UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Abbasiliasi, S., J.S. Tan, T.A.T. Ibrahim, F. Bashokouh, N.R. Ramakrishnan, S. Mustafa, and A.B. Ariff. 2017. Fermentation factors influencing the production of bacteriocins by lactic acid bacteria: a review. Rsc Advances. 7(47) : 29395-29420.

Adawiyah, D. R. dan F. Setiawan. 2017. Ambang deteksi dan preferensi rasa umami dalam model pangan. Jurnal Teknologi dan Industri Pangan. 28(1) : 55–61.

Aguirre-garcia, Y. L., S.D. Nery-flores, L.G. Campos-muzquiz, A.C. Flores-gallegos, L. Palomo-ligas, and J. Alberto. 2024. Lactic acid fermentation in the food industry and bio-preservation of food. Fermentation. 10(168) : 1–18.

Al-Hammam, M. Y. 2022. Identifikasi bakteri dan purifikasi parsial bakteriosin bakteri asam laktat GMP1 serta karakterisasi aktivitas antibakterinya terhadap bakteri kontaminan produk hasil perikanan. Departemen Perikanan Fakultas Pertanian Universitas Gadjah Mada. Tesis.

Al-Hammam, M. Y., M.M.P. Putra, A.H. Mardinsyah, G. Cahyati, and I.D. Puspita. 2023. Antibacterial activities of *Lactobacillus* sp. GMP1 and *Weisella* sp. GMP12 against some foodborne disease causing-bacteria. Jurnal Pengolahan Hasil Perikanan Indonesia. 26(2) : 206–215.

Alharbi, N. S., S. Kadaikunnan, J.M. Khaled, T.N. Almanaa, G. Moorthy, B. Rajoo, K.F. Alanzi, and S. Kumar. 2020. Optimization of glutamic acid production by *Corynebacterium glutamicum* using response surface methodology. Journal of King Saud University - Science. 32(2) : 1403–1408.

Amini, K., E. Susanto, dan S. Suharto. 2023. Karakteristik fisikokimia flavor bubuk kepala udang vanamei (*Litopenaeus vannamei*) dengan perbedaan konsentrasi maltodekstrin pada metode *foam mat drying*. Jurnal Ilmu dan Teknologi Perikanan 5(2) : 99–110.

An, Y., X. Cai, L. Cong, Y. Hu, R. Liu, S. Xiong, and X. Hu. 2022. Quality improvement of Zhayu, a fermented fish product in China : Effects of inoculated fermentation with three kinds of lactic acid bacteria. Foods. 11(2756) : 1–17.

Anggo, A. D., F. Swastawati, dan L. Rianingsih. 2014. Mutu organoleptik dan kimiawi terasi udang rebon dengan kadar garam berbeda dan lama fermentasi. Jurnal Pengolahan Hasil Perikanan Indonesia. 17(1) : 53–59.

Anniza, S. Z. 2026. Optimasi pembuatan sediaan bubuk bakteri asam laktat *Lactobacillus plantarum* GMP1 dan *Weisella* sp. GMP12 serta aplikasinya pada peningkatan mutu fermentasi wadi. Departemen Perikanan Fakultas Pertanian Universitas Gadjah Mada. Tesis.

Ao, X., J. Zhao, J. Yan, S. Liu, and K. Zhao. 2020. Comparative transcriptomic analysis of *Lactiplantibacillus plantarum* RS66CD biofilm in high-salt conditions and planktonic cells. PeerJ. 8 : 1–20.

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Aryani, D. C., H.M.W. Besten, and M.H. Zwietering. 2016. Quantifying variability in growth and thermal inactivation kinetics of *Lactobacillus plantarum*. Applied And Environmental Microbiology. 82(16) : 4896–4908.

Asiedu, M. and A.I. Sanni. 2002. Chemical composition and microbiological changes during spontaneous and starter culture fermentation of Enam Ne – Setaakye , a west african fermented fish-carbohydrate product. Eur Food Res Technol. 215 : 8–12.

Asnita, D. dan A. Meryandini. 2023. Bakteri asam laktat kandidat probiotik dari susu kuda bima. Jurnal Sumberdaya Hayati. 9(2) : 49–54.

Axelsson, L. 2003. Lactic acid bacteria: classification and physiology In Lactic Acid Bacteria: Microbiological and Functional Aspects, edn 3. 1-66.

Ba, H.V., H. Seo, P. Seong, S. Kang, and Y. Kim. 2018. *Lactobacillus plantarum* (KACC 92189) as a potential probiotic starter culture for quality improvement of fermented sausages. Korean Journal for Food Science of Animal Resources Korean. 38(1) : 189–202.

Bakrie, R. Y. 2021. Pengolahan wadi ikan patin (*Pangasius hypophthalmus*) proses cepat dan tidak asin. Ziraa'ah. 46(3) : 336–342.

Barcenilla, C., A. Avelino, L. Mercedes, O. Alvseike, and M. Prieto. 2022. Microbiological safety and shelf-life of low-salt meat products — a review. Foods. 11 : 1–24.

Batubara, P. A. P., Desniar, dan I. Setyaningsih. 2019. Pengaruh starter bakteri asam laktat probiotik terhadap perubahan kimiawi dan mikrobiologis rusip. Jurnal Teknologi Dan Industri Pangan. 30(1) : 28–35.

Berliyanti, A. R., A. Suprihadi, dan E. Kusdiyantini. 2020. Deteksi gamma-aminobutyric Acid (GABA) pada bakteri asam laktat hasil isolasi produk fermentasi petis ikan dari Rembang. NICHE Journal of Tropical Biology. 3(2) : 59–67.

Botsford, J. L., M. Alvarez, R. Hernandez, and R. Nicholst. 1994. Accumulation of glutamate by *Salmonella typhimurium* in response to osmotic stress. Applied And Environmental Microbiology. 60(7) : 2568–2574.

Cao, Y., Z. He, Z. Shi, and M. Enock. 2015. Improving the stability of glutamate fermentation by *Corynebacterium glutamicum* via supplementing sorbitol or glycerol. Bioresources and Bioprocessing. 2(9) : 1–11.

Chen, C., K. Huang, X. Li, H. Tian, H. Yu, J. Huang, and H. Yuan. 2021. Effects of CcpA against salt stress in *Lactiplantibacillus plantarum* as assessed by comparative transcriptional analysis. Applied Microbiology and Biotechnology. 105 : 3691–3704.

Cheruvari, A. and R. Kammara. 2025. Genomic characterization and probiotic properties of *Lactiplantibacillus pentosus* isolated from fermented rice. Probiotics and Antimicrobial Proteins. 17 : 4442–4464.

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Chrun, R., B. Pichpunleu, H. Thavrak, B. Borarin, C. Chim, and I. Yasuhiro. 2020. Application of lactic acid bacteria for enhanced food safety of cambodian fermented small fish (Pha-ork Kontrey). Food Science and Technology Research. 26(6) : 687–694.

Delfahedah, Y. dan S. Syukur. 2013. Isolasi, karakterisasi dan identifikasi dan bakteri asam laktat (BAL) yang berpotensi sebagai antimikroba dari fermentasi kakao varietas hibrid (trinitario). Jurnal Kimia Unand. 2(2) : 92–102.

Desniar, I. Setyaningsih, dan I.M. Fransiska. 2023. Perubahan kimiawi dan mikrobiologis selama fermentasi bekasam ikan nila menggunakan starter tunggal dan campuran. Jurnal Pengolahan Hasil Perikanan Indonesia. 26(3) : 414–424.

Dinc, S. O., F. Colakoglu, I.E. Kunili, and H.B. Ormanci. 2024. Profiling the effects of starter cultures on biochemical compounds in fermented fish sauces and their relationships with sensory perceptions. International Journal of Food Science and Technology. 59 : 6473–6490.

Dwinianti, E. F., I.R. Neliana, dan F.H.H. Prasetyo. 2025. Review: potensi bakteri asam laktat (BAL) untuk meningkatkan mutu produk pangan. Jurnal Biosense: Jurnal Penelitian Biologi Dan Terapannya. 8(3) : 263–278.

El, K., I. El, O. Khay, J. Abrini, S. Zinebi, N. Amajoud, and N. Skali. 2020. Molecular identification and antibiotic resistance of bacteriocinogenic lactic acid bacteria isolated from table olives. Archives of Microbiology. 10(1) : 1–11.

Frilanda, A., W.S. Putranto, and J. Gumilar. 2022. On set yoghurt making to total lactic acid bacteria, pH. Jurnal Teknologi Hasil Peternakan. 3(1) : 32–41.

Fu, B., X. Huang, J. Ma, Q. Chen, Q. Zhang, and P. Yu. 2022. Characterization of an inositol-producing *Lactobacillus plantarum* strain and the assessment of its probiotic potential and antibacterial activity. LWT-Food Science and Technology. 153(1) : 1–7.

Gänzle, M. G. 2015. Lactic metabolism revisited: metabolism of lactic acid bacteria in food fermentations and food spoilage. Current Opinion in Food Science. 2: 106-117.

Ghazanfari, N., S. Fallah, A. Vasiee, and F. T. Yazdi. 2023. Optimization of fermentation culture medium containing food waste for L-glutamate production using native lactic acid bacteria and comparison with industrial strain. Lwt. 184 : 114871.

Gong, X., W. Zuo, X. Tao, Z. Liu, and C. Chu. 2026. Effects of a novel salt-tolerance *Lactiplantibacillus plantarum* on the physicochemical properties and volatile profiles of broad-bean paste. Food Chemistry. 34 : 1–11.

Goude, R., S. Bonnassie, and C. Blanco. 2004. Glutamine, glutamate, and glucosylglycerate are the major osmotic solutes accumulated by *Erwinia chrysanthemi* strain 3937. Applied And Environmental Microbiology. 70(11) : 6535–6541.

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Hamidah, M. N., L. Rianingsih, dan Romadhon. 2019. Aktivitas antibakteri isolat bakteri asam laktat dari peda dengan jenis ikan berbeda terhadap *E. coli* dan *S. aureus*. Jurnal Ilmu Dan Teknologi Perikanan. 1(2) : 11–21.

Han, J., T. Kong, Q. Wang, J. Jiang, Q. Zhou, and P. Li. 2023. Regulation of microbial metabolism on the formation of characteristic flavor and quality formation in the traditional fish sauce during fermentation : a review. Critical Reviews in Food Science and Nutrition. 63(25) : 7564–7583.

Hartley, I. E., D.G. Liem, and R. Keast. 2019. Umami as an 'limentary' taste . A new perspective on taste classification. Nutrients. 11(182) : 1–18.

Hayati, R., R. Fadhil, dan R. Agustina. 2017. Analisis kualitas sauerkraut (asinan jerman) dari kol (*Brassica oleracea*) selama fermentasi dengan variasi konsentrasi garam. Rona Teknik Pertanian. 10(2) : 18–34.

Heruwati, E. S., S.T. Sukarto, dan S.U. Syah. 2004. Perkembangan histamin selama proses fermentasi peda dari ikan kembung (*Rasfrelliger negtecfus*). Jumal Penelitian Perikanan Indonesia. 10(3) : 47–55.

Hori, M., Y. Kawai, K. Nakamura, M. Shimada, H. Iwahashi, and T. Nakagawa. 2022. Characterization of the bacterial community structure in traditional gifu ayu-narezushi (fermented sweet fish). Journal of Bioscience and Bioengineering. 134(4) : 331–337.

Hua, Q., P. Gao, Y. Xu, W. Xia, Y. Sun, and Q. Jiang. 2020. Effect of commercial starter cultures on the quality characteristics of fermented fish-chili paste. LWT - Food Science and Technology. 122 : 1–10.

Iwelomene, O., A. Gougeon, M. Burnier, L. Belot, V. Sourd, J.P. Fauvel, and M. Granal. 2025. Dietary sodium reduction and blood pressure: a dose–response meta-analysis in hypertensive and chronic kidney disease patients. Clinical Kidney Journal. 19(2) : 1–10.

Jojima, T., M. Fujii, E. Mori, M. Inui, and H. Yukawa. 2010. Engineering of sugar metabolism of *Corynebacterium glutamicum* for production of amino acid L-alanine under oxygen deprivation. Applied Microbiology and Biotechnology. 87 : 159–165.

Kaewnongkae, C., P. Kantakam, W. Pompimom, and P. Hongsachart. 2026. Metabolomic profiling of *Lactiplantibacillus plantarum* L10 – 11 demonstrates stress tolerance and gamma-aminobutyric acid-producing capacity for fermented fish applications. International Journal Of Food Science and Technology. 61(1) : 1–14.

Kamil, R. Z., J. Marcelim, F.N. Aziz, N. Hasniah, H. Bintang, and P. Putra. 2026. Functional assessment of *Lactiplantibacillus plantarum* isolated from jackfruit. International Journal of Agriculture & Biology, 35 : 1–9.

Kandler, O. 1983. Carbohydrate metabolism in lactic acid bacteria. Antonie Van Leeuwenhoek. 49:209-224.

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Khalish, M. dan L.Y. Wulandari. 2020. Jurnal penelitian perawat profesional. Jurnal Penelitian Perawat Profesional. 2(2) : 125–130.

Kharchenko, M. S., V.S. Skripnikova, J.G. Rostova, and N.P. Zakataeva. 2025. Glutamate dehydrogenase from *Pantoea ananatis* : A new bacterial enzyme with dual coenzyme specificity. Plos One. 20(8) : 1–23.

Kisby, G. E. and P.S. Spencer. 2011. Is neurodegenerative disease a long-latency response to early-life genotoxin exposure. International Journal of Environmental Research and Public Health. 8 : 3889–3921.

Kostov, G., R. Denkova-kostova, V. Shopska, B. Goranov, and Z. Denkova. 2022. Microbial growth of *Lactobacillus delbrueckii* ssp. *Bulgaricus* b1 in a complex nutrient medium (mrs-broth). Anwendungen Und Konzepte Der Wirtschaftsinformatik. 16 : 1–8.

Kurnianto, M. A., T.D.A. Christabela, S. Septiana, H. Munarko, E. Chasanah, and D.M. Rini. 2026. Rusip, a traditional Indonesian fermented anchovy fish : Microbial changes, biochemical transformation, and functional prediction during the fermentation. Applied Food Research. 6(1) : 1–15.

Kusmarwati, A., E.S. Heruwati, T. Utami, dan S. Rahayu. 2011. Pengaruh peamahan *Pediococcus acidilactici* F-11 sebagai kultur starter terhadap kualitas rusip teri (*Stolephorus* sp.). Jurnal Pascapanen Dan Bioteknologi Kelautan Dan Perikanan. 6(1) : 13–26.

Ladensi, M. A., S. Winarti, dan L.A. Wicaksono. 2024. Pengaruh konsentrasi garam dan lama fermentasi terhadap karakteristik fisikokimia dan kandungan asam glutamat terasi nabati dari tempe gembus. Jurnal Sains Dan Teknologi Pangan. 9(4) : 7588–7602.

Leal-S!anchez, M. V., J.L. Ruiz-Barba, A.H. Sanchez, L. Rejano, R. Jimenez-Diaz, and A. Garrido. 2003. Fermentation profile and optimization of green olive fermentation using *Lactobacillus plantarum* LPCO10 as a starter culture. Food Microbiology. 20 : 421–430.

Li, H., G. Li, Y. Bi, and S. Liu. 2024. Fermented fish products : balancing tradition and innovation for improved quality. Foods. 13 : 1–28.

Li, S., S. Tang, R. Mo, J. Li, and L. Chen. 2023. Effects of NaCl curing and subsequent fermentation with *Lactobacillus sakei* or *Lactobacillus plantarum* on protein hydrolysis and oxidation in yak jerky. *Lwt*. *173* : 114298.

Liu, H., L. Da, and Y. Liu. 2019. Biochemical and biophysical research communications understanding the molecular mechanism of umami recognition by T1R1-T1R3 using molecular dynamics simulations. Biochemical and Biophysical Research Communications. 514(3) : 967–973.

Luo, W., X. He, Y. Chen, Y. Xu, Y. Zhuang, Y. Ding, and X. Fan. 2025. Integrated transcriptomic and proteomic analyses revealed the mechanism of the osmotic stress

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

response in *Lacticaseibacillus rhamnosus* ATCC 53103. Foods. 14 : 1–21.

Luo, Y., Y. Guo, X. Hu, W. Liu, B. Liu, J. Yang, Z. Tu, and Y. Huang. 2023. Flavor improvement of fermented soybean foods by co-fermentation with *Bacillus velezensis* and *Lactiplantibacillus plantarum*. LWT-Food Science and Technology. 186 : 1–9.

Maslami, V., Y. Marlida, Mirnawati, Jamsari, dan Y.S. Nur. 2018. Isolasi bakteri asam laktat (BAL) penghasil asam glutamat dari ikan budu sebagai feed suplemen ayam broiler. Jurnal Peternakan Indonesia. 20(1) : 29–36.

Maslami, V., Y. Marlida, Mirnawati, Jamsari, and Y.S. Nur. 2018. Optimization of glutamate production from *Lactobacillus plantarum* originating from minangkabau fermented food as a feed supplement for broiler. Pakistan Journal of Nutrition. 17(7) : 336–343.

Maslami, V., Y. Marlida, and Y.N. Shafan. 2023. The potency of glutamate producing lactic acid bacteria isolated as additive feed in improving broiler performance. JITRO. 10(1) : 62–68.

Miftachurrochmah, A., K. Fibrianto, and W.B. Sunarharum. 2024. Bekasam, an Indonesian unique traditional fermented fish as umami sources. Advances in Food Science, Sustainable Agriculture and Agroindustrial Engineering. 7(2) : 158–168.

Miftachurrochmah, A., W.B. Sunarharum, and K. Fibrianto. 2025. Traditional fermented fish 'bekasam' as a flavor enhancer : Perspectives on characteristics of fermented product and sensory properties. Journal of Ethnic Foods. 12(40) : 1–11.

Putra, M.M.P., M.Y. Al-hammam, G. Ahsan, K. Kharisma, B. Chandra, and I.D. Puspita. 2022. Antibacterial potency of cell free supernatant produced by lactic acid bacteria isolated from indonesian fermented fish products against histamine-producing bacteria. Indonesian Journal of Fisheries Science and Technology. 18(1) : 13–18.

Murti, R. W., Sumardianto, dan L. Purnamayati. 2021. Pengaruh perbedaan konsentrasi garam terhadap asam glutamat terasi udang rebon (*Acetes* sp.). Jurnal Pengolahan Hasil Perikanan Indonesia. 24(1) : 50–59.

Nakayama, Y., K. Hashimoto, Y. Sawada, M. Sokabe, H. Kawasaki, and B. Martinac. 2018. *Corynebacterium glutamicum* mechanosensitive channels : towards unpuzzling glutamate efflux for amino acid production. Biophysical Reviews. 4 : 1–11.

Namazi, P., B. Alizadeh, M. Noshad, and A. Vasiee. 2026. Physiological , biochemical , and functional characterization of *Lactiplantibacillus plantarum* strain CAU5271 as a dairy probiotic with a Gaussian Process Regression (GPR) model for stress tolerance prediction. Applied Food Research. 6(1) : 101634.

Nie, X., S. Lin, and Q. Zhang. 2014. Proteolytic characterisation in grass carp sausage inoculated with *Lactobacillus plantarum* and *Pediococcus pentosaceus*. Food Chemistry. 145 : 840–844.

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Nuraida, L. 2015. A review : health promoting lactic acid bacteria in traditional Indonesian fermented foods. Food Science and Human Wellness. 4(2) : 47–55.

Octariyani, I., D. Agnesty, J. Sihombing, W.A. Ramadaningrum, B.W. Harsanto, L. Leliana, and A. Frediansyah. 2026. Naniura : a traditional Batak fermented fish as a source of lactic acid bacteria and functional bioactives – a comprehensive review. International Journal of Gastronomy and Food Science. 43 : 1–16.

Ojha, A. K., N.P. Shah, and V. Mishra. 2021. Conjugal transfer of antibiotic resistances in *Lactobacillus* spp. Current Microbiology. 78(8) : 2839–2849.

Oksal, E., A.H. Fatah, M.M. Sylvani, Chuchita, Z. Pereiz, A.N. Gracia, dan Y.D. Nainggolan. 2025. Pengaruh variasi konsentrasi garam, samu dan waktu fermentasi pada produk wadi dari ikan patin (*Pangasius pangasius*) khas Kalimantan Tengah. Konservasi Hayati. 21(2) : 101–111.

Olaoye, O. A. and I.G. Ntuen. 2011. Spoilage and preservation of meat : a general appraisal and potential of lactic acid bacteria as biological preservatives. International Research Journal of Biotechnology. 2(1) : 33–46.

Onyeweaku, F. C., H.C. Amah, E.I. Obeagu, and U.U. Nwandikor. 2017. Prevalence of asymptomatic bacteriuria and its antibiotic susceptibility pattern in pregnant women attending private ante natal clinics in Umuahia Metropolitan. International Journal of Current Research in Biology and Medicine. 2(2) : 13–23.

Ooi, M. F., H.L. Foo, T.C. Loh, R. Mohamad, R.A. Rahim, and A. Ariff. 2021. A refined medium to enhance the antimicrobial activity of postbiotic produced by *Lactiplantibacillus plantarum* RS5. Scientific Reports. 11(1) : 7617.

Panesar, P. S., J.F. Kennedy, D.N. Gandhi, and K. Bunko. 2007. Bioutilisation of whey for lactic acid production. Food Chemistry. 105 : 1–14.

Papadopoulou, E., M. Cristina, R.D. Evgrafov, A. Kalea, P. Tsapekos, and I. Angelidaki. 2023. Adaptive laboratory evolution to hypersaline conditions of lactic acid bacteria isolated from seaweed. New Biotechnology. 75 : 21–30.

Park, Y., J. Kim, and D. Shin. 2024. Hemp seed protein hydrolysate enriched with γ - aminobutyric acid and peptides by microbial bioconversion. Fermentation. 10 : 1–12.

Perdani, C. G., R. Retno, R., dan L. Mahmudah. 2022. Prinsip-prinsip bahan tambahan pangan yang memenuhi syarat halal : alternatif penyedap rasa untuk industri makanan halal. Halal Researh. 2(2) : 96–111.

Plaitakis, A., E. Kalef-ezra, D. Kotzamani, I. Zaganas, and C. Spanaki. 2017. The glutamate dehydrogenase pathway and its roles in cell and tissue biology in health and disease. Biology. 6(11) : 1–26.

Prasetyo, O., U. Ruwaida, Z.F. Aurora, and R. Oktaviana. 2025. From culture to science : exploring scientific knowledge in the making of wadi , a traditional dish of the Dayak

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

and Banjar. Jurnal Penelitian Pendidikan IPA. 11(12) : 261–268.

Pratama, D. R., S. Melia, dan E. Purwati. 2020. Perbedaan konsentrasi kombinasi starter tiga bakteri terhadap total bakteri asam laktat, nilai ph, dan total asam tertitrasi yogurt. Jurnal Peternakan Indonesia. 22(3) : 339–345.

Procopio, S., M. Brunner, and T. Becker. 2014. Differential transcribed yeast genes involved in flavour formation and its associated amino acid metabolism during brewery fermentation. Eur Food Res Technol. 239 : 421–439.

Qiao, J. I. E., G. Shu, J. Nan, G. Du, Y. Hui, M. Zhang, and K.A. Li. 2025. Original research paper effects of nacl, peptone and glucose on the production of antioxidant peptides from goat milk fermented by. The Annals of the University Dunarea de Jos of Galati Fascicle VI – Food Technology. 48(2) : 153–164.

Rajput, K., A.Y. Jassim, A.A. Mohammed, A. Rahman, M. Said, A. Karnwal, and T. Malik. 2025. Statistical optimization of culture conditions for enhanced biomass yield of *Lactobacillus acidophilus* CM1 using plackett – burman and response surface methodology. International Journal of Food Science. 1–12.

Rajvanshi, M. and K.V. Venkatesh. 2011. Phenotypic characterization of *Corynebacterium glutamicum* under osmotic stress conditions using elementary mode analysis. J. Ind. Microbiol Biotechnol. 38 : 1345–1357.

Rao, M. S., J. Pintado, W.F. Stevens, and J.P. Guyot. 2004. Kinetic growth parameters of different amylolytic and non-amylolytic *Lactobacillus* strains under various salt and pH conditions. Bioresource Technology. 94(3) : 331–337.

Ray, B. 2004. Fundamental Food Microbiology (3rd ed.). CRC Press, Washington, D.C.

Reis, J. M. P., T.G. Tavares, J.M. Rocha, F.X. Malcata, A.C. Macedo. 2022. Cobrançosa table olives : Characterization of processing method and lactic acid bacteria profile throughout spontaneous fermentation. *Applied Sciences*. *12* : 1–16.

Restu. 2017. Pengaruh kombinasi gula aren dan samu dalam proses fermentasi daging ikan mas (*Cyprinus carpio*). Jurnal Ilmu Hewani Tropika. 6(2) : 78–81.

Riebroy, S., S. Benjakul, and W. Visessanguan. 2004. Some characteristics of commercial Som-fug produced in Thailand. Food Chemistry. 88 : 527–535.

Ryu, B., K. Shin, and S.K. Kim. 2021. Muscle protein hydrolysates and amino acid composition in fish. Marine Drugs. 19(377) : 1–12.

Safitri, D., Fitriah, S. Nashihah, Andika, dan N. Fajeriyati. 2025. Isolasi dan identifikasi bakteri asam laktat pada pekasam ikan haruan : efek fermentasi dan penggorengan. Bioscientist: Jurnal Ilmiah Biologi. 13(2) : 782–791.

Sano, C. 2009. History of glutamate production. American Journal of Clinical Nutrition. 90(3) : 728–732.

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Santos, B. A., P.C.B. Campagnol, R.N. Cavalcanti, M.T.B. Pacheco, F.M. Netto, E.M.P.Motta, R.M.S. Celeguini, R. Wagner, and M.A.R. Pollonio. 2015. Impact of sodium chloride replacement by salt substitutes on the proteolysis and rheological properties of dry fermented sausages. Journal of Food Engineering. 151 : 16–24.

Seniati, M., dan A. Irham. 2019. Pengukuran kepadatan bakteri *Vibrio harveyi* secara cepat dengan menggunakan spectrofotometer. Jurnal Agrokompleks, 19(2): 12-19.

Setiarto, R. H. B., N. Widhyastuti, N.A. Rikmawati. 2017. Optimasi konsentrasi fruktooligosakarida untuk meningkatkan pertumbuhan bakteri asam laktat starter yoghurt. Jurnal Veteriner. 18(36) : 428–440.

Singhal, N., N.S. Singh, S. Mohanty, and M. Kumar. 2021. Rhizospheric *Lactobacillus plantarum* (*Lactiplantibacillus plantarum*) strains exhibit bile salt hydrolysis, hypocholestrolemic and probiotic capabilities in vitro. Scientific Reports. 11 : 1–9.

Siswanto, A., Sumardianto, dan Romadhon. 2017. Pengaruh perbedaan konsentrasi garam pada ikan peda kembung (*Rastrelliger* sp.) terhadap jumlah bakteri penghasil asam sebagai penghambat pertumbuhan *Staphylococcus aureus* dan *Escherichia coli*. J. Peng. & Biotek. Hasil Pi. 6(2) : 17–23.

Sivamaruthi, B. S., K. Alagarsamy, N. Suganthy, S. Thangaleela, P. Kesika, and C. Chaiyasut. 2022. The role and significance of *Bacillus* and *Lactobacillus* species in thai fermented foods. Fermentation. 8(635) : 1–17.

Sooresh, M. M., B.P. Willing, and B.C.T. Bourrie. 2023. Opportunities and challenges of understanding community assembly in spontaneous food fermentation. Foods. 12(673) : 1–16.

Speranza, B., D. Campaniello, C. Altieri, M. Sinigaglia, A. Bevilacqua, and M.R. Corbo. 2021. Increase of acidification of synthetic brines by ultrasound-treated *Lactiplantibacillus plantarum* strains isolated from olives. Ultrasonics Sonochemistry. 74 : 1–12.

Speranza, B., A. Racioppo, D. Campaniello, C. Altieri, M. Sinigaglia, M.R. Corbo, and A. Bevilacqua. 2020. Use of autochthonous *Lactiplantibacillus plantarum* strains to produce fermented fish products. Frontiers in Micribiology. 11 : 1–9.

Spies, J.R. 1957. Colorimetric procedures for amino acids methods in Enzymologi. 3: 468-471.

Stephen, J. M. and A.M. Saleh. 2023. Homofermentative *Lactobacilli* isolated from organic sources exhibit potential ability of lactic acid production. Frontiers in Microbiology. 14 : 1297036.

Sumalim, A., A. Hampton, C. Averina, A. Lorando, and E. Rahmat. 2025. Exploration of bekasam , traditional fermented fish from Indonesia as functional food and source of bioactive compounds. Earth and Environmental Science. 1564 : 1–17.

Sumardianto, T. Agustini, and U. Amalia. 2017. Investigation of the quantity effect of

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

NaCl salt on generating glutamic acid contents during shrimp paste production by fermentation method. Journal of Computational and Theoretical Nanoscience. 23(7) : 6513-6518

Suratmi, S. dan S. Haryanto. 2021. Teknik isolasi produk ekstraseluler dan intraseluler dari bakteri *Vibrio harveyi*. Buletin Teknik Litkayasa Akuakultur. 19(1) : 61–65.

Surbakti, F. H. dan U. Hasanah. 2019. Identifikasi dan karakterisasi bakteri asam laktat pada acar ketimun (*Cucumis sativus* l.) sebagai agensi probiotik. Jurnal Teknologi Pangan Dan Kesehatan. 1(1) : 31–37.

Tanous, C., E. Chambellon, A.M. Sepulchre, and M. Yvon. 2005. The gene encoding the glutamate dehydrogenase in *Lactococcus lactis* is part of a remnant Tn3 transposon carried by a large plasmid. Journal of Bacteriology. 187(14) : 5019–5022.

Tenea, G. N. 2022. Decoding the gene variants of two native probiotic *Lactiplantibacillus plantarum* strains through whole-genome resequencing : Insights into bacterial adaptability to stressors and antimicrobial strength. Genes. 13(443) : 1–18.

Thongsomboon, W., A. Bunyatratchata, T. Vongkampang, R. Nammatra, C. Prakitchaiwattana, and S. Siriamornpun. 2023. Dynamic changes in Thai-style fermented fish : Low-salt , short fermentation with autochthonous starter culture. *LWT-Food Science and Technology*. *188* : 1–8.

Tolpeznikaite, E., V. Bartkevics, A. Skrastina, R. Pavlenko, M. Ruzauskas, V. Starkute, E. Zokaityte, D. Klupsaite, and R. Ruibys. 2023. Submerged and solid-state fermentation of Spirulina with lactic acid bacteria strains : antimicrobial properties and the formation of bioactive compounds of protein origin. Biology. 12(248) : 1–22.

Udomsil, N., S. Chen, S. Rodtong, and J. Yongsawatdigul. 2016. Quanti fi cation of viable bacterial starter cultures of *Virgibacillus* sp. and *Tetragenococcus halophilus* in fish sauce fermentation by real-time quantitative PCR. Food Microbiology. 57 : 54–62.

Vaccalluzzo, A., A. Pino, M. De Angelis, and J. Bautista-gallego. 2020. Effects of different stress parameters on growth and on oleuropein-degrading abilities of *Lactiplantibacillus plantarum* strains selected as tailored starter cultures for naturally table olives. Microorganisms. 8 : 1–12.

Wardani, S. K., M.N. Cahyanto, E.S. Rahayu, and T. Utami. 2017. The effect of inoculum size and incubation temperature on cell growth, acid production and curd formation during milk fermentation by *Lactobacillus plantarum* Dad 13. International Food Research Journal. 24(3) : 921–926.

Waty, K., E. Purwijantiningsih, dan S. Pranata. 2019. Kualitas fermentasi spontan wadi ikan patin (*Pangasius* sp.) dengan variasi konsentrasi garam. Biota. 4(1) : 24–32.

Wood, J. M., E. Bremer, L.N. Csonka, R. Kraemer, B. Poolman, T. Van der Heide, T., and L.T. Smith. 2001. Osmosensing and osmoregulatory compatible solute accumulation by bacteria. Comparative Biochemistry and Physiology Part A:

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Molecular & Integrative Physiology. 130(3) : 437-460.

Xu, D., Y. Liu, X. Li, F. Wang, Y. Huang, nad X. Ma. 2023. Application and effect of *Pediococcus pentosaceus* and *Lactiplantibacillus plantarum* as starter cultures on bacterial communities and volatile flavor compounds of zhayu, a chinese traditional fermented fish product. Foods. 12 : 1–18.

Yang, E., L. Fan, J. Yan, Y. Jiang, C. Doucette, S. Fillmore, and B. Walker. 2018. Influence of culture media, pH, and temperature on growth and bacteriocin production of bacteriocinogenic lactic acid bacteria. AMB Express. 8(10) : 1–14.

Yang, L., L. Chen, H. Li, Z. Deng, and J. Liu. 2022. Lactic acid production from mesophilic and thermophilic fermentation of food waste at different pH. Journal of Environmental Management. 304 : 1–10.

Yogeswara, I. B. A., S. Maneerat, and D. Haltrich. 2020. Glutamate decarboxylase from lactic acid bacteria — a key enzyme in GABA synthesis. Microorganisms. 8 : 1–24.

Zang, J., Y. Xu, W. Xia, and J.M. Regenstein. 2020. Quality, functionality, and microbiology of fermented fish : a review. Critical Reviews in Food Science and Nutrition. 60(7) : 1228–1242.

Zareian, M., A. Ebrahimpour, F.A. Bakar, A. Karim, and S. Mohamed. 2012. A glutamic acid-producing lactic acid bacteria isolated from Malaysian fermented foods. International Journal of Molecular Sciences. 13 : 5482–5497.

Zareian, M., A. Ebrahimpour, F.A. Bakar, A.K.S. Mohamed, B. Forghani, M.S.B. Ab-Kadir, and N. Saari. 2012. A glutamic acid-producing lactic acid bacteria isolated from malaysian fermented foods. International Journal of Molecular Sciences. 13(5) : 5482–5497.

Zeng, X., W. Xia, Q. Jiang, and F. Yang. 2013. Chemical and microbial properties of Chinese traditional low-salt fermented whole fi sh product Suan yu. Food Control. 30(2) : 590–595.

Zhang, Q., N. Xiao, H. Xu, Z. Tian, B. Li, W. Qiu, and W. Shi. 2022. Changes of physicochemical characteristics and flavor during suanyu fermentation with *Lactiplantibacillus plantarum* and *Saccharomyces cerevisiae*. Foods. 11 : 1–15.

Zhao, X., C. Zhao, L. Yang, L. Jiang, and J. Zhang. 2022. Spatial and temporal persistence of fluorescent *Lactiplantibacillus plantarum* RS-09 in intestinal tract. Frontiers in Micribiology. 13 : 1–13.

Zhou, R. Y., X. Huang, Z. Liu, J. Chua, and S. Liu. 2022. Evaluating the effect of lactic acid bacterial fermentation on salted soy whey for development of a potential novel soy sauce-like condiment Rebecca. Current Research in Food Science. 5 : 1826–1836.

Zineddine, B. A., M. Anas, H.A. Rizk, H.J. Eddine, and K. Mebrouk. 2011. Identification and characterization of functional and technological *Lactobacillus plantarum* strains

UNIVERSITAS
GADJAH MADA
Pengaruh Konsentrasi Garam terhadap Pertumbuhan dan Produksi Asam Glutamat Lactiplantibacillus plantarum GMP1 yang Diisolasi dari Ikan Terfermentasi, Pekasam
Pawestri Ilma Ramadhani, Ir. Mgs. M. Prima Putra, S.Pi., M.Sc., Ph.D., IPM.
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

isolated from raw goat and camel milk collected in Algeria. Journal of Pure and Applied Microbiology. 5(2) : 553–566.