement that the proposed solutions will contribute to sustainable intensification should be moderated because **their effectiveness was not tested in this study**.

The statement about a pilot trial is particularly important. If the pilot trial is part of a subsequent study, it should not be presented as evidence supporting the current manuscript.

Instead, the authors could state:

"The findings provide a basis for subsequent field validation of selected interventions."

32. References and Citations

The reference list contains a substantial number of relevant sources covering:

- irrigated rice production;
- farmer perceptions;
- fertilizer management;
- water management;
- weeds;
- irrigation costs;
- soil fertility;
- participatory approaches.

However, the reference list requires careful editorial checking.

Specific issues include:

1. **Possible duplicate references:** Diaw et al. (2005a) and (2005b) appear to have the same title, journal, volume, pages and DOI.
2. Inconsistent capitalization of article titles.
3. Inconsistent author formatting.
4. Some references are identified as preprints without sufficient publication information.
5. Some references lack DOI information.
6. Some institutional reports need clearer bibliographic details.
7. The reference style should be standardized according to the target journal.
8. Every citation in the text should be checked against the reference list and vice versa.

The authors should also verify all national statistics against their original official sources.

33. Language and Editorial Quality

The manuscript requires **substantial English-language editing**.

There are numerous issues involving:

- missing spaces;
- punctuation;
- inconsistent capitalization;
- typographical errors;
- awkward sentence construction;
- inconsistent terminology;
- incorrect formatting of scientific names;
- inconsistent abbreviations.

Examples include:

REVIEWER'S REPORT

- “householdincome”;
- “rice□producing”;
- “rice-based” formatting inconsistencies;
- “Oryzabarthii” instead of *Oryza barthii*;
- “Solanumlycopersicum” instead of *Solanum lycopersicum*;
- “Abelmoschusesculentus” instead of *Abelmoschus esculentus*;
- inconsistent presentation of author names in citations.

Scientific names should be italicized and correctly spaced throughout.

Professional English editing is strongly recommended.

34. Figures and Tables

The manuscript contains several tables and figures that are useful but require improvement.

Figure 1

The study-area map should show all six villages clearly, together with major rivers and irrigation zones.

Table 1

The distinction between “score” and “farmers reporting the constraint (%)” should be explained more clearly.

Table 2

The origin of proposed solutions—farmers versus project/researchers—should be distinguished.

Table 3

The basis for prioritization should be explicitly described.

Figures 2–7

Figures should include:

- sample size;
- units;
- clear legends;
- readable axis labels;
- consistent fonts;
- percentages that correspond exactly to the underlying data.

Strengths of the Manuscript

The manuscript has several important strengths:

1. **Relevant agricultural-development topic** addressing rice production and food security in Senegal.
2. Focus on the **middle Senegal River Valley**, an important rice-producing region.
3. Use of a **participatory/co-construction approach**.
4. Inclusion of both workshops and individual farmer surveys.
5. Six study villages provide geographic coverage within the target region.
6. Identification of multiple interconnected production constraints.
7. Useful information on irrigation infrastructure and pumping systems.
8. Quantitative information on fertilizer, seed and water-management practices.
9. Identification of locally proposed solutions.
10. Good integration of farmer perspectives with existing literature.
11. Practical relevance for agricultural extension, irrigation management and sustainable intensification.

REVIEWER'S REPORT

12. The manuscript recognizes the need for subsequent field validation.

Overall Recommendation

The manuscript addresses an important and practically relevant issue and has the potential to make a useful contribution to understanding farmer-perceived constraints and locally co-constructed solutions for irrigated rice production in the middle Senegal River Valley. The combination of participatory workshops and individual surveys is particularly valuable.

However, the current manuscript is predominantly descriptive and requires substantial methodological and analytical clarification before its conclusions can be fully supported. The most important revisions concern **sampling methodology, participatory scoring procedures, statistical analysis, interpretation of percentages, distinction between perceptions and objective measurements, documentation of the co-construction process, and clearer separation between observed findings and literature-based explanations.**

The manuscript should also undergo significant language editing and reference-format correction.

Recommendation: Minor Revision

Final Decision: MINOR REVISION