THE EFFECT OF ACIDIFICATION AND PASTEURIZATION ON SHELF-LIFE OF VACUUM-PACKAGED TEMPE AT ROOM TEMPERATURE

CAROLINA ASIMA SIMAMORA

FOOD TECHNOLOGY STUDY PROGRAM
FACULTY OF ENGINEERING AND TECHNOLOGY
IPB UNIVERSITY
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Bogor, June 2026

Carolina Asima Simamora
F2401221828

ABSTRAK

CAROLINA ASIMA SIMAMORA. Pengaruh Pengasaman dan Pasteurisasi terhadap Umur Simpan Tempe Dikemas Vakum pada Suhu Ruang. Dibimbing oleh SUGIYONO.

Tempe merupakan produk kedelai fermentasi tradisional Indonesia yang memiliki kandungan protein tinggi dan biaya produksi yang rendah. Meskipun memiliki nilai gizi yang baik, tempe hanya dapat bertahan sekitar dua hari pada suhu ruang, yang membatasi distribusinya. Penelitian ini bertujuan memperpanjang umur simpan tempe melalui penerapan teknologi rintangan, dengan menggabungkan pengasaman, kemasan vakum, dan pasteurisasi. Penelitian ini dibagi menjadi tiga tahapan, yaitu pengasaman tempe (perendaman dalam larutan glucono delta lactone 6% selama 90 dan 105 menit), pasteurisasi tempe yang telah diasamkan dan dikemas vakum (suhu 80°C selama 20 dan 25 menit), dan penyimpanan tempe pasteurisasi pada suhu ruang selama 8 hari. Selama penyimpanan, dilakukan pengamatan dengan interval 2 hari terhadap pH, kekerasan, angka lempeng total (ALT), dan atribut sensori melalui uji hedonik. Pengasaman menyebabkan penurunan pH tempe menjadi 4.47 $\pm$ 0.07 (90 menit perendaman) dan 4.67 $\pm$ 0.32 (105 menit perendaman). Tidak ada perbedaan nyata antara kedua waktu perendaman. Tempe yang telah diasamkan masih dapat diterima secara sensori sehingga perendaman tempe tersingkat dipilih untuk tahapan selanjutnya. Pasteurisasi tempe selama 20 menit dan 25 menit menghasilkan nilai pasteurisasi masing-masing 3.8 menit dan 9.4 menit yang setara dengan reduksi jumlah bakteri *Bacillus subtilis* sebesar 1.2 log dan 3.1 log. Selama penyimpanan, tempe pasteurisasi tidak mengalami perubahan nyata pada pH, kekerasan, dan ALT. Hasil ini menunjukkan bahwa kedua tempe pasteurisasi stabil selama masa penyimpanan. Berdasarkan hasil uji hedonik, tempe yang telah mengalami perlakuan pengasaman dan pasteurisasi memiliki umur simpan hingga 6 hari pada suhu ruang (umur simpan tempe kontrol hanya 2 hari).

Kata kunci: evaluasi sensori, pasteurisasi tempe, pengasaman, suhu ruang, umur simpan

ABSTRACT

CAROLINA ASIMA SIMAMORA. The Effect of Acidification and Pasteurization on Shelf-Life of Vacuum-Packaged Tempe at Room Temperature. Supervised by SUGIYONO.

Tempe is a traditional Indonesian fermented soybean product characterized by its high protein content and relatively low production cost. Despite its notable nutritional value, fresh tempe has a very limited shelf life of approximately two days at room temperature, which poses a significant challenge to its wider distribution and commercialization. This study aimed to extend the shelf life of tempe through the application of hurdle technology, combining three preservation methods, which were acidification, vacuum packaging, and pasteurization. The study was divided into three stages: tempe acidification (immersion in a 6% glucono delta lactone solution for 90 and 105 minutes), pasteurization of the acidified and vacuum-packaged tempe (80°C for 20 and 25 minutes), and storage of the pasteurized tempe at room temperature for 8 days. During storage, observations were conducted at 2-day intervals to measure pH, hardness, total plate count (TPC), and sensory attributes by hedonic testing. Acidification decreased the tempe pH to 4.47 $\pm$ 0.07 (90-minute immersion) and 4.67 $\pm$ 0.32 (105-minute immersion). No significant differences were found between the two immersion durations. The acidified tempe remained sensorially acceptable; therefore, the shortest immersion was selected to proceed to the next stage. Pasteurization for 20 and 25 minutes yielded pasteurization values of 3.8 minutes and 9.4 minutes, equivalent to a reduction in *Bacillus subtilis* counts of 1.2log and 3.1log cycles, respectively. During storage, the pasteurized tempe showed no significant changes in pH, hardness, or TPC, indicating that both pasteurized tempe remained stable throughout the storage period. Based on the hedonic test, tempe that underwent acidification and pasteurization treatment had a shelf life up to 6 days, compared to only 2 days for the control tempe, at room temperature.

Keywords: acidification, room temperature, pasteurized tempe, sensory evaluation, shelf life

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2026

Examiner team in the final project exam:
1 Dr. Faleh Setia Budi, S.T., M.T.
2 Prof. Dr. Ir. Dede Robiatul Adawiyah, M.Si

Research Title : The Effect of Acidification and Pasteurization on Shelf-Life of Vacuum-Packaged Tempe at Room Temperature
Name : Carolina Asima Simamora
NIM : F2401221828

Approved by

Supervisor:
Prof. Dr. Ir. Sugiyono, M.App.Sc
NIP. 196507291990021002

Acknowledged by

Head of Food Technology Study Program
Dr. Ing. Dase Hunaefi, S.Tp., M.FoodST
NIP. 197912082005011003

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PREFACE

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The author acknowledges that this undergraduate thesis may still contain limitations. Therefore, constructive suggestion for future improvement are sincerely welcomed. Its is hoped that this research may provide benefits and contribute positively to the development of knowledge in the relevant field.

Bogor, June 2026

Carolina Asima Simamora

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