Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode
Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Ahnan-winarno, A. D., Cordeiro, L., Winarno, F. G., Gibbons, J., & Xiao, H. (2021). Tempeh : A semicentennial review on its health benefits , fermentation , safety , processing , sustainability , and affordability. *Comprehensive Reviews in Food Science and Food Safety*, *2021*, 1717–1767. https://doi.org/10.1111/1541-4337.12710

Ajomiwe, N., Boland, M., Phongthai, S., Bagiyal, M., Singh, J., & Kaur, L. (2024). Protein Nutrition: Understanding Structure, Digestibility, and Bioavailability for Optimal Health. *Foods*, *13*(11), 1–15.

Asoegwu, S., Eke, C. N. U., Asoegwu, S. N., & Nwandikom, G. I. (2007). Some Physical Properties of Jackbean Seed (Canavalia ensiformis). *Agricultural Engineering International: The CIGR Ejournal*, *9*(February), 1–11. https://www.researchgate.net/publication/264872581

Azizah, A., Amania, L., & Nisak, Y. K. (2025). Pengaruh Jenis Kemasan Terhadap Karakteristik Kimia Tempe Kedelai. *Jurnal Teknologi Pangan Dan Agroindustri Perkebunan*, *5*(1), 11–17.

Barbut, S. (2005). Effects of Chemical Acidification and Microbial Fermentation on the Rheological Properties of Meat Products. *Meat Science*, *71*(2), 397–401. https://doi.org/10.1016/j.meatsci.2005.03.026

Bayram, M., Kaya, A., & Öner, M. D. (2004). Changes in properties of soaking water during production of soy-bulgur. *Journal of Food Engineering*, *61*(2), 221–230. https://doi.org/10.1016/S0260-8774(03)00094-3

UNIVERSITAS GADJAH MADA
Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Brodkorb, A., Egger, L., Alminger, M., Alvito, P., Assunção, R., Ballance, S., Bohn, T., Bourlieu-lacanal, C., Boutrou, R., & Carrière, F. (2019). INFOGEST static in vitro simulation of gastrointestinal food digestion. *Nature Protocols*, 1–24. https://doi.org/10.1038/s41596-018-0119-1

Çabuk, B., Nosworthy, M. G., Stone, A. K., Korber, D. R., Tanaka, T., House, J. D., & Nickerson, M. T. (2018). Effect of fermentation on the protein digestibility and levels of non-nutritive compounds of pea protein concentrate. *Food Technology and Biotechnology*, *56*(2), 257–264. https://doi.org/10.17113/ftb.56.02.18.5450

Church, F. C., Porter, D. H., Catignani, G. L., & Swaisgood, H. E. (1985). An o-phthalaldehyde spectrophotometric assay for proteinases. *Analytical Biochemistry*, *146*(2), 343–348. https://doi.org/10.1016/0003-2697(85)90549-4

Ciabotti, S., Silva, A. C. B. B., Juhasz, A. C. P., Mendonça, C. D., Tavano, O. L., Mandarino, J. M. G., & Gonçalves, C. A. A. (2016). Chemical composition, protein profile, and isoflavones content in soybean genotypes with different seed coat colors. *International Food Research Journal*, *23*(2), 621–629.

Dhital, S., Hil, Bhattarai, R. R., Gorham, J., & Gidley, M. J. (2016). Intactness of cell wall structure controls the in vitro digestion of starch in legumes. *Food and Function*, *7*(3), 1367–1379. https://doi.org/10.1039/c5fo01104c

El Hosry, L., Elias, V., Chamoun, V., Halawi, M., Cayot, P., Nehme, A., & Bou-Maroun, E. (2025). Maillard Reaction: Mechanism, Influencing Parameters,

Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode
Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Advantages, Disadvantages, and Food Industrial Applications: A Review. *Foods*, *14*(11), 1–43. https://doi.org/10.3390/foods14111881

Emkani, M., Moundanga, S., Oliete, B., & Saurel, R. (2023). Protein composition and nutritional aspects of pea protein fractions obtained by a modified isoelectric precipitation method using fermentation. *Frontiers in Nutrition*, *10*, 1–19. https://doi.org/10.3389/fnut.2023.1284413

Emkani, M., Oliete, B., & Saurel, R. (2022). Effect of Lactic Acid Fermentation on Legume Protein Properties, a Review. *Fermentation*, *8*(244).

Fan, W., Tan, X., Xu, X., Li, G., & Wang, Z. (2019). Relationship between enzyme , peptides , amino acids , ion composition , and bitterness of the hydrolysates of Alaska pollock frame. *Journal Food Biochemistry*, *43*(4), 1–9. https://doi.org/10.1111/jfbc.12801

Foegeding, E. A., & Davis, J. P. (2011). Food protein functionality: A comprehensive approach. *Food Hydrocolloids*, *25*(8), 1853–1864. https://doi.org/10.1016/j.foodhyd.2011.05.008

Forester, S. M., Jennings-Dobbs, E. M., Sathar, S. A., & Layman, D. K. (2023). Perspective: Developing a Nutrient-Based Framework for Protein Quality. *Journal of Nutrition*, *153*(8), 2137–2146. https://doi.org/10.1016/j.tjnut.2023.06.004

Holzapfel, W. H. (2002). Appropriate starter culture technologies for small-scale fermentation in developing countries. *International Journal of Food Microbiology*, *75*(3), 197–212. https://doi.org/10.1016/S0168-

Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode
Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

1605(01)00707-3

Indrayati, F., Utami, R., & Nurhartadi, E. (2013). Pengaruh Penambahan Minyak Atsiri Kunyit Putih (Kaempferia rotunda) Pada Edible Coating Terhadap Stabilitas Warna dan Ph Fillet Ikan Patin yang Disimpan pada Suhu Buku. *Jurnal Teknosains Pangan*, *2*(4), 25–31.

Ismail, B. P., Senaratne-lenagala, L., Stube, A., & Brackenridge, A. (2020). Protein demand : review of plant and animal proteins used in alternative protein product development and production. *Feature Article*, *10*(4), 53–63. https://doi.org/10.1093/af/vfaa040

Kementrian Pertanian. (2024). Statistik Konsumsi Pangan Tahun 2024. *Pusat Data Dan Sistem Informasi Pertanian, Kementrian Pertanian Republik Indonesia*, 1–23. https://satudata.pertanian.go.id/details/publikasi/781

Kim, J. S., Kim, J., Kim, S. H., & Moon, K. (2025). Development of chickpea tempeh using Rhizopus oryzae for dysphagia diet : Effect of fermentation time and heat treatment. *Innovative Food Science and Emerging Technologies*, *100*(3), 103940. https://doi.org/10.1016/j.ifset.2025.103940

Kustyawati, M. E., Nawansih, O., & Nurdjanal, S. (2017). Profile of aroma compounds and acceptability of modified tempeh. *International Food Research Journal*, *24*(2), 734–740.

Kusumawati, I., Astawan, M., & Prangdimurti, E. (2020). Efisiensi Proses Produksi dan Karakteristik Tempe dari Kedelai Pecah Kulit (Production Process Efficiency and Characteristic of Tempe from Dehulled Soybean). *Jurnal*

UNIVERSITAS GADJAH MADA
Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Pangan, *29*(2), 117–126. https://doi.org/10.33964/jp.v29i2.492

Marjuki, I., Endah, S., & Darini, M. (2018). Pengaruh Macam Amelioran Lokal dan Dosis Legin Koro Terhadap Pertumbuhan dan Hasil Tanaman Koro Pedang (Canavalia ensiformis L.) di Lahan Marjinal Tanah Grumusol. *Jurnal Ilmiah Agroust*, *2*(2), 126–135. https://doi.org/https://doi.org/10.30738/jiagt.v2i2.4271

Marsi, O. H., Faizal, & Hadis, A. (2025). Kemampuan Membedakan Warna Dengan Menggunakan Media Bola Warna Pada Siswa Tunagrahita di Sekolah Luar Biasa Primakarya. *Pinisi Journal of Art, Humanity & Social Studies*, *5*(1), 214–224.

Maryoto A. (2019). Buku Manfaat Serat Bagi Tubuh. *Alprin*, *2*, 44–50.

Mazı, B. G., & Çağlayan, K. (2025). Ultrasound-Assisted Soaking and Solution Effects on the Anti-Nutritional Qualitu and Physical Properties of Legume Seeds. *Food Science & Nutrition*, *13*(4), 1–18. https://doi.org/10.1002/fsn3.70152

Munanga, B. de J. C., Loiseau, G., Grabulos, J., & Mestres, C. (2016). Modeling lactic fermentation of gowé using lactobacillus starter culture. *Microorganisms*, *4*(4). https://doi.org/10.3390/microorganisms4040044

Nasab, S. S., Tahmouzi, S., Feizollahi, E., & Mollakhalili-Meybodi, N. (2024). Impacts of novel non-thermal processing (NTP) on anti-nutritional compounds of food grains and seeds. *Food Control*, *162*. https://doi.org/10.1016/j.foodcont.2024.110469

UNIVERSITAS GADJAH MADA
Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Nielsen, P. M., Petersen, D., & Dambmann, C. (2001). Improved method for determining food protein degree of hydrolysis. *Food Chemistry and Toxicology*, *66*(5), 642–646. https://doi.org/10.1111/j.1365-2621.2001.tb04614.x

Nout, M. J. R., & Kiers, J. L. (2005). Tempe fermentation, innovation and functionality: Update into the third millenium. *Journal of Applied Microbiology*, *98*(4), 789–805. https://doi.org/10.1111/j.1365-2672.2004.02471.x

Ojo, M. A., Ade-Omowaye, B. I., & Ngoddy, P. O. (2016). *Mineral Elements in Canavalia Ensiformis : Influence of Hydrothermal Processing Techniques*. *February*, 548–555.

Prasetyo, B., Suwignyo, B., Ishigaki, G., Gondo, T., Jati, D. K., & Prasojo, Y. S. (2025). Nutrient content of jack bean (Canavalia ensiformis) at different growth stages in Blora, East Java, Indonesia. *BIO Web of Conferences*, *164*, 1–7. https://doi.org/10.1051/bioconf/202516402001

Purwandari, F. A., Annisa, E. D. N., Rachmawati, A. T., Puspitasari, D., Wikandari, R., Setyaningsih, W., Ningrum, A., & Sardjono. (2021). Effect of different cooking methods on chemical composition, nutritional values, and sensory properties of Jack bean (Canavalia ensiformis) tempe. *Food Research*, *5*(3), 327–333. https://doi.org/10.26656/fr.2017.5(3).530

Purwandari, F. A., Fogliano, V., & Capuano, E. (2024). Tempeh fermentation improves the nutritional and functional characteristics of Jack beans

UNIVERSITAS GADJAH MADA
Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

(Canavalia ensiformis (L.) DC). *Food and Function*, *15*(7), 3680–3691. https://doi.org/10.1039/d3fo05379b

Purwandari, F. A., Westerbos, C., Lee, K., Fogliano, V., & Capuano, E. (2023). Proximate composition, microstructure, and protein and starch digestibility of seven collections of Jack bean (Canavalia ensiformis) with different optimal cooking times. *Food Research International*, *170*(December 2022), 112956. https://doi.org/10.1016/j.foodres.2023.112956

Rahayu, N. A., Cahyanto, M. N., & Indrati, R. (2019). Pola Perubahan Protein Koro Benguk (Mucuna pruriens) Selama Fermentasi Tempe Menggunakan Inokulum Raprima. *AgriTECH*, *39*(2), 128. https://doi.org/10.22146/agritech.41736

Rahayu, W., Pambayun, R., Santoso, U., Nuraida, L., & Ardiansyah. (2015). *Tinjauan Ilmiah Teknologi Pengolahan Tempe Kedelai*.

Rauf, R. F. (2023). Pengaruh Suhu Pengeringan pada. *Jurnal Pendidikan Teknologi Pertanian*, *9*(2), 273–289.

Romulo, A., & Surya, R. (2021). Tempe: A traditional fermented food of Indonesia and its health benefits. *International Journal of Gastronomy and Food Science*, *26*. https://doi.org/10.1016/j.ijgfs.2021.100413

Rovalino-córdova, A. M., Fogliano, V., & Capuano, E. (2018). A closer look to cell structural barriers a ff ecting starch digestibility in beans. *Carbohydrate Polymers*, *181*(October 2017), 994–1002. https://doi.org/10.1016/j.carbpol.2017.11.050

UNIVERSITAS
GADJAH MADA
Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Singh, P., Pandey, V. K., Sultan, Z., Singh, R., & Dar, A. H. (2023). Classification, benefits, and applications of various anti-nutritional factors present in edible crops. *Journal of Agriculture and Food Research*, *14*(December), 100902. https://doi.org/10.1016/j.jafr.2023.100902

Sparringa, R. A., Kendall, M., Westby, A., & Owens, J. D. (2002). Effects of temperature, pH, water activity and CO2 concentration on growth of Rhizopus oligosporus NRRL 2710. *Journal of Applied Microbiology*, *92*(2), 329–337. https://doi.org/10.1046/j.1365-2672.2002.01534.x

Sridhar, K. R., & Seena, S. (2006). Nutritional and Antinutritional Significance of Four Unconventional Legumes of the Genus Canavalia - A Comparative Study. *Food Chemistry*, *99*(2), 267–288. https://doi.org/10.1016/j.foodchem.2005.07.049

Suharsi, T. K., Surahman, M., & Rahmatani, S. F. (2013). Pengaruh Jarak Tanam dan Pemangkasan Tanaman pada Produksi dan Mutu Benih Koro Pedang (Canavalia enziformis). *Jurnal Ilmu Pertanian Indonesia (JIPI)*, *18*(3), 172–177.

Teoh, S. Q., Chin, N. L., Chong, C. W., Ripen, A. M., How, S., & Lim, J. J. L. (2024). A review on health benefits and processing of tempeh with outlines on its functional microbes. *Future Foods*, *9*(November 2023), 100330. https://doi.org/10.1016/j.fufo.2024.100330

Toor, B. S., Kaur, A., Sahota, P. P., & Kaur, J. (2021). Antioxidant Potential, Antinutrients, Mineral Composition and FTIR Spectra of Legumes Fermented

UNIVERSITAS
GADJAH MADA
Daya Cerna Protein Tempe Koro Pedang Putih (Canavalia ensiformis (L.) DC.) Dengan Berbagai Metode Pengasaman
Carissa Anindya Zahra, Dr. Fiametta Ayu Purwandari, S.T.P., M.Sc. ; Dr. Ir. Muhammad Nur Cahyanto, M.Sc.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

with Rhizopus oligosporus. *Food Technology and Biotechnology*, *59*(4), 530–542. https://doi.org/10.17113/ftb.59.04.21.7319

Yarlina, V. P., Nabilah, F., Zaida, Nurhasanah, S., & Lani, M. N. (2024). Optimal Fermentation Time for Jack Bean (Canavalia Ensiformis) Tempeh: A Comprehensive Pattern Analysis of Chemical and Enzyme Changes. *Current Research in Nutrition and Food Science*, *12*(3), 1143–1153. https://doi.org/10.12944/CRNFSJ.12.3.12

Yin, L., Liu, Z., Lu, X., Cheng, J., Lu, G., Sun, J., Yang, H., Guan, Y., & Pang, L. (2023). Analysis of the nutritional properties and flavor profile of sweetpotato residue fermented with Rhizopus oligosporus. *LWT*, *174*(December 2022), 114401. https://doi.org/10.1016/j.lwt.2022.114401

Zhang, Y., Wei, R., Azi, F., Jiao, L., Wang, H., He, T., Liu, X., Wang, R., & Lu, B. (2022). Solid-state fermentation with Rhizopus oligosporus RT-3 enhanced the nutritional properties of soybeans. *Frontiers in Nutrition*, *9*(September), 1–14. https://doi.org/10.3389/fnut.2022.972860