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REVIEWER'S REPORT

Manuscript No.: IJAR-55078

Title: Phytochemical study and larvicidal activity evaluation of essential oils from Cymbopogon citratus (D.C.) Stapf. and Cymbopogon giganteus Chiov. on Anopheles gambiae s.l.

Recommendation:

Accept as it is .....

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: Dr. Amina

Reviewer's Comment for Publication.

The manuscript presents a scientifically relevant investigation into the larvicidal potential of essential oils from *Cymbopogon citratus* and *C. giganteus* against *Anopheles gambiae*, the major malaria vector, addressing a critical public health challenge and aligning with global efforts to identify eco-friendly alternatives to synthetic insecticides. The study employs a well-established methodological framework: essential oils are extracted through the standard Clevenger hydrodistillation method, larvicidal bioassays follow WHO (1985) guidelines, and statistical analyses using LD_{50} estimation, ANOVA, and Tukey's test are appropriately conducted. The manuscript clearly reports extraction yields and provides a detailed characterization of *C. citratus* essential oil, highlighting its citral-rich profile with α-citral (44.8%) and β-citral (32.7%) as dominant constituents, while also offering a meaningful comparison between plant-derived oils and deltamethrin, thus strengthening the study's scientific contribution. Additionally, the work supports the valorisation of local botanical resources in Niger and promotes sustainable mosquito control strategies rooted in indigenous *Cymbopogon* species. However, several limitations reduce the completeness of the study, including the lack of phytochemical analysis for *C. giganteus*, absence of chromatograms, and reliance on literature for its composition. The biological testing scope remains narrow, as only the second and third larval instars were examined, with no assessment of pupal or adulticidal effects, synergistic interactions, repellency, or residual activity, and only one synthetic insecticide was used for comparison. Presentation issues such as missing error bars and p-values in figures, minor inconsistencies in Table 4, and unclear alphabetical groupings also require attention. Furthermore, the discussion does not adequately address mechanisms of action for major compounds, environmental safety, non-target organism effects, or the stability and shelf-life of essential oils. Another limitation concerns the generalizability of the results, since essential oil composition is influenced by environmental variables and the study relies on samples from a single location. Despite these weaknesses, the research carries scientific, environmental, and public health significance by contributing updated LD_{50} values for wild *Anopheles gambiae* populations, confirming the strong larvicidal activity of citral-rich and limonene-rich essential oils, and demonstrating the potential of biodegradable, plant-based products as alternatives to pyrethroids. The study also highlights opportunities for community-based integrated

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vector management, particularly in malaria-endemic regions facing increasing pyrethroid resistance. Key findings include extraction yields of 1.91% for *C. citratus* and 0.46% for *C. giganteus*, larvicidal activities showing LD_{50} values of 70.13 ppm for *C. giganteus*, 114.36 ppm for *C. citratus*, and 2.3 ppm for deltamethrin, along with clearly observed dose-dependent mortality. While essential oils are less potent than synthetic insecticides, they provide an environmentally preferable option and support traditional knowledge regarding the mosquito-repellent properties of *Cymbopogon* species. Overall, the study offers valuable insights but would benefit from expanded chemical analysis, broader biological testing, improved data presentation, and deeper discussion.