

Review of: "Recycling of Waste Bamboo (*Bambusa vulgaris*) into Value-Added Platform Chemicals: Bioethanol and Bioethylene"

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Potential competing interests: No potential competing interests to declare.

Title: Recycling of Waste Bamboo (*Bambusa vulgaris*) into Value-Added Platform Chemicals: Bioethanol and Bioethylene

The paper is on the production of bio-ethanol and bio-ethylene from waste bamboo and presents a compelling case for the utilization of bamboo biomass as an alternative to fossil fuels in Nigeria, addressing both environmental and economic concerns.

Below are the reviewer's comments:

1) ABSTRACT

- a) Some sentences are difficult to understand because they are lengthy and complex. For example, the sentence describing the use of NaOH and H₂O₂ could be split into shorter, more understandable parts.
- b) The abstract does not provide specific outcomes or results of the research, including key findings such as the yield of bioethanol and bioethylene.
- c) Technical terms such as "SHF" and "catalytic dehydration" were not explained.

2. METHODOLOGY

- a) Was the soil removed from the bamboo before it was ground and milled?
- b) Under 2.2 Pretreatment: The following alkali reagents are described as non-polluting and non-corrosive: sodium hydroxide, calcium hydroxide.
These reagents are strong bases and are corrosive.
- c) Figure 5 is described as "Dilute Alkali (NaOH)". But the picture shows solid NaOH.
- d) Improve the titles of Figures 6-8. Provide better pictures of the different processes.
- e) The fractionating column is not evident in Figure 9, which shows a fractional distillation set up.

- f) In STEP 3: Enzymatic Hydrolysis, FPU does not mean “fatty acid unit.” It is a FILTER PAPER UNIT.
- g) In STEP 4: Fermentation, *Saccharomyces cerevisiae* is not an enzyme.
- h) Provide a figure for the set-up and the reference for the DEHYDRATION PROCESS.
- i) The “STEPS” lack details, especially STEPS 3 and 4. Provide more detailed experimental conditions.
- j) The methodologies on the characterization of the products were not described.

3. RESULTS

- a) Tables 1 and 2 may be summarized in one table for ease of comparison.
- b) Indicate the reference for the values of conventional ethanol in Table 2.
- c) One major limitation is the lack of characterization data for bio-ethylene. This gap hinders the thoroughness of the study and its capacity to compare bio-ethylene with ethylene produced conventionally.

4. DISCUSSION

- a) The discussion lacks details and provides general comparisons without sufficient quantitative data to verify the claims. It is possible to examine data from the literature.
- b) It was mentioned on page 13 that the bioethanol is less volatile because of the water content and some other impurities from the fermentation process. This should be properly addressed before the characterization of the bioethanol is carried out. Comparing the product with conventional ethanol is not accurate if the bioethanol obtained is not pure.
- c) The higher specific gravity of conventional ethanol, due to production methods and raw material sources, should be supported by data.
- d) Include an economic analysis of production costs and potential market impact to provide a more robust justification of the research and to support the conclusion that the yields for both bio-ethanol and bioethylene are promising.

5. CONCLUSION and RECOMMENDATIONS

- a) The recommendations suggest modifying and optimizing pretreatment processes and purification techniques, but these need specific strategies or detailed methods for improvements.

Addressing the identified areas for improvement, such as the characterization of bio-ethylene, comprehensive economic and environmental studies, process optimization and purification techniques, and development of a well-defined implementation strategy for increasing the production scale, would improve the strength, practical relevance, and potential



for recycling bamboo wastes for industrial applications.