



EFFECT OF ULTRASONICATION ON YIELD, TEXTURE, AND NUTRITIONAL CONTENT OF TOFU MADE FROM GREEN PEAS (*Pisum sativum*)

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ABSTRAK

AMMARA GHANIYA ADI. Pengaruh Ultrasonikasi terhadap Rendemen, Tekstur, dan Kandungan Gizi Tahu dari Kacang Polong Hijau (*Pisum sativum*). Dibimbing oleh EKO HARI PURNOMO and RAHAYU LESTARI SUGIARTINI

Kedelai (*Glycine max* (L.) Merr.) merupakan bahan baku utama dalam produksi tahu, namun ketergantungan Indonesia yang tinggi terhadap kedelai impor menimbulkan kekhawatiran terkait keberlanjutan dan ketahanan pangan. Kacang polong hijau (*Pisum sativum*) yang tersedia secara lokal namun masih kurang dimanfaatkan menawarkan potensi sebagai sumber protein alternatif. Penelitian ini bertujuan untuk mengoptimalkan perlakuan ultrasonikasi berbasis energi pada bubur kacang polong hijau guna meningkatkan kualitas tahu, terutama dalam hal rendemen, tekstur, dan komposisi gizi. Ultrasonikasi diterapkan menggunakan kombinasi amplitudo (30%, 60%, dan 90%) dan waktu perlakuan (5, 10, dan 15 menit) sebelum proses koagulasi menggunakan magnesium klorida ($MgCl_2$). Kedua parameter tersebut digabungkan menjadi satu variabel fundamental, yaitu energi ultrasonikasi (kJ). Analisis berbasis energi ini memungkinkan semua perlakuan dipetakan dalam satu kerangka energi total untuk mengidentifikasi kondisi optimum proses. Hasil penelitian menunjukkan bahwa energi ultrasonikasi secara signifikan memodifikasi matriks protein yang tercermin dalam hubungan parabola terbalik antara energi dengan rendemen, atribut tekstur dan sebagian besar komposisi gizi. Perlakuan optimum dicapai pada energi sekitar 162 kJ yang menghasilkan tahu dengan rendemen tertinggi mencapai 78.38% kenaikannya dibandingkan tanpa treatment ultrasonikasi. Ini menunjukkan bahwa tahu dari kacang polong hijau yang diproses pada kondisi energi optimum terbukti berpotensi menjadi bahan baku alternatif yang menjanjikan untuk produksi tahu berprotein tinggi di Indonesia.

Kata kunci: Kacang Polong, Profil Tekstur, Rendemen, Tahu, Ultrasonikasi



ABSTRACT

AMMARA GHANIYA ADI. Effect of Ultrasonication on the Yield, Texture and Nutritional Content of Tofu Made from Green Peas (*Pisum sativum*). Supervised by EKO HARI PURNOMO and RAHAYU LESTARI SUGIARTINI.

Soybeans (*Glycine max* (L.) Merr.) are the primary raw material in tofu production; however, Indonesia's heavy dependence on imported soybeans raises concerns about sustainability and food security. Green peas (*Pisum sativum*), which are locally available but underutilized, offer potential as an alternative protein source. This research aimed to optimize an energy-based ultrasonication treatment of green pea slurry to enhance tofu quality, particularly in terms of yield, texture, and nutritional composition. Ultrasonication was applied using combinations of amplitude levels (30%, 60%, and 90%) and treatment times (5, 10, and 15 minutes) prior to coagulation with magnesium chloride (MgCl₂). These two parameters were combined into a single fundamental variable, ultrasonication energy (kJ). This energy-based analysis allowed all treatments to be mapped within a unified total-energy framework to identify the optimum processing condition. The results revealed that ultrasonication energy significantly modified the protein matrix, as reflected by the inverted parabolic relationship between energy and yield, texture attributes, and most nutritional parameters. The optimum condition was achieved at approximately 162 kJ, which produced tofu with the highest yield representing a 78.38% increase compared with the non-sonicated control. These findings demonstrate that green pea-based tofu processed under optimum ultrasonication energy conditions shows strong potential as a promising alternative raw material for high-protein tofu production in Indonesia.

Keywords: *Green peas, Texture Profile, Tofu, Ultrasonication, Yield*



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EFFECT OF ULTRASONICATION ON TEXTURE AND NUTRITIONAL CONTENT OF TOFU MADE FROM GREEN PEA (*Pisum Sativum*)

AMMARA GHANIYA ADI

Undergraduate Thesis
Submitted as a requirement for obtaining
Bachelor's Degree in Food Technology

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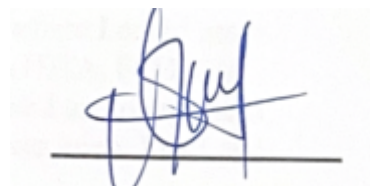
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Bogor, October 2025

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