

REVIEWER'S REPORT

Manuscript No.: IJAR- 59208

Title: THE EFFECTS OF SUBSTRATE TYPE AND CULTIVAR ON THE ESTABLISHMENT AND GROWTH PERFORMANCE OF PLANTAIN PLANTLETS.

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 evaluates the effects of five growing substrates and four plantain cultivars on nursery establishment and growth performance under a 4 × 5 factorial Completely Randomized Design with three replications. The study assesses stem girth, leaf area, number of leaves, root number, suckering, chlorophyll content, fresh weight and dry weight over 4–12 weeks after planting.

The topic is relevant to plantain nursery production because the quality of planting material is an important component of successful crop establishment. The comparison of compost, sawdust, soil-based mixtures and soil alone, together with cultivar × substrate interactions, has practical value.

The manuscript presents a consistent general trend in which compost performs better for several growth and seedling-quality parameters. However, **substantial methodological, statistical, data-presentation and language issues need to be addressed before the manuscript can be considered for publication.**

The most important concerns are the absence of essential experimental details, unclear substrate mixing ratios, insufficient description of the experimental unit and sample size, inadequate statistical reporting, missing chlorophyll methodology, inconsistencies regarding plant height, questionable terminology such as “yield” for nursery traits, and several numerical/table and cultivar-name inconsistencies.

1. Originality and Scientific Contribution

The study has a clear practical objective: to compare the effects of substrate type and cultivar on plantain plantlet performance under nursery conditions. The Introduction identifies a research gap concerning the comparative response of plantain cultivars to compost, sawdust and soil-based combinations in southwestern Nigeria.

The manuscript would nevertheless benefit from a stronger statement of its scientific contribution.

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The authors should explicitly explain:

1. What is novel compared with previous studies on banana/plantain nursery substrates?
2. Why were these particular four cultivars selected?
3. Why were these five substrate treatments selected?
4. What practical question is the experiment designed to answer?
5. Whether the objective is to identify the best substrate, the best cultivar, or the best **substrate × cultivar combination**.

The final objective should be stated in measurable terms.

2. Minor Concern: Experimental Details Are Insufficient

The experiment is described as a **4 × 5 factorial CRD with three replications**, giving 20 treatment combinations and 60 experimental units.

However, the manuscript does not clearly state:

- number of plantlets per experimental unit;
- number of pots/grow bags per replicate;
- pot/container size;
- number of plants sampled for destructive measurements;
- whether one plantlet or several plantlets constituted the experimental unit;
- whether the same plants were measured at 4, 6, 8, 10 and 12 WAP;
- total number of plantlets used.

These details are essential for evaluating the statistical validity of the experiment.

The authors should provide a clear experimental-unit description, for example:

“Each experimental unit consisted of X plantlets grown in X-L containers, with X containers per replication.”

Without this information, the effective sample size cannot be established.

3. Substrate Mixing Ratios Are Missing

This is a minor methodological limitation.

The manuscript identifies:

- compost;
- soil + compost;
- sawdust;
- soil + sawdust;
- soil alone.

However, the exact proportions of soil and organic material are not given. The manuscript itself acknowledges that the exact volume or weight ratios for soil + compost and soil + sawdust are unavailable.

This prevents reproducibility.

The authors must provide:

- soil:compost ratio;
- soil:sawdust ratio;
- whether ratios were weight-based or volume-based;
- source of compost;
- compost maturity;
- source/type of sawdust;
- particle size;
- soil type;

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- soil physicochemical properties;
- pH;
- organic carbon;
- N, P and K;
- moisture content if available.

If these values genuinely cannot be recovered, this limitation should be explicitly acknowledged and the conclusions should be moderated.

4. Physical and Chemical Characterization of Substrates Is Needed

The manuscript attributes compost superiority to nutrient availability, moisture retention, aeration, biological activity and improved physical properties.

However, none of these properties appears to have been measured.

The authors should provide, where available:

- pH;
- electrical conductivity;
- organic matter;
- total nitrogen;
- available phosphorus;
- exchangeable potassium;
- bulk density;
- porosity;
- water-holding capacity.

If these measurements were not conducted, statements such as “compost had relatively high nutrient content” should be presented as a **possible explanation based on literature**, rather than as an experimentally demonstrated mechanism.

5. Experimental Site Description Is Incomplete

The experiment was conducted at the LAUTECH Teaching and Research Farm in Ogbomoso, Oyo State, Nigeria.

However, important environmental information is missing.

The authors should provide:

- geographic coordinates;
- altitude;
- climatic classification;
- temperature range;
- relative humidity;
- rainfall conditions during the experiment;
- nursery type;
- light conditions/shading percentage;
- duration and dates of the experiment.

These details are particularly important because nursery conditions can strongly affect plant growth.

6. Nursery Management Requires More Detail

The manuscript states that watering and other management practices were applied uniformly.

However, the actual management protocol is not described.

The authors should specify:

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- watering frequency;
- approximate quantity of water;
- source and quality of irrigation water;
- shading;
- fertilization;
- pest and disease management;
- weed management;
- temperature/humidity monitoring;
- whether all containers were repositioned periodically.

Uniform management is important, but it should be **quantified and reproducible**.

7. Planting Material Characteristics Are Missing

The study compares four cultivars:

- Agbagba;
- Obinolewai;
- Orishele;
- Curare Enano.

However, the initial characteristics of the plantlets are not reported.

The authors should state:

- source of plantlets;
- propagation method;
- age;
- initial height;
- initial pseudostem girth;
- initial number of leaves;
- initial root status;
- approximate initial biomass;
- whether plantlets were uniform at planting.

If plantlets differed substantially at the beginning, this could confound treatment effects.

8. Chlorophyll Measurement Is Not Reproducible

The manuscript reports chlorophyll values and discusses them extensively. However, the exact chlorophyll measurement procedure is not provided. The manuscript explicitly states that the instrument or analytical protocol is unspecified.

This is a significant methodological gap.

The authors must provide:

- instrument/model;
- measurement unit;
- leaf selected for measurement;
- measurement position on leaf;
- number of readings per plant;
- whether the reported value is SPAD or extracted chlorophyll;
- extraction solvent and procedure if chemical extraction was used.

The current expression "chlorophyll value" is scientifically incomplete.

9. Measurement of Leaf Area Requires Clarification

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Leaf area is one of the major response variables, but the manuscript does not clearly describe how leaf area was measured. It only states that measurements were taken and expressed in cm².

The authors should specify whether leaf area was determined using:

- a leaf-area meter;
- digital image analysis;
- length × maximum width × correction factor;
- another method.

If an empirical formula was used, it should be provided.

10. Root-Counting Procedure Needs More Detail

Roots were counted after plantlets were removed from the substrate.

However, “number of roots” can be difficult to standardize.

The authors should explain:

- whether primary roots only were counted;
- whether secondary roots were included;
- how damaged roots were treated;
- whether roots were washed before counting;
- whether roots shorter than a specified length were counted;
- whether root measurements were performed on all plants or a subsample.

This is particularly important because root number is used as evidence for substrate superiority.

11. Fresh and Dry Weight Methodology Should Be Clarified

Fresh weight was measured immediately after extraction, while dry weight was determined after oven drying at 105 ± 2°C for 16–18 hours or until constant weight.

The authors should clarify:

- whether shoots and roots were weighed together;
- whether roots were washed before weighing;
- whether surface moisture was removed;
- number of plants sampled;
- whether samples were dried individually or pooled;
- whether constant weight was actually confirmed.

The manuscript should also ensure that the drying protocol is consistently described as the actual protocol used.

12. Minor Statistical Concern: Repeated Measurements Over Time

Stem girth, leaf area and number of leaves were measured repeatedly at:

4, 6, 8, 10 and 12 WAP.

The manuscript simply states that ANOVA and DMRT were used.

If the **same plantlets were repeatedly measured**, observations across time are not independent.

The authors should clarify whether:

- separate ANOVAs were performed at each WAP; or
- a repeated-measures ANOVA/mixed model was used.

If separate ANOVAs were performed, the statistical model and approach to multiple testing should be clearly stated.

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A mixed-effects/repeated-measures approach may be more appropriate if the same experimental units were followed through time.

13. Statistical Model Should Be Explicitly Presented

For a factorial experiment, the manuscript should state the statistical model, for example:

$$Y_{ijk} = \mu + S_i + C_j + (SC)_{ij} + \epsilon_{ijk}$$

where:

- S = substrate effect;
- C = cultivar effect;
- S × C = interaction;
- ϵ = experimental error.

The manuscript currently only states that ANOVA was performed.

The authors should report:

- F-values;
- degrees of freedom;
- P-values;
- error term;
- coefficient of variation (CV%);
- standard error/standard error of mean;
- sample size.

This would greatly improve statistical transparency.

14. The Results Tables Report Means Without Sufficient Statistical Information

The tables provide means and superscript letters, but do not provide the ANOVA statistics.

For example, Table 1 reports substrate and cultivar means for stem girth and indicates significance with letters and interaction symbols.

However, the reader cannot determine:

- magnitude of the treatment effect;
- F-statistic;
- exact P-value;
- coefficient of variation;
- experimental error.

The revised manuscript should include either:

- a separate ANOVA table; or
- F-values and P-values in the relevant tables.

15. Interaction Effects Should Be Interpreted Carefully

The manuscript reports significant substrate × cultivar interactions for several variables.

For example, the stem-girth interaction is non-significant at 4 WAP but significant from 6 WAP onward.

Similarly, leaf area interaction is reported as significant at all sampling dates.

When an interaction is significant, interpretation of the main effects should be made cautiously because the effect of substrate depends on cultivar and vice versa.

The authors should emphasize the **simple effects and specific treatment combinations** rather than repeatedly concluding that compost is universally superior.

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16. Serious Inconsistency Concerning Plant Height

This is a minor issue.

The Methods section lists the measured variables as:

- stem girth;
- leaf area;
- number of leaves;
- number of roots;
- suckering;
- chlorophyll;
- fresh weight;
- dry weight.

Plant height is not listed as a measured parameter.

However, the Discussion states that compost produced the greatest “plant height,” and the conclusion also states that compost supported superior plant height.

This inconsistency must be corrected.

Either:

1. plant height was actually measured, in which case the Methods, Results and tables must include it; or
2. plant height was not measured, in which case all references to plant height must be removed.

17. “Yield” Terminology Is Inappropriate for the Presented Measurements

Tables 6 are titled:

“Effects of Substrate and Cultivar on the Yield of Plantain”

and

“Effects of Substrate and Cultivar on Yield of Plantain.”

However, the measured variables are:

- root number;
- suckering;
- chlorophyll;
- fresh weight;
- dry weight.

These are **nursery growth/seedling-performance parameters**, not crop yield.

The title should be revised to something such as:

“Effects of Substrate and Cultivar on Seedling Performance Attributes of Plantain Plantlets.”

This correction should also be made throughout the text.

18. Cultivar Effect Is Overstated for Several Parameters

The Results state that cultivar significantly affected several measured attributes.

However, Table 6 shows that for number of roots, suckering and chlorophyll, cultivar means share the same superscript letter, indicating no significant cultivar differences according to the table.

The authors should distinguish clearly between:

- statistically significant differences;
- numerical differences.

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For example, Obinolewai having 68.60 chlorophyll units versus Agbagba 49.67 is numerically different, but if both carry the same statistical grouping in the table, the manuscript should not describe this as a significant cultivar effect.

19. Significant Interaction Does Not Automatically Mean Every Combination Is Superior

The manuscript frequently interprets the significant interaction as evidence that particular cultivar × substrate combinations are superior.

However, when interaction is significant, the appropriate interpretation requires formal comparison of the treatment combinations.

For example, the interaction table reports:

- Agbagba × compost: 21.00 roots;
- Orishele × compost: 20.33;
- Obinolewai × compost: 20.33.

The discussion should rely on the statistical grouping rather than numerical magnitude alone.

20. One Extremely High Leaf-Area Value Requires Verification

The manuscript reports an exceptionally high leaf area of **1,891.30 cm² for Agbagba under soil + sawdust**, which the authors themselves identify as deviating from the general pattern.

This value should be carefully checked against:

- original field/laboratory records;
- measurement sheets;
- calculation method;
- units;
- data-entry errors.

If verified, the authors should explain the biological basis or report the observation transparently as an outlier.

21. Fresh-Weight Values Also Require Verification

The manuscript reports a fresh weight of **446.00 g for Agbagba grown in sawdust**, substantially higher than most other treatment combinations. The text itself recommends verification against the original records.

This should be resolved before publication.

The authors should verify whether:

- 446.00 g is correct;
- the same number of plantlets was used;
- roots and shoots were included consistently;
- moisture content differed;
- there was a transcription error.

22. Fresh Weight Should Not Be Interpreted as Superior Biomass Without Considering Water Content

The manuscript correctly notes that sawdust produced the highest numerical fresh weight but that most substrate differences were not statistically significant.

However, fresh weight is strongly affected by tissue water content.

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The discussion should emphasize dry weight as the more informative indicator of accumulated dry biomass when comparing substrate treatments, unless water status was independently measured.

23. Causal Explanations Are Sometimes Stronger Than the Data Support

The manuscript repeatedly attributes compost effects to:

- increased nutrient availability;
- improved moisture retention;
- improved aeration;
- enhanced microbial activity;
- improved nutrient uptake;
- increased photosynthesis.

These mechanisms are biologically plausible, but the experiment did not directly measure most of them.

The wording should therefore be modified to:

“may be associated with...”

or

“could be explained by...”

unless supporting measurements are available.

24. Compost Alone Performing Better Than Soil + Compost Requires Discussion

An interesting finding is that compost alone generally performed better than soil + compost.

For example, compost recorded 78.67 g dry weight compared with 71.08 g under soil + compost.

This raises an important methodological question: **what were the actual physical and chemical properties of the pure compost compared with the mixtures?**

Without characterization and mixing ratios, it is difficult to explain this result scientifically.

The Discussion should avoid simply assuming that dilution of nutrients is responsible.

25. “Clean Planting Material” Claim Should Be Qualified

The manuscript recommends compost and responsive cultivars for production of “high-quality clean plantain planting materials.”

However, the study evaluates growth and nursery performance, not pathogen or virus status.

Therefore, the term “**clean planting material**” should be used cautiously unless disease/pathogen testing was performed.

A more appropriate expression would be:

“vigorous and healthy-looking nursery plantlets”

or

“high-quality nursery planting material.”

26. Recommendations Are Broader Than the Experimental Evidence

The conclusion recommends compost as the preferred substrate and recommends minimizing unamended soil.

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This is generally supported for the measured nursery conditions, but the recommendation should be limited to:

“under the nursery conditions evaluated in this study.”

The experiment does not establish:

- field establishment success;
- long-term yield;
- disease resistance;
- economic profitability;
- optimal compost rate;
- performance under different environmental conditions.

Therefore, the recommendation should not be generalized beyond the experimental conditions.

27. Economic Analysis Is Missing

The manuscript recommends compost for nursery production but does not compare the cost of:

- compost;
- sawdust;
- soil;
- transport;
- preparation;
- labour;
- container filling;
- irrigation.

Because the Recommendation section mentions the need for the “most economical substrate mixture,” an economic analysis or at least a discussion of cost should be considered.

28. Cultivar Names Are Inconsistent Throughout the Manuscript

Several forms appear in different sections:

- **Obinolewai**
- **Obinolewa**
- **Obinolewa i**
- **Orishele**
- **Orisele**
- **Curare Enano**
- **Curare Ena**

For example, the Methods list “Obinolewai,” “Orishele” and “Curare Enano,” while tables contain variations such as “Obinolewa,” “Orisele” and “Curare Ena.”

The authors must standardize the cultivar names throughout:

Agbagba; Obinolewai; Orishele; Curare Enano.

29. Table Numbering Requires Correction

The manuscript contains:

- Table 1;
- Table 2;
- Table 3;
- Table 4;

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- Table 5;
- Table 6;

but later another table is again labelled **Table 6** for the substrate × cultivar performance data.

This should be corrected to sequential numbering.

The table titles should also be standardized.

30. Table 2 Appears Incomplete

The interaction table for stem girth appears to contain the first 15 combinations in the extracted presentation, while the continuation is separated onto the next page.

The final manuscript should ensure that all 20 treatment combinations are presented clearly in a single continuous table or logically continued table.

31. Table Presentation Needs Improvement

The tables use very compact formatting and superscript letters but do not provide:

- SE/SEM;
- CV%;
- F-values;
- P-values;
- sample size.

For a factorial experiment, an ANOVA summary table would considerably improve presentation.

32. Introduction Can Be More Focused

The Introduction provides relevant background on plantain production and substrate properties.

However, it could be shortened and reorganized into four clear parts:

1. Importance of plantain production;
2. Importance of nursery planting material;
3. Role of substrate and cultivar;
4. Research gap and objective.

At present, some literature discussion is repetitive.

33. Discussion Contains Repetition

Several sections repeat the same explanation:

- compost improves nutrient availability;
- compost improves moisture retention;
- compost improves aeration;
- compost promotes root development;
- soil performs poorly.

These points are repeated across Results and Discussion.

The Discussion should focus more on:

- why compost differed from mixtures;
- cultivar-specific responses;
- significant interactions;
- comparison with previous studies;
- practical implications;
- limitations.

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34. Results and Discussion Should Be More Clearly Separated

The manuscript often combines numerical reporting with extensive mechanistic interpretation.

For example, after reporting stem-girth differences, several sentences immediately provide physiological explanations.

A clearer structure would be:

Results: statistical findings and numerical data.

Discussion: interpretation and comparison with literature.

This would improve readability and reduce repetition.

35. References Need Careful Formatting

The reference list contains useful recent literature, including studies from 2023–2026. However, formatting is inconsistent in places, including:

- missing spaces;
- inconsistent author formatting;
- inconsistent journal formatting;
- inconsistent capitalization;
- inconsistent presentation of DOI information.

The references should be formatted according to the target journal's style.

The authors should also verify that every citation in the text appears in the reference list and that every reference is cited in the text.

36. Language and Editorial Quality Require Minor Revision

There are numerous grammatical and typographical problems.

Examples include:

- “CULTIV AR” in the title;
- “plantlets performance” instead of “plantlet performance”;
- “Musaplantlets”;
- “plantlets production”;
- “ANOVA)treatment”;
- “growthas shown”;
- “developmentphysiological activity”;
- “plantlet”/“plantlets” inconsistencies;
- “SUBSTARTE” in tables;
- “LEAVES” formatting problems.

These should be comprehensively corrected.

A professional English-language editing pass is strongly recommended.

37. Scientific Units and Terminology Need Standardization

The manuscript reports chlorophyll values without units, while other parameters use cm, cm² and g.

The authors should ensure that every quantitative variable has:

- correct unit;
- measurement method;
- appropriate number of decimal places.

For example, “chlorophyll content = 61.42” is incomplete without indicating whether this is:

- SPAD units;

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- mg g⁻¹ fresh weight;
- mg cm⁻²;
- another measure.

38. The Conclusion Should Reflect the Actual Significant Effects

The conclusion states that cultivar differences were evident for several traits.

This should be rewritten more precisely to distinguish traits for which cultivar was significant from those where it was not.

For example:

- cultivar significantly affected stem girth at later stages;
- cultivar did not significantly affect number of leaves;
- cultivar effects varied among biomass/quality parameters;
- substrate × cultivar interactions were important for several traits.

This would make the conclusion statistically accurate.

39. Limitations Section Is Needed

The manuscript does not appear to contain a dedicated limitations section.

A short section should acknowledge:

- single experimental location;
- nursery-only conditions;
- short 12-week assessment;
- limited number of cultivars;
- lack of substrate physicochemical characterization;
- absence of field validation;
- lack of economic analysis;
- lack of pathogen/virus assessment;
- uncertainty if plantlet initial size was not standardized;
- limitations associated with repeated-measures statistical analysis, if applicable.

Strengths of the Manuscript

The study has several positive features:

- Clear and practically relevant research question.
- Appropriate factorial treatment structure.
- Four plantain cultivars are compared.
- Five substrate conditions are evaluated.
- Multiple growth and physiological parameters are assessed.
- Measurements extend from 4 to 12 WAP.
- Substrate × cultivar interactions are considered.
- Compost shows a generally consistent positive response for several important nursery traits.
- The study has potential practical relevance for plantain nursery management.
- The authors appropriately recognize that some numerical differences, particularly fresh weight under sawdust, were not statistically significant.

Overall Recommendation

The manuscript contains useful experimental information and has potential practical value for plantain nursery production. The factorial design and evaluation of several cultivars and substrates provide a reasonable foundation for the study.

International Journal of Advanced Research

Publisher's Name: Jana Publication and Research LLP

www.journalijar.com

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However, **the current version requires substantial revision**. The lack of essential experimental details, incomplete substrate characterization, insufficient statistical reporting, unclear treatment of repeated measurements, missing chlorophyll methodology, plant-height inconsistency, incorrect "yield" terminology, data-verification issues, and extensive editorial problems prevent the manuscript from being considered publication-ready.

If these methodological and statistical issues are adequately resolved and the Results/Discussion are rewritten to accurately reflect the statistical findings, the manuscript could become a useful contribution to research on plantain nursery production.

Final Decision: Minor Revision