

REVIEWER'S REPORT

Manuscript No.: IJAR- 59365

Title: Effect of fermentation time on the amino acid profile and sensory characteristics of four cookies formulations made from souchet (*Cyperus esculentus* L.),

Recommendation:

Accept after minor revision

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

Reviewer's ID: Dr. Bilquees Hamza

Detailed Reviewer's Report

This manuscript addresses an important food science and value-addition objective: utilizing an underutilized crop, tiger nut or souchet (*Cyperus esculentus* L.), to produce sugar-free, gluten-free cookie formulations. The authors evaluated four distinct formulations: an unfermented control (BFST) and three formulations subjected to controlled fermentation durations of 24 hours (BFSF24), 48 hours (BFSF48), and 72 hours (BFSF72). The main experimental focus centers on assessing the resulting amino acid profiles via High-Performance Liquid Chromatography (HPLC) and evaluating consumer organoleptic acceptability through a 20-member sensory panel using a standard 9-point hedonic scale.

The experimental findings demonstrate clear biochemical benefits associated with spontaneous or controlled fermentation. Specifically, the 48-hour fermentation regime (BFSF48) achieved optimal nutritional enhancement, resulting in statistically significant ($p < 0.05$) higher concentrations of both essential amino acids (such as leucine, isoleucine, lysine, valine, and phenylalanine) and non-essential amino acids (such as glutamic acid, arginine, and aspartic acid) compared to unfermented flour and other fermentation durations. Biologically, the authors attribute this increase to endogenous or microbial proteolytic enzymes breaking down complex storage proteins into free, bioavailable amino acids.

On the sensory front, all cookie formulations achieved mean hedonic scores above 5.0 out of 9, confirming general consumer acceptability. Parameters including color, taste, texture/crunchiness, and overall liking showed no statistically significant differences across formulations ($p > 0.05$). However, aroma differed significantly ($p = 0.029$), with the unfermented control (BFST) receiving the highest

REVIEWER'S REPORT

score (7.10/9) and the 72-hour fermented sample receiving the lowest (6.00/9). The overall acceptance scores remained strong, led by the unfermented control (7.05/9) and followed closely by the 48-hour fermented sample (6.90/9) and 24-hour sample (6.85/9).

Overall, the manuscript presents a clear, practical application of fermentation technology to enhance the protein quality of alternative flour products. However, the manuscript contains notable typographical errors, inconsistencies in terminology, equipment oversight, and methodological gaps that require minor revisions before formal publication.

Recommendations for Improvement

- Correction of Biological Material Terminology:** Throughout the text, particularly in the Materials and Methods section (lines 62, 82) and section headings (line 156), the tubers are referred to as "Jerusalem artichoke" (*Helianthus tuberosus*). However, the actual study subject is tiger nut / souchet (*Cyperus esculentus* L.). Jerusalem artichoke is a completely different species belonging to the Asteraceae family. The authors must systematically replace all references to "Jerusalem artichoke" with "tiger nut" or "souchet" to ensure scientific accuracy.
- Typographical and Temperature Errors in Oven Parameters:** In line 149, the manuscript states that the baking oven was preheated to "1700 °C". This is an obvious typographical error, as standard baking temperatures range between 170 °C and 180 °C. Industrial baking at 1700 °C would completely incinerate organic matter. This must be corrected to 170 °C or 180 °C. Additionally, please specify the exact baking duration rather than giving a loose range of "15 to 20 minutes".
- Inconsistencies in Sample Quantities:** In line 64, the authors state that a total of "3 kg of Jerusalem artichokes were used," but in line 74, they describe dividing "Four (04) kilograms of tiger nuts" into four 1-kg batches. The authors must reconcile this discrepancy in mass balance.
- Elaboration on Fermentation Process Parameters:** The fermentation protocol described in lines 75–77 mentions placing moist tubers in sealed food-grade bags. The manuscript lacks technical details regarding the fermentation conditions. The authors should explicitly state the ambient or controlled temperature (°C) at which fermentation took place, whether it was solid-state anaerobic fermentation, and whether initial moisture content or pH was recorded prior to drying at 70 °C.
- Clarification of Phenolic Compounds Analysis:** The abstract (line 21) and keywords (line 26) explicitly mention phenolic compounds and an optimal accumulation at 48 hours. However, there is no corresponding analytical method described in the Materials and Methods section, nor are there quantitative results or discussions concerning total phenolic content (TPC) or individual

REVIEWER'S REPORT

phenolics in the body of the manuscript. Either the analytical methodology and quantitative data for phenolic compounds must be integrated into the text, or references to phenolic compounds in the abstract and keywords must be removed.

6. **Formula and Method Integrity:** In line 168, the equation for calculating amino acid concentration appears as corrupted text artifacts ($A \times C \times \text{Final volume} \dots$). The mathematical formula should be clearly rendered in standard algebraic text format with defined variables. Furthermore, in Table 1, the row labeled "Tarragon" appears to be a translation error for baking powder or leavening agent. This must be clarified and corrected.
7. **Sensory Evaluation Panel Size and Diversity:** The sensory evaluation was conducted with a small panel of 20 semi-trained or untrained tasters. While acceptable for preliminary screening, the authors correctly note that extended consumer testing is advisable. The methodology should clarify whether these 20 tasters were untrained consumers or screened panelists, and state if ethical clearance/consent protocols were approved by an institutional board.
8. **Discussion of Flavor Volatiles:** The reduction in aroma acceptability in 48-hour and 72-hour fermented formulations needs a slightly deeper chemical context. The authors should briefly expand on how accumulation of organic acids (e.g., acetic, lactic acid) or enzymatic lipid oxidation during extended tuber soaking might impart sour or off-notes that mask the desirable roasted, nutty aroma of unfermented tiger nut flour.
9. **Grammar and Style Polish:** Minor grammatical glitches and French-to-English translation artifacts (e.g., "Oui" instead of "Yes" in statistical rows of Tables 2 and 3, line 230) need cleaning. Standard English food science conventions should be maintained throughout.

Final Acceptance Recommendation

Recommendation: Accept with Minor Revisions.

The manuscript presents scientifically sound, original data that demonstrates the potential of fermented tiger nut flour in developing nutritious, gluten-free baked products. The work fits well within the scope of food processing, cereal science, and functional food development. The conclusions are supported by the presented amino acid profiles and sensory scoring. Once the authors address the minor errors—specifically fixing species nomenclature ("Jerusalem artichoke"), correcting the baking temperature typo, reconciling initial sample weights, clarifying the status of phenolic compound testing, and cleaning up table labels—the paper will be fully suitable for publication.