Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 47 2025

Colloquium on Applied Sciences 2 2024
8-14 July 2024, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

Repurposing of Overripe Tempeh: Flour Production, Chip Formulation and Antinutrient Profiling of Overripe Tempeh

Muhamad Fateh Irfan Mohamad Zaini[a], Adi Md Sikin[a*]

Structured Abstract

Background: Food waste is a significant issue, particularly in developing countries, where various factors such as lifestyle, industrialization, and consumer habits contribute to it. Tempeh, a traditional fermented soybean product from Indonesia, is known for its nutritional benefits and growing popularity in plant-based diets. The fermentation process of tempeh involves the fungus Rhizopus oligosporus, which breaks down complex proteins in soybeans. Overripe tempeh, often discarded due to extended fermentation, presents a unique opportunity to reduce food waste. This study aims to explore the potential of repurposing overripe tempeh into flour and chips, thus reducing food waste and enhancing its nutritional value

Methods: The study followed a comprehensive experimental workflow. Soybeans were soaked, dehulled, boiled, and inoculated with *Rhizopus oligosporus* to produce tempeh. Overripe tempeh was obtained by extending the fermentation period. The overripe tempeh was then sliced, dried, and ground into flour. This flour was used to prepare tempeh chips by mixing it with other ingredients, shaping the dough, and deep-frying the chips. Nutritional composition analyses were conducted to measure moisture, fat, ash, protein, and carbohydrate content. Antinutrient levels of oxalate were also analyzed using spectrophotometric techniques. Sensory evaluations were performed to assess the appearance, colour, aroma, texture, taste, and overall approval of the tempeh chips.

Results: The nutritional analysis of tempeh flour showed a progressive increase in moisture content over the fermentation days, while fat and protein contents decreased. Ash and carbohydrate contents showed an increasing trend. Antinutrient analysis indicated a significant reduction in oxalate concentration over time, suggesting that extended fermentation reduces antinutrient levels. Sensory analysis revealed that the tempeh chips had desirable sensory attributes.

Conclusion: The study demonstrates that overripe tempeh can be effectively repurposed into flour and chips, providing a sustainable solution to food waste while enhancing nutritional value. The findings suggest that extended fermentation reduces antinutrient levels, improving the nutritional profile of tempeh products. This research highlights the potential for innovative uses of overripe tempeh, contributing to sustainable food practices and offering valuable insights into the development of nutrient-dense, plant-based food products.

Keywords: Overripe Tempeh, Food waste, *Rhizopus Oligosporus*, Antinutrients, Tempeh Chips

*Correspondence: adisikin@uitm.edu.my

[a] School of Industrial Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia