

REVIEWER'S REPORT

Manuscript No.: IJAR-58050

Title: DIVERSITE DES RHIZOBACTERIES DE LA RHIZOSPHERE DES GENOTYPES D ANACARDIER (Anacardier occidentale L.) TOP 24 DE LA STATION DE RECHERCHE DE LATAHA (CNRA) ET CARACTERISATION DE LEUR POTENTIEL DANS LA PROMOTION DE LA CROISSANCE DES PLANTES (PGPR),

Recommendation:

Accept after minor revision

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

Reviewer's ID: Abdul Haseeb Mir

Detailed Reviewer's Report

The manuscript addresses a critical and highly relevant area of tropical agroecology and sustainable cultivation. Cashew production is a cornerstone of the agricultural economy in Côte d'Ivoire, yet the optimization of its production through bio-fertilization remains under-explored. The authors investigate the physiological and functional diversity of bacterial communities residing within the rhizosphere of elite cashew genotypes designated as Top 24 at the Lataha Research Station. By isolating indigenous rhizobacteria and screening them for specific plant growth-promoting traits, the study provides a foundational framework for reducing chemical inputs and establishing sustainable bio-inoculants adapted to the local pedoclimatic conditions of northern Côte d'Ivoire.

Methodologically, the study couples an investigation of soil physicochemical properties—such as pH, relative moisture, and electrical conductivity—with classical microbiological isolation and phenotypic characterization. The collection of seventy-five composite soil samples from multiple depths across different cashew genotypes, alongside peripheral citrus trees as local controls, establishes a robust experimental baseline. The authors isolated twenty-five distinct bacterial strains, subjecting them to Gram staining, morphological examination, and foundational biochemical profiling including catalase, oxidase, mannitol fermentation, and mobility assays. Furthermore, the manuscript evaluates essential plant growth-promoting rhizobacteria traits, focusing on inorganic phosphate solubilization, biological nitrogen

REVIEWER'S REPORT

fixation, indole-3-acetic acid production, ammonia synthesis, hydrocyanic acid release, and nitrate reductase and urease enzymatic activities.

The findings present a clear profile of an acidic rhizosphere microbiome where a significant proportion of the isolates possess promising functional traits. Specifically, the widespread capacity for ammonia production, biological nitrogen fixation, and indole-3-acetic acid synthesis among the isolates underscores the biological potential of these indigenous strains to enhance plant nutrition and hormonal stimulation. The text is logically organized, transitioning appropriately from environmental parameters to microbial structural distribution and functional assays. The research provides an essential stepping stone toward translating native soil ecology into practical bio-fertilization strategies for perennial crops in sub-Saharan Africa.

Improvements

While the conceptual basis and objective of the manuscript are highly commendable, several substantial methodological and analytical limitations must be addressed to elevate the work to international publication standards. The most critical weakness lies in the taxonomic identification of the twenty-five bacterial isolates. The authors rely exclusively on classical phenotypic, morphological, and basic biochemical testing to characterize their strains. In contemporary microbial ecology, concluding a study on diversity without molecular validation, such as 16S rRNA gene sequencing, severely limits the scientific value of the data. Phenotypic traits and morphological groupings are prone to homoplasy and convergent evolution, meaning unrelated bacterial genera can exhibit identical Gram reactions, bacillary shapes, and catalase or oxidase profiles. Without genotypic identification, the ecological discussion regarding specific genera, such as *Bacillus*, *Burkholderia*, or *Enterobacter*, remains purely speculative. The authors should explicitly acknowledge this limitation as a preliminary phase of their research or, ideally, provide molecular sequencing data for the top-performing functional isolates to confirm their exact taxonomic positions.

The experimental design regarding the control samples also requires refinement and better contextualization. The inclusion of four isolates from peripheral citrus trees provides an interesting comparative point, but the rationale behind choosing citrus as an outgroup is not fully articulated in the text. Rhizosphere microbial recruitment is highly dependent on genotype-specific root exudates. To properly assess how the elite cashew Top 24 genotypes shape their unique microflora, the authors should contrast these findings with bulk, non-rhizosphere soil collected away from any active root zones. Including a clear baseline of bulk soil would allow the authors to definitively prove the strength of the rhizosphere effect versus the background soil microbiome of the Lataha station. Furthermore, the statistical analysis section states that data were processed using R version 4.5.1, employing analysis of

REVIEWER'S REPORT

variance or Kruskal-Wallis tests. However, the presentation of the results in the text remains highly descriptive. The manuscript would benefit from a more rigorous multi-variable analysis, such as a Principal Component Analysis or a hierarchical clustering analysis, to visually map how specific cashew genotypes correlate with particular soil properties and functional bacterial traits.

The discussion section provides an adequate explanation of soil acidity and root exudation patterns, but it lacks deep physiological interpretation regarding the negative results. For instance, all twenty-five isolates completely lacked the ability to solubilize tricalcium phosphate and produce hydrocyanic acid. The complete absence of phosphate solubilization is highly problematic for tropical soils, which are notoriously phosphorus-deficient due to aluminum and iron fixation. The authors should expand their discussion on why these indigenous strains fail to express organic acids on Pikovskaya medium. This could be linked to the highly acidic nature of their native environment, which ranges from 3.71 to 5.24, meaning these bacteria may utilize alternative, highly specialized mechanisms for nutrient mobilization that are not captured under standard neutral-pH laboratory assays. Exploring these biochemical underpinnings would significantly increase the impact and scholarly value of the paper.

Recommendations

To ensure the manuscript is fully polished and ready for academic dissemination, a series of comprehensive revisions must be executed. First, the title and various textual segments must be corrected for nomenclature consistency. The botanical name for the cashew tree contains a typographical error in the uppercase title and abstract, where it is written as *Anacardier occidentale* L. rather than the globally accepted scientific name *Anacardium occidentale* L. The authors must carefully verify that all scientific names of plants and potential bacterial groups are italicized and correctly spelled throughout the entire document.

Second, the presentation of the quantitative data in the tables requires standardized formatting. Table I features complex statistical notation with multiple superscript letters indicating significant differences based on post-hoc testing, yet the precise meaning of these lettering combinations is not clearly defined in the table footer. The footer needs an explicit statement explaining the confidence intervals and the specific post-hoc test used, such as Tukey's Honest Significant Difference, to allow readers to interpret the variance in electrical conductivity and relative moisture properly. Additionally, Table IV, which displays the biochemical characteristics, contains formatting misalignments and inverted column structures that make tracking individual isolates like ZF34-1 or YKKF1RF-1 highly confusing. The layout should be reconstructed into a clean, conventional vertical matrix where isolates form the rows and biochemical tests represent the columns.

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REVIEWER'S REPORT

Third, the text contains a few minor language anomalies and mechanical issues that erode its professional quality. In the abstract, a sentence reads "More than fifteen research papers and were review," which contains a glaring omission of the passive auxiliary verb or noun phrase. It should be revised to state that more than fifteen research papers were reviewed alongside various online data sources. In the methodology section, the text refers to a dilution range from 10 to 10^{-7} , which contains a typo where the initial factor should likely read 10^{-1} to maintain a logical logarithmic sequence. In the discussion, the phrase "isolats de fromes bacilles" must be corrected to "isolats de formes bacilles" to eliminate the spelling inversion.

Finally, the bibliography must be thoroughly cross-checked for completeness and stylistic uniformity. Several references listed in the text, such as Mendes et al. (2013) and Bais et al. (2006), are presented correctly in the narrative but exhibit slight formatting variations in the final reference list regarding punctuation and journal abbreviations. Ensuring a clean, uniform citation format according to a single established international journal standard will reinforce the scholarly authority of the work. By implementing these modifications, removing ambiguous descriptive claims, and addressing the taxonomic limitations, the authors will deliver a highly cohesive and impactful contribution to tropical agro-microbiology.