

DAFTAR PUSTAKA

- Abdul, H. B. N., N. J. Xuan, S. N. H. Oslan. 2023. A comprehensive review of bioactive compounds from lactic acid bacteria: Potential functions as functional food in dietetics and the food industry. *Foods* Basel, Switzerland. 12(15). 2850.
- Adrianto, R., D. Wiraputra, M. D. Jyoti, & A. Z. Andaningrum. 2020. Total bakteri asam laktat, total asam, nilai pH, sineresis, total padatan terlarut dan sifat organoleptik yoghurt metode back slopping. *Jurnal Teknologi Pertanian*. 13(2): 105–111.
- Ahmed, T., M. R. Rana, W. Zzaman, R. Ara, & M. G. Aziz. 2021. Optimization of substrate composition for pectinase production from Satkara (*Citrus macroptera*) peel using *Aspergillus niger*-ATCC 1640 in solid-state fermentation. *Heliyon Sciences*. 7(10).
- Ahn, C.-B., K.-H. Lee, & J.-Y. Je. 2010. Enzymatic production of bioactive protein hydrolysates from tuna liver: Effects of enzymes and molecular weight on bioactivity. *International Journal of Food Science and Technology*. 45: 562–568.
- Aini, J. Ustiawaty, E. Kurniawan, & A. Maulana. 2022. Isolate and characterization of lactic acid bacteria (LAB) in local nira as probiotic starter candidates. *Jurnal Biologi Tropis*. 22(4): 1195–1203.
- Akbari, M., S. H. Razavi, F. Khodaiyan, J. Blesa, & M. J. Esteve. 2023. Fermented corn bran: A by-product with improved total phenolic content and antioxidant activity. *LWT Journal*. 184, 115090.
- Akbarian, M., A. Khani, S. Eghbalpour, & V. N. Uversky. 2022. Bioactive peptides: Synthesis, sources, applications, and proposed mechanisms of action. *International Journal of Molecular Sciences*. 2(2): 1-11.
- Alhanannasir, N. S. Sebayang, P. Parameswara, A. Berlian, I. Prisantika, I. Saputra, F. Ayu, Idialistuti, & A. D. Murtado. 2024. Pengolahan pangan dengan cara fermentasi. *Jurnal Teknologi Pangan*. 12(1): 11–14.
- Almroth, B. C., E. Albertsson, J. Sturve, & L. Förlin. 2008. Oxidative stress, evident in antioxidant defences and damage products, in rainbow trout caged outside a sewage treatment plant. *Ecotoxicology and Environmental Safety*. 70: 370–378.
- Alshuniaber, M. A., R. Krishnamoorthy, & W. H. Al-Qhtani. 2021. Antimicrobial activity of polyphenolic compounds from Spirulina against food-borne bacterial pathogens. *Saudi Journal of Biological Sciences*. 28(1): 459–464.
- Anggraini, R., D. Aliza, & S. Mellisa. 2016. Identifikasi bakteri *Aeromonas hydrophila* dengan uji mikrobiologi pada ikan lele dumbo (*Clarias gariepinus*) yang dibudidayakan di Kecamatan Baitussalam Kabupaten Aceh Besar. *Jurnal Ilmiah Mahasiswa Kelautan dan Perikanan Unsyiah*. 1(2): 270–286.
- Anggrani, M. A., M. Ilmiah, & D. N. Mahfudhah. 2023. Literature review of antioxidant

activity of several types of onions and its potential as health supplements. Indonesian Journal of Chemical Science. 12(1): 104–111.

- Aristyan, I., R. Ibrahim, & L. Rianingsih. 2014. Pengaruh perbedaan kadar garam terhadap mutu organoleptik dan mikrobiologis terasi rebon (*Acetes* sp.). Jurnal Pengolahan dan Bioteknologi Hasil Perikanan. 3(2): 60–66.
- Ariyati, S. 1998. Pengaruh salinitas dan dosis pupuk urea terhadap pertumbuhan populasi *Spirulina* sp. Jurusan Biologi Fakultas Matematika dan IPA Universitas Diponegoro, Semarang. Skripsi.
- Aruna, T. E., O. C. Aworh, A. O. Raji, & A. I. Olagunju. 2017. Protein enrichment of yam peels by fermentation with *Saccharomyces cerevisiae* (BY4743). Annals of Agricultural Sciences. 62(1): 33–37.
- Ashaolu, T., K. Samborska, C. Lee, M. Tomas, E. Çapanoğlu, Ö. Tarhan, B. Taze, & S. Jafari. 2021. Phycocyanin, a super functional ingredient from algae: Properties, purification, characterization, and applications. International Journal of Biological Macromolecules. 4(1): 3-15.
- Asih, D. J., N. K. Warditiani, & I. G. S. Wiarsana. 2022. Review artikel: Aktivitas antioksidan ekstrak amla (*Phyllanthus emblica* / *Embluca officinalis*). Jurnal Ilmiah Multi Disiplin Indonesia. 1(6): 674–687.
- Asila, M. R., Kamaludin, & H. A. Holik. 2022. Chemical content and pharmacological activities of *Spirulina* sp. Indonesian Journal of Biological Pharmacy. 2(2): 59–66.
- Badriyah, I. B., & Ardyati, T. 2013. Deteksi aktivitas proteolitik isolat bakteri asal ampas tahu pada substrat bekatul. Jurnal Biotropika. 1(3): 109-113.
- Bamdad, F., J. Wu, & L. Chen. 2011. Effects of enzymatic hydrolysis on molecular structure and antioxidant activity of barley hordein. Journal of Cereal Science. 54: 20–28.
- Bawole, H., R. M. Rompas, & E. L. Ginting. 2017. Ekstraksi hidrokarbon dari beberapa mikroalga. Jurnal Pesisir dan Laut Tropis. 1(1): 18–23.
- Bi, A., A. M. Borrero-I, G. Dom, J. M. Molina-guijarro, E. Eugenio, D. Ibarra, & M. Herm. 2022. Solid state fermentation with *Streptomyces* as an ecofriendly route to tune lignin properties and its use as a binder in adhesive formulation. ACS Sustainable Chemistry & Engineering. 3(3): 105-114.
- Bobeciã, V., V. Covaliov, V. Nenno, & O. Covaliova. 2015. Phytochemical compounds and plant products that stimulate methanogenic processes of anaerobic fermentation by microorganisms. SIMI Proceedings: 57–65.
- Bold, H. C., & M. J. Wynne. 1985. Introduction to the Algae: Structure and reproduction (2nd ed). Prentice-Hall Inc, United States of America.

- Budiardi, T., N. B. P. Utomo, & A. Santosa. 2010. Growth performance and nutrition value of *Spirulina* sp. under different photoperiod. *Jurnal Akuakultur Indonesia*. 9(2): 146–156.
- Bürck, M., C. Fratelli, M. Assis, & A. Braga. 2024. Naturally colored ice creams enriched with C-phycoyanin and *Spirulina* residual biomass: Development of a fermented, antioxidant, tasty and stable food product. *Fermentation Journal*. 2(3): 51-62.
- Cahyaningrum, P. L., S. A. M. Yuliari, C. Putra, & I. B. P. Suta. 2020. Antioxidant activity of loloh malaka fruit (*Phyllanthus emblica* L.) in Ayurveda medication: How it supports environmental conservation. *Journal of Physics Conference Series*, 1469: 1–8.
- Cahyaningtyas, F. D., & P. R. Wikandari. 2022. Review artikel: Potensi fruktooligosakarida dan inulin bahan pangan lokal sebagai sumber prebiotik. *Unesa Journal of Chemistry*. 1(1): 14-26.
- Campanella, L., G. Crescentini, & P. Avino. 1999. Chemical composition and nutritional evaluation of some natural and commercial food products based on *Spirulina*. *EDP Sciences*. 57(2).
- Cao, C., M. Feng, J. Sun, X. Xu, & G. Zhou. 2019. Screening of lactic acid bacteria with high protease activity from fermented sausages and antioxidant activity assessment of its fermented sausages. *CyTA – Journal of Food*. 17, 347–354.
- Castro, E. D. M., E. Shannon, & N. A. Ghannam. 2019. Effects of fermentation on enhancing the nutraceutical properties of *Arthrospira platensis* (*Spirulina*). *MDPI Journal*. 5(1): 28-39.
- Chen, H. 2013. *Modern Solid State Fermentation*. Springer. Dordrecht–Heidelberg–New York–London.
- Chen, H., & J. Xu. 2004. *Modern Solid State Fermentation: Theory and practice*. Beijing: Chemical Industry Press.
- Choi, W., D. Kang, S. Heo, & H. Lee. 2018. Enhancement of the neuroprotective effect of fermented *Spirulina maxima* associated with antioxidant activities by ultrasonic extraction. *Applied Sciences*. 2(2): 41-53.
- Choirunnisa, A. R., I. Fidrianny, & K. Ruslan. 2016. Comparison of five antioxidant assays for estimating antioxidant capacity from three *Solanum* sp. extracts. *Asian Journal of Pharmaceutical and Clinical Research*, 9, 123–128.
- Christwardana, M., M. A. Nur, & Hadiyanto. 2013. *Spirulina platensis*: Potensinya sebagai bahan pangan fungsional. *Jurnal Aplikasi Teknologi Pangan*. 2(1): 1–4.
- Cifferi, O. 1983. *Spirulina, The Edible Organism*. American Society for Microbiology. USA.

- Daliri, E. B. M., B. H. Lee, B. J. Park, S. H. Kim, & D. H. Oh. 2018. Antihypertensive peptides from whey proteins fermented by lactic acid bacteria. *MDPI Journal*. 25(1): 45-53.
- Deng, R., & T. J. Chow. 2010. Hypolipidemic, antioxidant, and anti-inflammatory activities of microalgae *Spirulina*. *Cardiovascular Therapeutics*. 28(1): 33–45.
- Dey, T. B., S. Chakraborty, K. K. Jain, A. Sharma, & R. C. Kuhad. 2016. Antioxidant phenolics and their microbial production by submerged and solid state fermentation process: A review. *Trends in Food Science & Technology*. 4(1): 44-56.
- Dianursanti, & M. A. Hafidzah. 2021. The enhancement of phycocyanin yield and purity from *Spirulina plantesis* using freeze-thawing method on various solvents. *LWT Journal*. 5(3): 78-88.
- Doneva, M., K. Loginovska, S. Dyankova, I. Nacheva, O. Metodieva, & N. N. Nikolova. 2024. Application of whey protein hydrolysates as a fermentation medium with strains of lactic acid bacteria. *Journal of Chemical Technology and Metallurgy*. 59(1): 15–22.
- Ekantari, N., Y. Marsono, Y. Pranoto, & E. Harmayani. 2017. Pengaruh media budidaya menggunakan air laut dan air tawar terhadap sifat kimia dan fungsional biomassa kering *Spirulina plantesis*. *Jurnal Agritech*. 37(2): 173–182.
- Elias, R. J., S. S. Kellerby, & E. A. Decker. 2008. Antioxidant activity of proteins and peptides. *Critical Reviews in Food Science and Nutrition*. 48: 430–441.
- Estrada, J. E., P. Piñero Bermejo, Besco, & A. M. Villar del Fresno. 2001. Antioxidant activity of different fractions of *Spirulina platensis* protein extract. *Farmaco*, 56(1), 497–500.
- Eykelenburg, V. C. 1977. On the morphology and ultrastructure of the cell wall of *Spirulina plantesis*. *Journal of Microbiology and Serology*. 43: 89–99.
- Farnsworth, N. R. 1966. Biological and phytochemical screening of plants. *Journal of Pharmaceutical Sciences*. 55: 225–276.
- Feng, G., D. Mikkelsen, E. Hoedt, B. Williams, B. Flanagan, M. Morrison, & M. Gidley. 2020. In vitro fermentation outcomes of arabinoxylan and galactoxyloglucan depend on fecal inoculum more than substrate chemistry. *Food & Function Journal*. 2(1): 42-56.
- Feng, L., Y. Qiao, Y. Zou, M. Huang, Z. Kang, & G. Zhou. 2014. Effect of Flavourzyme on proteolysis, antioxidant capacity and sensory attributes of Chinese sausage. *Meat Science*. 98: 34–40.
- Fernández, M., A. Martín, M. J. Benito, R. Casquete, I. Recio, & M. D. G. Córdoba. 2016. Influence of starter cultures on the generation of antioxidant nitrogen compounds in Iberian dry-fermented sausages. *International Journal of Food Science &*

Technology. 51: 435–443.

- Fitriana, N., & M. T. Asri. 2022. Aktivitas proteolitik pada enzim protease dari bakteri rizosphere tanaman kedelai (*Glycine max* L.) di Trenggalek. *LenteraBio*. 11(1): 144–152.
- Fratelli, C., M. Bürck, A. Silva-Neto, L. Oyama, V. De Rosso, & A. Braga. 2022. Green extraction process of food grade C-phycoyanin: Biological effects and metabolic study in mice. *Processes Food Journal*. 15(1): 123-145.
- Gallego, M., L. Mora, E. Escudero, & F. Toldrá. 2018. Bioactive peptides and free amino acids profiles in different types of European dry-fermented sausages. *International Journal of Food Microbiology*. 276: 71–78.
- Gaur, G., & M. Gänzle. 2023. Conversion of (poly)phenolic compounds in food fermentations by lactic acid bacteria: Novel insights into metabolic pathways and functional metabolites. *Current Research in Food Science*. 2(1): 44-55.
- Gholib, G., & A. Rohman. 2007. *Kimia farmasi: Analisis*. Pustaka Pelajar, Yogyakarta.
- Grover, P., A. Bhatnagar, N. Kumari, A. N. Bhatt, D. K. Nishad, & J. Purkayastha. 2021. C-phycoyanin—a novel protein from *Spirulina platensis*: In vivo toxicity, antioxidant and immunomodulatory studies. *Saudi Journal of Biological Sciences*. 28(3): 1853–1859.
- Guinda, A., J. M. Castellano, J. M. S. Lozano, T. D. Hervas, P. G. Adanez, & M. Rada. 2015. Determination of major bioactive compounds from olive leaf. *Food Science and Technology*. 431–438.
- Hadioetomo, R. S. 1993. *Mikrobiologi dasar dalam praktek teknik dan prosedur dasar laboratorium*. Gramedia. Jakarta.
- Hadiyanto, & M. Azim. 2012. *Mikroalga sumber pangan dan energi masa depan*. UNDIP Press. Semarang.
- Hamidah, M. N., L. Rianingsih, & 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.
- Hamprakorn, K., B. Maneewan, W. Jantasin, & J. Panatuk. 2024. Effect of by-product from C-phycoyanin extraction as a prebiotic properties and probiotic microbial population. *Veterinary Integrative Sciences*. 23(1): 1–16.
- Hernández-Ledesma, B., A. Dávalos, B. Bartolomé, & L. Amigo. 2005. Preparation of antioxidant enzymatic hydrolysates from alpha-lactalbumin and beta-lactoglobulin: Identification of active peptides by HPLC-MS/MS. *Journal of Agricultural and Food Chemistry*. 53(3): 588–593.
- Hersoelistyorini, W., D. Sumanto, & L. Najih. 2010. Pengaruh lama simpan pada suhu ruang terhadap kadar protein dodol tape kulit umbi kayu. *Jurnal Pangan dan Gizi*,

1(1), 24–34.

- Hölker, U., M. Höfer, & J. Lenz. 2004. Biotechnological advantages of laboratory-scale solid-state fermentation with fungi. *Applied Microbiology and Biotechnology*. 64(2): 175–186.
- Hosseini, F. S., Z. Zolfagharian, & A. Amiri. 2024. Quality assessment of hydrolysate poultry by-products treated by bacterial fermentation. *International Journal of Enteric Pathogens*. 12(1): 8–14.
- Huang, Y., D. Xiao, B. M. Burton-Freeman, & I. Edirisinghe. 2016. *Chemical Changes of Bioactive Phytochemicals During Thermal Processing*. Elsevier. China.
- Hudha, M. I., R. R. Nata, & Z. H. R. Miftachul. 2022. Pembuatan dekomposer alami dengan variasi perbandingan limbah sumber bakteri dan waktu fermentasi. *Jurnal Pengolahan Pangan*. 3(2): 11-24.
- Hur, J., T. Thanh, H. Nguyen, N. Park, J. Kim, & D. Kim. 2018. Characterization of quinoa (*Chenopodium quinoa*) fermented by *Rhizopus oligosporus* and its bioactive properties. *AMB Express*, 8(143), 1–8.
- Hur, S., S. Lee, Y. Kim, I. Choi, & G. Kim. 2014. Effect of fermentation on the antioxidant activity in plant-based foods. *Food Chemistry*. 160: 346–356.
- Husni, A., N. Izmi, F. Z. Ayunani, A. Kartini, N. Husnayain, & A. Isnansetyo. 2022. Characteristics and antioxidant activity of fucoidan from *Sargassum hystrix*: Effect of extraction method. *International Journal of Food Science*. 2(2) 3689724.
- Ibrahim, A. S. S., Al-Salamah, A. A., Elbadawi, Y. B., El-Tayeb, M. A., & Ibrahim, S. S. S. 2015. Production of extracellular alkaline protease by new halotolerant alkaliphilic *Bacillus* sp. NPST-AK15 isolated from hyper saline soda lakes. *Electronic Journal of Biotechnology*. 18(3): 236–243.
- Irasari, N., A. Diharmi, S. W. Sidauruk, & F. Sinurat. 2022. Identifikasi komponen bioaktif dan aktivitas antibakteri ekstrak kasar rumput laut merah (*Eucheuma spinosum*). *Jurnal Teknologi dan Industri Pertanian Indonesia*. 14(1): 9–15.
- Irena, A. 2010. *Isolasi dan optimasi protease bakteri termofilik dari sumber air panas Tangkuban Perahu Bandung*. Departemen Biokimia FMIPA IPB. Bogor. Skripsi.
- Ismail, M., Y. El-Ayouty, & M. Piercey-Normore. 2016. Role of pH on antioxidants production by *Spirulina (Arthrospira platensis)*. *Brazilian Journal of Microbiology*. 47: 298–304.
- Ismail, Y. S., C. Yulvizar, & Putriani. 2017. Isolasi, karakterisasi dan uji aktivitas antimikroba bakteri asam laktat dari fermentasi biji kakao (*Theobroma cacao* L.). *Jurnal Bioleuser*. 1(2): 45–53.

- Ismaini, N. Tosani, & D. Sutanto. 2023. Perbandingan kinerja berbagai tipe pH-meter digital pada pengujian sampel tanah dan air berdasarkan ISO 17025:2017. *Jurnal Penelitian Sains*. 25105: 24–28.
- Isnansetyo, A., & Kurniastuty. 1995. *Teknik Kultur Phytoplankton Dan Zooplankton*. Kanisius Press. Yogyakarta.
- Jain, S., & A. K. Anal. 2017. Production and characterization of functional properties of protein hydrolysates from egg shell membranes by lactic acid bacteria fermentation. *Journal of Food Science Technology*. 54(5): 1062–1072.
- Jamnik, P., N. Mahnic, A. Mrak, L. Pogačnik, B. Jeršek, A. Niccolai, J. Rutar, N. Ogrinc, L. Dušak, B. Ferjančič, M. Korošec, A. Cerar, B. Lazar, U. Lovše, T. Pungert, P. Fabjan, & N. Ulrih. 2022. Fermented biomass of *Arthrospira platensis* as a potential food ingredient. *Antioxidants*. MDPI Journal. 3(2): 23-45.
- Jayanthi, P., & P. Lalitha. 2011. Reducing power of the solvent extracts of *Eichhornia crassipes* (Mart.) Solms. *International Journal of Pharmacy and Pharmaceutical Sciences*. 3(3): 126–128.
- Jensen, G. S., D. I. Ginsberg, & C. Drapeau. 2001. Blue-green algae as an immuno enhancer and biomodulator. *Journal of American Nutrition Association*. 3(4): 24–30.
- Jongkon, P., T. Siripen, & R. D. Lee. 2008. Phytoremediation of kitchen wastewater by *Spirulina platensis* (Nordstedt) Geiteler: Pigment content, production variable cost and nutritional value. *Maejo International Journal of Science and Technology*. 2(2): 159–171.
- Kadyan, S., H. M. Rashmi, D. Pradhan, A. Kumari, A. Chaudari, & G. K. Deshwal. 2021. Effect of lactic acid bacteria and yeast fermentation on antimicrobial, antioxidative and metabolomic profile of naturally carbonated probiotic whey drink. *Food Science and Technology*. 142: 111059.
- Kanpiengjai, A., K. Unban, T. Nguyen, D. Haltrich, & C. Khanongnuch. 2019. Expression and biochemical characterization of a new alkaline tannase from *Lactobacillus pentosus*. *Protein Expression and Purification*. 157: 36–41.
- Kavak, A. E., D. Balkanli, O. Sagdic, A. Ozdemir, & E. Dertli. 2025. Optimized Spirulina fermentation with *Lacticaseibacillus rhamnosus*: Bioactive properties and pilot-scale validation. *LWT Journal*. 122: 113590
- Khootama, A., D. N. Putri, & H. Hermansyah. 2018. Techno-economic analysis of lipase enzyme production from *Aspergillus niger* using agro-industrial waste by *solid state fermentation*. *Food Processing Journal*. 145: 254890.
- Khubber, S., F. J. Marti-Quijal, I. Tomasevic, F. Remize, & F. J. Barba. 2022. Lactic acid fermentation as a useful strategy to recover antimicrobial and antioxidant compounds from food and by-products. *Current Opinion in Food Science*. 43: 189–198.

- Kieliszek, M., K. Pobiega, K. Piwowarek, & A. Kot. 2021. Characteristics of the proteolytic enzymes produced by lactic acid bacteria. *LWT Journal*. 2(2): 17-27.
- Konkol, D., E. Jonuzi, E. Popiela, K. Sierzant, M. Korzeniowska, K. Leicht, M. Gumowski, A. Krasowska, M. Lukaszewicz, & M. Korczynski. 2023. Influence of solid state fermentation with *Bacillus subtilis* 67 strain on the nutritional value of rapeseed meal and its effects on performance and meat quality of broiler chickens. *Poultry Science*. 102(102742): 1–11.
- Korhonen, H. 2009. Milk-derived bioactive peptides: From science to applications. *Journal of Functional Foods*. 177–187.
- Koyande, A. K., K. W. Chew, K. Rambabu, Y. Tao, D. T. Chu, and P. L. Show. 2019. Microalgae: A potential alternative to health supplementation for humans. *Food Science and Human Wellness*. 8: 16–24.
- Kozlenko, R., & R. H. Henson. 1998. *Spirulina: Effects on the AIDS virus, Cancer and the Immune System*. Spirulina Health Library. Germany.
- Kristiandi, K., S. A. Lusiana, N. A. Q. A'yunun, R. N. R. I. Marzuki, S. Rezeki, I. Erdiandini, A. E. Yuniato, S. D. L. R. A. Ifadah, R. Kushargina, T. Yuniarti, & O. S. R. Pasanda. 2021. *Teknologi Fermentasi*. Yayasan Kita Menulis. Medan.
- Kuria, M., J. Matofari, & J. Nduko. 2021. Physicochemical, antioxidant, and sensory properties of functional mango (*Mangifera indica* L.) leather fermented by lactic acid bacteria. *Journal of Agriculture and Food Research*.
- Kurniati, T. 2020. Detoksifikasi Zat Antinutrisi Forbol Ester dan Nilai Gizi *Jatropha curcas* L. Melalui Fermentasi oleh Kapang *Rhizopus oryzae* dan *Aspergillus niger* Serta Konsorsiumnya. Cendekia Press. Bandung.
- Kusuma, G. P. A. W., K. A. Nocianitri, & I. D. P. K. Pratiwi. 2020. Pengaruh lama fermentasi terhadap karakteristik fermented rice drink sebagai minuman probiotik dengan isolat *Lactobacillus* sp. F213. *Jurnal Itepa*. 9(2): 182–193.
- Lee, S. H., J. E. Lee, Y. Kim, & S. Y. Lee. 2016. The production of high purity phycocyanin by *Spirulina platensis* using light-emitting diodes based two-stage cultivation. *Applied Biochemistry and Biotechnology*. 178(2): 382–395.
- Leksono, B., M. Cahyanto, E. Rahayu, R. Yanti, & T. Utami. 2022. Enhancement of antioxidant activities in black soy milk through isoflavone aglycone production during indigenous lactic acid bacteria fermentation. *Journal of Food Science and Technology*. 55(1): 87-99.
- Li, P., W. Lin, X. Liu, X. Wang, X. Gan, L. Luo, & W. Lin. 2017. Effect of bioaugmented inoculation on microbiota dynamics during solid-state fermentation of Daqu starter using autochthonous of *Bacillus*, *Pediococcus*, *Wickerhamomyces* and *Saccharomyces*. *Food Microbiology*. 61: 83–92.
- Li, R., W. Luo, Y. Liu, C. Chen, S. Chen, J. Yang, P. Wu, X. Lv, Z. Liu, L. Ni, & J. Han.

2022. The investigation on the characteristic metabolites of *Lactobacillus plantarum* RLL68 during fermentation of beverage from by-products of black tea manufacture. *Current Research in Food Science*. 5: 1320–1329.
- Liu, J. G., C. W. Hou, S. Y. Lee, Y. Chuang, & C. C. Lin. 2011. Antioxidant effects and UVB protective activity of Spirulina (*Arthrospira platensis*) products fermented with lactic acid bacteria. *Process Biochemistry*. 46: 1405–1410.
- Liu, N., S. Miao, & L. Qin. 2020. Screening and application of lactic acid bacteria and yeasts with L-lactic acid-producing and antioxidant capacity in traditional fermented rice acid. *Food Science & Nutrition*. 2: 1220–1229.
- Locatelli, M., R. Gindro, F. Travaglia, J. D. Coïsson, M. Rinaldi, & M. Arlorio. 2009. Study of the DPPH-scavenging activity: Development of a free software for the correct interpretation of data. *Food Chemistry*. 114(3): 889–897.
- Maleki, N., F. Khodaiyan, & M. Mousavi. 2015. Antioxidant activity of fermented hazelnut milk. *Food Science and Biotechnology*. 24(1): 107–115.
- Martins, S., S. I. Mussatto, G. Martínez-Avila, J. Montañez-Saenz, C. N. Aguilar, & J. A. Teixeira. 2011. Bioactive phenolic compounds: Production and extraction by solid-state fermentation – a review. *Biotechnology Advances*. 29: 365–373.
- Martí-Quijal, F. J., A. Tornos, A. Príncipe, C. Luz, G. Meca, P. Tedeschi, M.-J. Ruiz, & F. J. Barba. 2020. Impact of fermentation on the recovery of antioxidant bioactive compounds from sea bass byproducts. *Antioxidants*. 9(3): 239.
- Maslahah, N., & H. Nurhayati. 2024. *Manfaat Kesehatan Beberapa Senyawa Fitokimia*. Gramedia Press. Semarang
- Masojidek, J., M. Koblizek, & G. Torzillo. 2004. Photosynthesis in microalgae. In: A. Richmond (Ed). *Handbook of microalgal culture: Biotechnology and applied phycology*. Blackwell Science Ltd. 2(2): 20–39.
- Mathur, M. 2019. Bioactive Molecules of Spirulina: A food supplement. In: *Bioactive Molecules in Food*. Springer Nature Publisher. Turkey.
- Maurice, M. L. 2011. *Factors Effecting Ethanol Fermentation Via Simultaneous Saccharification And Fermentation: A Study To Determine The Optimal Operating Conditions To Convert Cellulosic Biomass Into Ethanol During Enzymatic Hydrolysis And Microbial Fermentation*. Massachusetts: Worcester Polytechnic Institute.
- Meng, J., J. L. Wang, Y. P. Hao, M. X. Zhu, & J. Wang. 2023. Effects of *Lactobacillus fermentum* GD01 fermentation on the nutritional components and flavor substances of three kinds of bean milk. *LWT – Food Science and Technology*. 5: 107–119.
- Mishra, T., M. Joshi, S. Singh, P. Jain, R. Kaur, S. Ayub, & K. Kaur. 2013. Spirulina: The beneficial algae. *International Journal of Applied Microbiology Science*.

2(3): 21–35.

- Molyneux, P. 2004. The use of the stable free radical diphenylpicryl-hydrazyl (DPPH) for estimating antioxidant activity. *Songklanakarin Journal of Science and Technology*. 26(2): 211–219.
- Morales, G., P. Sierra, S. Mancilla, A. Paredes, L. A. Loyola, O. Gallardo, & J. Borquez. 2003. Secondary metabolites from four medicinal plants from Northern Chile: Antimicrobial activity and biotoxicity against *Artemia salina*. *Journal of the Chilean Chemical Society*. 48(2).
- Mora-Villalobos, J. A., J. Montero-Zamora, N. Barboza, C. Rojas-Garbanzo, J. Usaga, M. Redondo-Solano, L. Schroedter, A. Olszewska-Widdrat, & J. P. López-Gómez. 2020. Multi-product lactic acid bacteria fermentations: A review. *Fermentation*. *Journal Chemical Society*. 10: 320–329.
- Mujika, J., J. Uranga, & J. Matxain. 2013. Computational study on the attack of ·OH radicals on aromatic amino acids. *Chemistry*. 19(21): 6862–6873.
- Munteanu, I. G., & C. Apetrei. 2021. Analytical methods used in determining antioxidant activity: A review. *International Journal of Molecular Sciences*. 22(7): 30–38.
- Muthmainnah, B. 2017. Skrining fitokimia senyawa metabolit sekunder dari ekstrak etanol buah delima (*Punica granatum L.*) dengan metode uji warna. *Jurnal Media Farmasi*. 2(2): 20-28.
- Najmah. 2024. Produk fermentasi probiotik acar timun (pickled cucumber) dengan penambahan sari lemon sebagai pangan fungsional. *Jurnal Normalitas*. 12(2): 143–152.
- Neha, K., M. Haider, A. Pathak, & M. Yar. 2019. Medicinal prospects of antioxidants: A review. *European Journal of Medicinal Chemistry*. 178: 687–704.
- Niccolai, A., E. Shannon, N. A. Ghannam, N. Biondi, L. Rodolfi, & M. R. Tredici. 2019. Lactic acid fermentation of *Arthrospira platensis* (Spirulina) biomass for probiotic-based products. *Journal of Applied Phycology*. 31: 1077–1083.
- Nisa, K., V. T. Rosyida, S. Nurhayati, A. W. Indrianingsih, C. Darsih, & W. Apriyana. 2018. Total phenolic contents and antioxidant activity of rice bran fermented with lactic acid bacteria. *International Conference on Natural Products and Bioresource*. 1: 20–29.
- Nur, M. M. A., T. M. Setyoningrum, H. N. Suwardi, B. Alfitamara, A. Kurniawan, V. A. Prananda, D. N. Afni, S. Alodia, & R. Pamularsih. 2021. Potensi *Spirulina platensis* sebagai sumber kosmetik dan bioplastik (review). 1(1): 65-76.
- Nurilmala, M., T. Nurhayati, & R. Roskananda. 2018. Limbah industri filet ikan patin untuk hidrolisat protein. *Jurnal Pengolahan Hasil Perikanan Indonesia*. 21(2): 287–294.

- Nurkhasanah, M. S. Bachri, & S. Yuliani. 2023. *Antioksidan dan Stres Oksidatif*. UAD Press. Yogyakarta.
- Nwachukwu, I., & R. Aluko. 2019. Structural and functional properties of food protein-derived antioxidant peptides. *Journal of Food Biochemistry*. 10: 2320–2329.
- Ould Bellahcen, T., M. Cherki, J. A. C. Sánchez, A. Cherif, & A. El Amrani. 2019. Chemical composition and antibacterial activity of the essential oil of *Spirulina platensis* from Morocco. *Journal of Essential Oil-Bearing Plants*. 22(5): 1265–1276.
- Palacios, O., B. López, & L. De-Bashan. 2022. *Microalga growth-promoting bacteria* (MGPB): A formal term proposed for beneficial bacteria involved in microalgal–bacterial interactions. *Algal Research*. 1: 180–209.
- Parada, J., G. Caire, M. De Mule, M. Storni, & B. Cano. 1998. Lactic acid bacteria growth promoters from *Spirulina platensis*. *International Journal of Food Microbiology*. 45(3): 225–228.
- Park, W., H. Kim, M. Li, D. Lim, J. Kim, S. Kwak, C. Kang, M. Ferruzzi, & M. Ahn. 2018. Two classes of pigments, carotenoids and C-phycocyanin, in spirulina powder and their antioxidant activities. *Molecules: A Journal of Synthetic Chemistry and Natural Product Chemistry*. 23: 1–12.
- Peres Fabbri, L., A. Cavallero, F. Vidotto, & M. Gabriele. 2024. Bioactive peptides from fermented foods: Production approaches, sources, and potential health benefits. *Foods*. 13(21): 3369.
- Phyu, H. E., Z. K. Oo, & K. N. Aye. 2015. Screening on proteolytic activity of lactic acid bacteria from various yogurts and fermented milk. *International Journal of Advanced Science Engineering Technology*. 11: 34–37.
- Pontonio, E., C. Dingo, M. Gobbetti, & C. G. Rizzello. 2019. Maize milling by-products: From food wastes to functional ingredients through lactic acid bacteria fermentation. 7: 620–649.
- Punia, S., K. Sandhu, S. Grasso, S. Purewal, M. Kaur, A. Siroha, K. Kumar, V. Kumar, & M. Kumar. 2020. *Aspergillus oryzae* fermented rice bran: A byproduct with enhanced bioactive compounds and antioxidant potential. *Foods*. 10: 1–12.
- Purwaningsih, S., & E. Deskawati. 2021. Karakteristik dan aktivitas antioksidan rumput laut *Gracilaria* sp. asal Banten: Characteristics and antioxidant activities of *Gracilaria* sp. seaweed from Banten. *Jurnal Pengolahan Hasil Perikanan Indonesia*. 23(3): 503–512.
- Putra, A. H., P. Anwar, & Jiyanto. 2021. Kualitas fisik silase daun kelapa sawit dengan penambahan bahan aditif ekstrak cairan asam laktat. *Jurnal Green Swarnadwipa*. 10(3): 351–362.
- Putra, M. M. P., W. Wisnumurti, N. H. Athallah, A. T. A. Zaen, A. R. Sahura, & Ustadi.

2025. Influence of enzyme concentration, hydrolysis duration, and drying temperature on the production of antioxidant-containing peptide from catfish (*Clarias* sp.) gills. *Journal of Applied Food Technology*. 12(1): 57–64.
- Qosim, A. M., D. J. Subagyono, and R. Gunawan. 2024. Studi Pirolisis Mikroalga (*Spirulina platensis*) Terhadap Konsentrasi Produk Turunan Karbohidrat. UAD Press. Yogyakarta
- Quatravaux, S., F. Remize, E. Bryckaert, D. Colavizza, & J. Guzzo. 2006. Examination of *Lactobacillus plantarum* lactate metabolism side effects in relation to the modulation of aeration parameters. *Journal of Applied Microbiology*. 101: 903–912.
- Rahmadi, A. 2019. Bakteri asam laktat dan mandai cempedak. Mulawarman University Press. Kalimantan
- Rahmawati, A., Muflihunna, & L. M. Sarif. 2015. Analisis aktivitas antioksidan produk sirup buah mengkudu (*Morinda citrifolia* L.) dengan metode DPPH. 5(5): 20–29.
- Rahmawati, S., S. Hidayatulloh, & M. Suprayatmi. 2017. Ekstraksi fikosianin dari *Spirulina platensis* untuk biopigmen dan antioksidan. *Jurnal Pertanian*. 8(1): 36–45.
- Restiani, R. 2016. Hidrolisis secara enzimatis protein bungkil biji nyamplung (*Calophyllum inophyllum*) menggunakan bromelain. *Biota: Jurnal Ilmiah Ilmu-ilmu Hayati*. 103–110.
- Reuter, G. 1985. Elective and selective media for lactic acid bacteria. *International Journal of Food Microbiology*. 2: 55–68.
- Ricci, I., R. Artacho, and M. Olalla. 2010. Milk protein peptides with angiotensin I-converting enzyme inhibitory (ACEI) activity. *Critical Reviews in Food Science and Nutrition*. 50(5): 390–402.
- Rizaldi, R. 2017. Isolasi dan karakterisasi bakteri proteolitik yang berasosiasi dengan lamun *Enhalus acoroides* di Pantai Bama, Taman Nasional Baluran, Situbondo, Jawa Timur. Universitas Airlangga, Jawa Timur. Skripsi.
- Robi, N. H. 2014. Pemanfaatan ekstrak tauge kacang hijau (*Phaseolus radiatus*) sebagai pupuk untuk meningkatkan populasi *Spirulina* sp. Universitas Airlangga. Skripsi
- Rodriguez, H., J. A. Curiel, J. M. Landete, B. De las Rivas, F. L. De Felipe, & Gomez-Cordoves. 2009. Food phenolics and lactic acid bacteria. *International Journal of Food Microbiology*. 5(2): 220–236.
- Romay, C. H., R. González, N. Ledón, D. Ramirez, & V. Rimbau. 2003. C-phycocyanin: A biliprotein with antioxidant, anti-inflammatory and neuroprotective effects. *Current Protein and Peptide Science*. 4(1): 207–216.

- Rusli, F. Amalia, & Z. Dwyana. 2018. Potensi bakteri *Lactobacillus acidophilus* sebagai antidiare dan imunomodulator. *Jurnal Biologi Makassar*. 3(2): 25–30.
- Rutherford, S. M. 2010. Methodology for determining degree of hydrolysis of protein hydrolysates: A review. *Journal of AOAC International*. 93(5): 1515–1522.
- Sadeer, N. B., D. Montesano, S. Albrizio, G. Zengin, & M. F. Mahomoodally. 2020. The versatility of antioxidant assays in food science and safety—Chemistry, applications, strengths, and limitations. *Food Processing Journal*. 2: 20–49.
- Said, S. D., K. Pontas, A. Thaib, T. Maimun, & C. Silvianti. 2022. Increasing crude protein content of sago dregs through solid state fermentation process. *Journal of Applied Technology*. 9(1): 1–6.
- Salampe, M., S. Rahimah, S. Nur, S. S. Mamada, F. S. Biring, K. Keyzia, F. N. Matandung, D. Payung, A. A. Rahman, N. Wahyuddin, & V. P. Ivone. 2025. Uji aktivitas antioksidan ekstrak daun murbei (*Morus alba*) menggunakan metode BCB, CUPRAC, dan FRAP. *Journal Pertanian Indonesia*. 2(2): 22-45.
- Salmean, G. G., F. L. Castillo, & C. G. Cevallos. 2015. Nutritional and toxicological aspects of spirulina (*Arthrospira platensis*). *Nutrición Hospitalaria*. 32(1): 34–40.
- Salminen, S., A. Von Wright, L. Morelli, P. Marteau, D. Brassart, W. M. De Vos, R. Fondén, M. Saxelin, K. Collins, G. Mogensen, S. E. Birkeland, & T. Mattila-Sandholm. 1998. Demonstration of safety of probiotics: A review. *International Journal of Food Microbiology*. 44(1–2): 93–106.
- Sanatang, P., & T. Purnama. 2023. Uji skrining fitokimia ekstrak supernatan dari bakteri endofit kulit pisang. *Jurnal Biologi Makassar*. 8(1): 44–50.
- Saputro, M. N. B. 2016. Profil protein, aktivitas antioksidan, dan inhibitor ACE dari susu kuda dan hidrolisatnya. Disertasi. Institut Pertanian Bogor, Bogor.
- Sari, R. A., R. Nofiani, & P. Ardiningsih. 2012. Karakterisasi bakteri asam laktat genus *Leuconostoc* dari pekasam ale-ale hasil formulasi skala laboratorium. 1(1): 14–20.
- Sari. 2012. Isolasi dan karakterisasi bakteri asam laktat (BAL) dari buah-buahan di Riau. *Jurnal Mikrobiologi*. 2(1): 10-19.
- Sasaki, M., B. W. Bosman, & P. S. Tan. 1995. Comparison of proteolytic activities in various lactobacilli. *Journal of Dairy Research*. 62: 601–610.
- Sayuti, K., & R. Yenrina. 2015. Antioksidan alami dan sintetik. Andalas University Press, Padang.
- Seo, H. S., S. Y. Kwak, & Y. S. Lee. 2010. Antioxidative activities of histidine containing caffeic acid-dipeptides. *Bioorganic & Medicinal Chemistry Letters*. 20: 4266–4272.

- Setianingsih, S. 2010. Kajian senyawa antimikroba bakteri asam laktat homofermentatif isolat ASI. Skripsi. Institut Pertanian Bogor.
- Setyaningsih, I., S. Afriani, & Uju. 2018. Komposisi kimia *Spirulina platensis* yang dikultivasi dalam fotobioreaktor dengan fotoperiode berbeda. *Jurnal Pengolahan Hasil Perikanan Indonesia*. 21(3): 471–479.
- Shanthi, G., M. Premalatha, & N. Anantharaman. 2021. Potential utilization of fish waste for the sustainable production of microalgae rich in renewable protein and phycocyanin—*Arthrospira platensis* (*Spirulina*). *Journal of Cleaner Production*. 294: 126106.
- Shu, G., Z. Wang, C. Dai, C. Yao, X. Dong, H. Wan, & H. Chen. 2021. Effect of alcalase on antioxidant and antihypertensive activities of goat milk fermented by *Lactobacillus plantarum* L60 and *Lactobacillus rhamnosus* LR22. 521329.
- Singhania, R. R., R. K. Sukumaran, A. K. Patel, C. Larroche, & A. Pandey. 2010. Advancement and comparative profiles in the production technologies using solid-state and submerged fermentation for microbial cellulases. *Enzyme and Microbial Technology*. 46: 541–549.
- Sopandi, T., & Wardah. 2014. *Mikrobiologi pangan*. Penerbit Andi, Yogyakarta.
- Starzyńska-Janiszewska, A., B. Stodolak, & A. Wikiera. 2015. Proteolysis in tempeh-type products obtained with *Rhizopus* and *Aspergillus* strains from grass pea (*Lathyrus sativus*) seeds. *Acta Scientiarum Polonorum Technologia Alimentaria*. 14: 125–132.
- Suciati, F., Nurliyani, & Indratiningsih. 2019. Physicochemical, microbiological and sensory properties of fermented whey using kombucha inoculum. *Bulletin of Animal Science*. 43(1): 52–57.
- Suharman, N. K. Izzati, & T. A. N. Himelda. 2023. Analisis cemaran mikroba dalam produk minuman sari kedelai dengan metode total plate count (TPC). 1(1): 9–13.
- Sulistiawati, E., M. Setyawan, Z. Abidin, M. Darmawan, H. A. Makasar, & T. W. Pamungkas. 2023. Perbandingan kinerja ekstraksi fikobiliprotein dari *Spirulina platensis* melalui pengadukan dan freezing-thawing. *JPB Kelautan dan Perikanan*. 18(1): 41–49.
- Sumbali, G., & R. S. Mehrotra. 2009. *Principles of microbiology*. Tata McGraw Hill, New Delhi.
- Suminto, C. D. Setiawan, W. Nurcholis, U. Hasanah, & Trivadila. 2025. Optimization of *Justicia gendarussa* Burm.f. fermentation by *Aspergillus oryzae* based on total phenolic, total flavonoid, and antioxidant capacity responses. *Journal of Applied Biology & Biotechnology*. 13(4): 41–48.
- Sunaryanto, R., & Marwoto. 2012. Isolasi, identifikasi, dan karakterisasi bakteri asam

laktat dari dadih susu kerbau. *Jurnal Sains dan Teknologi Indonesia*. 14(2): 228–233.

Suprihatin. 2010. *Teknologi fermentasi*. UNESA University Press, Surabaya.

Susilowati, A. Y., S. N. Jannah, H. P. Kusumaningrum, & Sulistiani. 2022. Isolasi dan identifikasi bakteri asam laktat dari susu kambing sebagai bakteri antagonis *Listeria monocytogenes* dan *Escherichia coli* penyebab foodborne disease. *Jurnal Teknologi Pangan*. 6(2): 33–41.

Tacias-Pascacio, V., R. Morellon-Sterling, E. Siar, O. Tavano, Á. Berenguer-Murcia, & R. Fernández-Lafuente. 2020. Use of Alcalase in the production of bioactive peptides: A review. *International Journal of Biological Macromolecules*. 4(2): 33–41.

Thevarajah, B., G. Nishshanka, M. Premaratne, P. Nimarshana, D. Nagarajan, J. Chang, & T. Ariyadasa. 2022. Large-scale Production of *Spirulina*-based Proteins and c-phycoyanin: A Biorefinery Approach. *Biochemical Engineering Journal*. 3(2): 43–51

Tolpeznikaite, E., V. Bartkevics, A. Skrastina, R. Pavlenko, M. Ruzauskas, V. Starkute, E. Zokaityte, D. Klupsaite, R. Ruibys, & J. M. Rocha. 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(2): 248.

Tomassi, E., N. Arouna, M. G. Caruso, A. Girgenti, P. Picone, D. Nuzzo, & L. Pucci. 2025. Fermentation of *Chlorella vulgaris* and *Aphanizomenon flos-aquae* biomass improves the antioxidant profile. *LWT – Food Science and Technology*. 156723.

Tonolo, F., A. Folda, S. Ferro, R. Seraglia, A. Lombardi, C. Andrighetto, A. Giannoni, O. Marin, & M. Rigobello. 2023. Fermentation of corn by-products: From agrifood waste to higher value antioxidant products. *Fermentation*. 2: 147568.

Tulasi, M. I., N. D. F. K. Foeh, & A. I. R. Detha. 2024. Studi literatur senyawa metabolit bakteri asam laktat dan kegunaannya dalam mengoptimalkan kesehatan hewan. *Jurnal Veteriner Nusantara*. 7(25): 1–11.

Urcan, A. C., A. D. Criste, & D. S. Dezmirean. 2024. Impact of solid-state fermentation processes on the bioactive profile and antioxidant activity of bee-collected pollen. *Scientific Papers: Animal Science and Biotechnologies*. 57 (2).

Usman, M., Q. Li, D. Luo, Y. Xing, & D. Dong. 2024. Valorization of soybean by-products for sustainable waste processing with health benefits. *Journal of the Science of Food and Agriculture*. 105. <https://doi.org/10.1002/jsfa.13999>

Vaquero, I., A. Marcobal, & R. Muñoz. 2004. Tannase activity by lactic acid bacteria isolated from grape must and wine. *International Journal of Food Microbiology*. 96(2): 199–204. <https://doi.org/10.1016/J.IJFOODMICRO.2004.04.004>

- Verni, M., C. Dingo, C. Rizzello, & E. Pontonio. 2021. Lactic acid bacteria fermentation and endopeptidase treatment improve the functional and nutritional features of *Arthrospira platensis*. *Frontiers in Microbiology*. 127561.
- Vieira da Silva, B., J. C. M. Barreira, & M. B. P. P. Oliveira. 2016. Natural phytochemicals and probiotics as bioactive ingredients for functional foods: Extraction, biochemistry and protected-delivery technologies. *Trends in Food Science & Technology*. 50: 144–158. <https://doi.org/10.1016/j.tifs.2015.12.007>
- Virtanen, T., A. Pihlanto, S. Akkanen, & H. Korhonen. 2007. Development of antioxidant activity in milk whey during fermentation with lactic acid bacteria. *Journal of Applied Microbiology*. 102(1): 106–115. <https://doi.org/10.1111/j.1365-2672.2006.03072>
- Vonshak, A. 1997. *Spirulina platensis (Arthrospira)*. Taylor & Francis Press. Great Britain.
- Waluyo, L. 2005. *Mikrobiologi umum*. UMM Press, Malang.
- Wang, H. M., S. J. Tsai, & J. Y. Lin. 2025. Fermentation characteristics of lactofermented cucumbers using an isolated *Lactiplantibacillus plantarum* NCHU-FC1 strain. *Applied Food Research*. 5: 100742.
- Wang, J., & W. Wan. 2009. Factors influencing fermentative hydrogen production: A review. *International Journal of Hydrogen Energy*. 34: 799–811.
- Wang, Z., Y. Feng, N. Yang, T. Jiang, H. Xu, & H. Lei. 2022. Fermentation of kiwifruit juice from two cultivars by probiotic bacteria: Bioactive phenolics, antioxidant activities and flavor volatiles. *Food Chemistry*. 373.
- Wardani, Y. K., E. B. E. Kristiani, & Suchyo. 2020. Korelasi antara aktivitas antioksidan dengan kandungan senyawa fenolik dan lokasi tumbuh tanaman *Celosia argentea* Linn. *Jurnal Bioma*. 22(2): 136–142.
- Wibowo, M. S. 2012. Pertumbuhan dan kontrol bakteri. *Jurnal Pertumbuhan Bakteri*. Yogyakarta Press. UNY.
- Wibowo, R. 1988. *Petunjuk Khusus Deteksi Mikroba Pangan*. Gramedia Press. Yogyakarta: Pusat Antar Universitas Pangan dan Gizi Universitas Gadjah Mada.
- Widodo, W. 2002. *Bioteknologi Fermentasi Susu*. Malang: Pusat Pengembangan Bioteknologi UMM Press. Malang.
- Winarti, S. 2010. *Makanan Fungsional*. Graha Ilmu. Yogyakarta.
- Wu, Z. Q. 2006. *The Technology and Application of Solid State Fermentation*. Beijing: Chemical Industry Press.
- Wu, Q., L. Liu, A. Miron, B. Klimova, D. Wan, & K. Kuča. 2016. The antioxidant, immunomodulatory, and anti-inflammatory activities of *Spirulina*: An overview.

Archives of Toxicology. 90: 1817–1840. <https://doi.org/10.1007/s00204-016-1744-5>

- Wulandani, B. R. D., D. Kisworo, M. Bulkaini Yasin, M. C. C. Timah, & A. Fudholi. 2020. Antioxidant activities and viability of lactic acid bacteria in yogurt made from buffalo milk with addition of blewah (*Cucumis melo* L. var. *reticulatus* Naudin) juice. *International Journal of Advanced Science and Technology*. 29: 4788–4796.
- Wulantika, N. W., A. S. Yasir, & M. W. Wiranti. 2019. Potensi *Spirulina platensis* terhadap aktivitas antioksidan, antidiabetes dan antihipertensi. *Jurnal Farmasi Malahayati*. 2(2): 164–174.
- Yay, C. Z. O., S. Cinar, T. B. Donmez, O. Tumer, G. Guneser, & M. I. Hosoglu. 2024. Optimizing bioreactor conditions for *Spirulina* fermentation by *Lactobacillus helveticus* and *Kluyveromyces marxianus*: Impact on chemical & bioactive properties. *Bioresource Technology*. 130832. <https://doi.org/10.1016/j.biortech.2024.130832>
- Yin, Z. T., L. S. Chang, A. S. Babji, N. A. M. Zaini, S. Fazry, S. R. Sarbini, C. K. Peterbauer, & S. J. Lim. 2024. A review on proteolytic fermentation of dietary protein using lactic acid bacteria for the development of novel proteolytically fermented foods. *International Journal of Food Science and Technology*. 59(3): 1213–1236. <https://doi.org/10.1111/ijfs.16888>
- You, L., M. Zhao, J. M. Regenstein, & J. Ren. 2010. Changes in the antioxidant activity of loach (*Misgurnus anguillicaudatus*) protein hydrolysates during a simulated gastrointestinal digestion. *Food Chemistry*. 120: 810–816.
- Yu, H., Y. Liu, X. Wang, J. Liu, & H. Liu. 2020. Probiotic *Lactobacillus* and *Bifidobacterium* improve physiological function and antioxidant capacity in weaned rats. *Frontiers in Microbiology*. 11: 1540. <https://doi.org/10.3389/fmicb.2020.01540>
- Yu, J., D. Ma, S. Qu, Y. Liu, H. Xia, F. Bian, Y. Zhang, C. Huang, R. Wu, J. Wu, S. You, & Y. Bi. 2020. Effects of different probiotic combinations on the components and bioactivity of *Spirulina*. *Journal of Basic Microbiology*. 1–15.
- Yulvizar, C., & Z. Ananda. 2021. Isolasi dan identifikasi bakteri dari ginjal ikan nila (*Oreochromis niloticus*). *Jurnal Bioleuser*. 5(3): 51–55.
- Yusmarini, T. Indrati, Y. Utami, & Y. Marsono. 2010. Aktivitas proteolitik bakteri asam laktat dalam fermentasi susu kedelai. *Jurnal Teknologi dan Industri Pangan*.
- Zhang, J., B. Dang, X. Zhang, & J. Yang. 2024. Effect of solid-state fermentation with *Bacillus subtilis* on polyphenol enrichment and antioxidant activity in black highland barley. *Journal of Food Measurement and Characterization*. 4: 176598.
- Zhang, J., P. Wang, Y. Tan, Y. Zhao, J. Zhu, X. Bai, L. Xiao, D. Zhang, J. Teng, L. Tian,

& H. Liu. 2022. Effects of *Lactiplantibacillus plantarum* dy-1 fermentation time on the characteristic structure and antioxidant activity of barley β -glucan in vitro. *Current Research in Food Science*. 5: 125–130. <https://doi.org/10.1016/j.crfs.2021.12.005>

Zhang, N., D. Li, X. Zhang, Y. Shi, & H. Wang. 2015. Whole oats as a synbiotic food rich in lactic acid bacteria and prebiotic by solid-state fermentation. *Food & Function*. 7: 657849

Zhang, Y., P. Hu, L. Lou, M. Zhan, D. Fan, Q. Li, & Q. Liao. 2017. Antioxidant activities of lactic acid bacteria for quality improvement of fermented sausage. 4: 124356.

Zheng, J., T. Inoguchi, S. Sasaki, Y. Maeda, M. F. McCarty, M. Fujii, N. Ikeda, K. Kobayashi, N. Sonoda, & R. Takayanagi. 2013. Phycocyanin and phycocyanobilin from *Spirulina platensis* protect against diabetic nephropathy by inhibiting oxidative stress. *American Journal of Physiology – Regulatory, Integrative and Comparative Physiology*. 304(2): R110–R120. <https://doi.org/10.1152/ajpregu.00648.2011>