

DAFTAR PUSTAKA

- Ackah, E., & Dompey, E. 2021. Effects of Fermentation and Drying Durations on The Quality of Cocoa (*Theobroma cacao* L.) Beans During the Rainy Season in The Juaboso District of the Western-North Region, Ghana. *Bulletin of the National Research Centre*, 45(175). 1–10.
- Akoa, S. P., Boulanger, R., Effa Onomo, P., Lebrun, M., Ondobo, M. L., Lahon, M. C., Djocgoue, P. F. 2023. Sugar Profile and Volatile Aroma Composition in Fermented Dried Beans and Roasted Nibs From Six Controlled Pollinated Cameroonian Fine-Flavor Cocoa (*Theobroma cacao* L.) Hybrids. *Food Bioscience*, 53. 1–15.
- Aunillah, A., Purwanto, E. H., Wardiana, E., & Iflah, T. 2021. The Effect of Fermentation Process, Extraction Methods and Solvents on Yield, Total Polyphenol, and Antioxidant Levels of Cocoa Beans. *IOP Conference Series: Earth and Environmental Science*, 828(1). 1–7.
- Balcázar-Zumaeta, C. R., Pajuelo-Muñoz, A. J., Trigos-Rojas, D. F., Iliquin-Chavez, A. F., Fernández-Romero, E., Yoplac, I., Castro-Alayo, E. M. 2023. Reduction in the Cocoa Spontaneous and Starter Culture Fermentation Time Based on the Antioxidant Profile Characterization. *Foods*, 12(17). 1–35.
- Becerra, L. D., María, X. Q.-C., Sebastian, E., & Ruth, Y. R. 2023. Correlation Between Color Parameters and Bioactive Compound Content During Cocoa Seed Transformation Under Controlled Process Conditions. *Food Bioscience*, 53. 1–10.
- Bobiles, S. C., Elegado, F. B., Millena, C. G., & Merca, F. E. 2022. Small-Scale Cacao (*Theobroma cacao* L.) Fermentation Process Utilizing Cacao Pod Husk. *Food Research*, 6(4). 236–245.
- Campos, S. D. M., Martínez-burgos, W. J., Anacleto, G., Ocán-torres, D. Y., Costa, S., Vega, F. R., Soccol, C. R. 2025. The Role of Microbial Dynamics, Sensorial Compounds, and Producing Regions in Cocoa Fermentation. *Microbiology Research*, 16(75). 1–34.
- Chóez-Guaranda, I., Maridueña-Zavala, M., Quevedo, A., Quijano-Avilés, M., Manzano, P., & Cevallos-Cevallos, J. M. 2024. Changes in GC-MS Metabolite Profile, Antioxidant Capacity and Anthocyanins Content During Fermentation of Fine-Flavor Cacao Beans From Ecuador. *Plos One*, 19(3). 1–30.
- Dewandari, K. T., Rahmawati, R., & Munarso, S. J. 2021. The Effect of Techniques and Fermentation Time on Cocoa Beans Quality (*Theobroma cacao* L.). *IOP Conference Series: Earth and Environmental Science*, 653(1). 1–8.
- Díaz-Muñoz, C., & De Vuyst, L. 2022. Functional Yeast Starter Cultures for Cocoa Fermentation. *Journal of Applied Microbiology*, 133(1), 39–66.
- Dulce, V.-R., Gschaedler, A., Kirchmayr, M., Avendaño-Arrazate, C., Rodríguez-Campos, J., Calva-Estrada, S. de J., & Lugo-Cervantes, E. 2021. Cocoa Bean Turning as a Method for Redirecting the Aroma Compound Profile in Artisanal Cocoa Fermentation. *Heliyon*, 7(8). 1–12.

- Falconí, C. E., Viviana, Y.-M., Roberto, J. H., & Darwin, R. C. 2023. Inoculum of a Native Microbial Starter Cocktail to Optimize Fine-Aroma Cocoa (*Theobroma cacao*) Bean Fermentation. *Agronomy*, 13(10). 1–16.
- González, A. F. R., Gustavo, A. G. G., Paola, A. P.-H., Luis, J. L., & Juan, C. S. 2024. Fermentation and its Effect on the Physicochemical and Sensory Attributes of Cocoa Beans in the Colombian Amazon. *Plos One*, 19(10). 1–20.
- Gulcin, İ., & Saleh, H. A. (2023). DPPH Radical Scavenging Assay. *Processes*, 11(8). 1–20.
- Gutiérrez-Ríos, H. G., Suárez-Quiroz, M. L., Hernández-Estrada, Z. J., Castellanos-Onorio, O. P., Alonso-Villegas, R., Rayas-Duarte, P., González-Rios, O. 2022. Yeasts as Producers of Flavor Precursors during Cocoa Bean Fermentation and Their Relevance as Starter Cultures: A Review. *Fermentation*, 8(7). 1–18.
- Handayani, A. P., Setiawan, A. W., & Handoko, Y. A. 2022. Perbandingan Kualitas Fermentasi Biji Kakao dengan Penambahan Kultur Campur dan Kultur Tunggal *Lactobacillus plantarum*. *Jurnal Galung Tropika*, 11(1). 1–14.
- Haruna, L., Ernest, E. A., Ernest, T., Isaac, T., Wilson, Y., Kesse, J. A., & Mary, L. 2024. Effects of Predrying and Spontaneous Fermentation Treatments on Nib Acidification, Fermentation Quality, and Flavour Attributes of Ghanaian Cocoa (*Theobroma cacao*) Beans. *International Journal of Food Science*, 2024. 1-15.
- Husna, A., Agatha, S., Noor, H., Vritta, W., Rista, A., Hanif, M., & Dahlia, E. 2024. Physical and Flavor Qualities of Cocoa Beans Affected by Different Box Fermenter Capacity, Fermentation Length, and Microbial Cultures. *BIO Web of Conferences*, 143. 1–7.
- Kadir, I., Tanhindarto, R. P., Widyastuti, H., Pratama, I. M., & Lasmawati, D. 2023. Application of Gamma Irradiation in Dried Cocoa (*Theobroma cacao* L.) Seeds Physico-Chemical Properties. *IOP Conference Series: Earth and Environmental Science*, (1). 1–7.
- Kouassi, A. D. D., Koné, K. M., Assi-Clair, B. J., Lebrun, M., Maraval, I., Boulanger, R., Guehi, T. S. 2022. Effect of Spontaneous Fermentation Location on the Fingerprint of Volatile Compound Precursors of Cocoa and the Sensory Perceptions of the End-Chocolate. *Journal of Food Science and Technology*, 59(11). 4466–4478.
- Lastriyanto, A., & Aulia, A. I. 2021. Analisa Kualitas Madu Singkong (Gula Pereduksi, Kadar Air, dan Total Padatan Terlarut) Pasca Proses Pengolahan dengan Vacuum Cooling. *Jurnal Ilmu Produksi Dan Teknologi Hasil Peternakan*, 9(2). 110–114.
- Liu, Y., Duan, N., Jiang, L., He, H., Cheng, H., Liao, J., Xu, F. 2023. A New Method to Determine Composition of Sphalerite Without Secondary Pollution Based on CIELAB Color Space. *SusMat*, 3(5). 671–681.
- López-Hernández, M. del P., Jenifer, C.-N., Camilo, I. J.-B., & María, D. L.-T. 2021. Growth, Respiration and Physicochemical Changes During the Maturation of Cacao Fruits. *Journal of the Science of Food and Agriculture*, 101(13). 5398–5408.
- Marwati, T., Djaafar, T. F., Hatmi, R. U., Kobarsih, M., Indrasari, S. D., Fitrotin, U.,

- Rahayu, E. S. 2024. Alternative Fermentation Method of Cocoa Beans: The use of *Lactiplantibacillus plantarum* subsp. *plantarum* HL-15 as Starter Culture and Valorization of Cocoa Pulp By-product. *Journal of Agriculture and Food Research*, 18. 1–10.
- Marwati, T., Purwaningsih, Djaafar, T. F., Sari, A. B. T., & Hernani. 2021. Inhibition the Growth of Fungi and Improving the Quality of Cocoa Beans Through Fermentation Using Lactic Acid Bacteria. *IOP Conference Series: Earth and Environmental Science*, 807(2). 1–13.
- Mayra, O. C., & Manosalvas-quiros, L.-A. 2024. Effect of Fermentation Parameters on the Antioxidant Activity of Ecuadorian Cocoa (*Theobroma cacao* L.), 9(6). 872–886.
- Melo, T. S., Tássia, C. P., João, V. P. E., Alana, L. O. M., Leonardo, F. M., & Eliete, da S. B. 2021. Evaluation of the Content of Bioactive Compounds in Cocoa Beans During the Fermentation Process. *Journal of Food Science and Technology*, 58(5). 1947–1957.
- Mougang, N. N., Tene, S. T., Zokou, R., Kohole, H. A. F., Solefack, E. N., Ntongme Mboukap, A., Womeni, H. M. 2024. Influence of Fermentation Time, Drying Time and Temperature on Cocoa Pods (*Theobroma cacao* L.) Marketability. *Applied Food Research*, 4(2). 1–10.
- Ngatirah, Danik, N., & Nuraeni, D. D. 2024. Pelatihan Pengolahan Buah Kakao Menjadi Biji Kakao Kering Terfermentasi Untuk Meningkatkan Kualitas Produk. *JMM (Jurnal Masyarakat Mandiri)*, 8(1). 289–302.
- Ojimmelukwe, P. C. 2025. Microbial Succession During Box and Heap Fermentation of Cocoa Beans (*Theobroma Cocoa*) - impacts on Nutrients and Chocolate Quality. *Research Square*, 1–20.
- Oliveira, M. M., Cerqueira, B. V., Barbon, S., & Barbin, D. F. 2021. Classification of Fermented Cocoa Beans (Cut Test) Using Computer Vision. *Journal of Food Composition and Analysis*, 97. 1–8.
- Pakpahan, S., Agustina, G., Simbolon, H., Artha, T., & Nadeak, U. 2025. Organoleptic Test and Hedonic Test on Biscuits Made from Sweet Potato Leaves and Tilapia Fish. *Jurnal Penelitian Pendidikan IPA*, 11(4). 20–31.
- Paramuj, M., Wanbahroni, J. B., & Wahyu, S. 2022. Improving the Quality of Cacao Beans (*Theobroma cacao* L.) With the Use of Yeast Types and Soaking Time in the Fermentation Process. *Jurnal Pertanian Tropik*, 9(3). 196–200.
- Permata, A. A., & Hidayah, N. 2024. Analysis of The Effect of Fermentation Duration on the Organoleptic Properties of Dried Cocoa Beans (*Theobroma cacao* L.) at Nglanggeran Agricultural Technology Park. *Journal of Halal Science and Research (JHSR)*, 5(2). 182–190.
- Piankarn, C., Ruamporn, L., Korawit, C., & Chiu-Hsia, C. 2021. Fermentation Profile of Thai Cocoa Beans. *PIM International Conference*, 3(3). 24–33.
- Piekarska-Radzik, L., & Klewicka, E. 2021. Mutual Influence of Polyphenols and *Lactobacillus* spp. Bacteria in Food: A Review. *European Food Research and Technology*, 247(1). 9–24.
- Pinto, A., Antoine, D., Giulia, V. L., Ana, C. de O., Fabio, G. M., Douglas, F. B.,

- Hervé, R. 2024. Advances in the Individual Authentication of Cocoa Beans: Vis/NIR Spectroscopy as a Tool to Distinguish Fermented from Unfermented Beans and Classify Genotypes in the Eastern Amazonia. *Food Control*, 164. 1–10.
- Pita-Garcia, J., José, R.-T., Sócrates, P.-P., Emerita, D.-P., Diana, C.-M., Rómulo, S., Fabiola, C. 2025. Impact of Combined Sun and Hybrid Drying Technologies on Cocoa Drying Process and Quality. *Heliyon*, 11(4). 1–15.
- Pokharel, B. 2023. Cocoa Bean Fermentation: Impact on Chocolate Flavor and Quality. *International Journal of Science and Research (IJSR)*, 12(6). 1668–1674.
- Priambodo, D. C., Saputro, D., Pahlawan, M. F. R., Saputro, A. D., & Masithoh, R. E. 2022. Determination of Acid Level (pH) and Moisture Content of Cocoa Beans at Various Fermentation Level Using Visible Near-Infrared (Vis-NIR) Spectroscopy. *IOP Conference Series: Earth and Environmental Science*, 985(1). 1–8.
- Putri, D. N., Hans, D. S., Joel, G. J., Xavier, G., & Joachim, J. S. 2024. Sensory Attributes of Fine Flavor Cocoa Beans and Chocolate: A systematic Literature Review. *Journal of Food Science*, 89(4). 1917–1943.
- Rahayu, E. S., Triyadi, R., Khusna, R. N. B., Djaafar, T. F., Utami, T., Marwati, T., & Hatmi, R. U. 2021. Indigenous Yeast, Lactic Acid Bacteria, and Acetic Acid Bacteria from Cocoa Bean Fermentation in Indonesia Can Inhibit Fungal-Growth-Producing Mycotoxins. *Fermentation*, 7(3). 1-11.
- Raju, R. N., Heyes, J., Archer, R., & Chen, Q. 2024. Influence of Fermentation on the Quality of Fijian *Theobroma cacao* Beans Over Two Harvest Seasons. *New Zealand Journal of Crop and Horticultural Science*, 52(4). 441–454.
- Ramos-Escudero, F., Casimiro-Gonzales, S., Fernández-Prior, Á., Cancino Chávez, K., Gómez-Mendoza, J., Fuente-Carmelino, L. de la, & Muñoz, A. M. 2021. Colour, Fatty Acids, Bioactive Compounds, and Total Antioxidant Capacity in Commercial Cocoa Beans (*Theobroma cacao* L.). *Lwt*, 147. 1–31.
- Remitar, C. P., & Alminda, M. 2023. Quality Evaluation of Cocoa Beans at Various Quantities and Duration of Basket Fermentation. *Annals of Tropical Research*, 45(2). 122–141.
- Rizal, M., Karmawati, E., Siswanto, Trisawa, I. M., Samsudin, Rismayani, Tarigan, N. 2024. A Sustainable and Ecological Approach to Integrated Cocoa Pest Management in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 1346(1). 1-11.
- Sabahannur, S., & Syam, N. 2025. The Effect of Yeast Concentration and Fermentation Time on the Physical, Chemical, and Flavor Characteristics of Cocoa Beans. *Food Research*, 9(2). 118–129.
- Sabahannur, St, Syam, N., & Ervina. 2023. Mutu Fisik dan Kimia Biji Kakao (*Theobroma cacao* L.) pada Beberapa Jenis Klon. *AGROTEK: Jurnal Ilmiah Ilmu Pertanian*, 7(2). 99–107.
- Saputro, A. D., Muhammad, D. R. A., Sunarharum, W. B., Kusumadevi, Z., & Irmandharu, F. 2021. Physical Characteristics of Chocolate Made from

- Cocoa Bean Fermented at Different Duration: A Preliminary Study. *IOP Conference Series: Earth and Environmental Science*, 653(1). 1–10.
- Sari, A. B. T., Efrain, P., Song, X., Rothkopf, I., Schweiggert-Weisz, U., Schieber, A., & Gola, S. 2025. Effects of Processing Methods of Unfermented Cocoa Beans from Indonesia on the Chemical and Physical Characteristics of Butter and Cake. *Journal of Agriculture and Food Research*, 19. 1–9.
- Sari, A. B. T., Fahrurrozi, Tri, M., Titiiek, F. D., Retno, U. H., Purwaningsih, Endang, S. R. 2023. Chemical Composition and Sensory Profiles of Fermented Cocoa Beans Obtained from Various Regions of Indonesia. *International Journal of Food Science*, 2023. 1–13.
- Sari, A. B. T., Belgis, M., Amilia, W., & Murtadlo, F. M. 2023. The Sensory Profile Of Unfermented Cocoa Beans And Its Changes After Moisture Treatments. *AIP Conference Proceedings*, 2583(01), 1–7.
- Subroto, E., Djali, M., Indiarto, R., Lembong, E., & Baiti, N. 2023. Microbiological Activity Affects Post-Harvest Quality of Cocoa (*Theobroma cacao* L.) Beans. *Horticulturae*, 9(7). 1–25.
- Tamimi, K. Al, Chusnul, H., Tyas, U., & Lucia, D. W. 2023. Flavor Precursor Formation of Non-Fermented Forastero Cocoa Beans after Flavourzyme® and Glucose Treatment. *Lwt*, 184. 1–12.
- Tigrero-Vaca, J., Maridueña-Zavala, M. G., Liao, H. L., Prado-Lince, M., Zambrano-Vera, C. S., Monserrate-Maggi, B., & Cevallos-Cevallos, J. M. 2022. Microbial Diversity and Contribution to the Formation of Volatile Compounds during Fine-Flavor Cacao Bean Fermentation. *Foods*, 11(7). 1–19.
- Verce, M., Schoonejans, J., Hernandez Aguirre, C., Molina-Bravo, R., De Vuyst, L., & Weckx, S. 2021. A Combined Metagenomics and Metatranscriptomics Approach to Unravel Costa Rican Cocoa Box Fermentation Processes Reveals Yet Unreported Microbial Species and Functionalities. *Frontiers in Microbiology*, 12(2). 1–24.
- Viesser, J. A., de Melo Pereira, G. V., de Carvalho Neto, D. P., Rogez, H., Góes-Neto, A., Azevedo, V., Soccol, C. R. 2021. Co-culturing Fructophilic Lactic Acid Bacteria and Yeast Enhanced Sugar Metabolism and Aroma Formation During Cocoa Beans Fermentation. *International Journal of Food Microbiology*, 339. 1–11.
- Vuyst, L. De, & Leroy, F. 2020. Functional Role of Yeasts, Lactic Acid Bacteria and Acetic Acid Bacteria in Cocoa Fermentation Processes. *FEMS Microbiology Reviews*, 44(4). 432–453.
- Wiliantari, S., Raditya, I., & Berna, E. 2022. Total Polyphenols, Total Flavonoids, Antioxidant Activity and Inhibition of Tyrosinase Enzymes from Extract and Fraction of *Passiflora ligularis* Juss. *Pharmacognosy Journal*, 14(3). 660–671.
- Yunita, D., Yusriana, Y., Aisyah, Y., Indarti, E., Wahyuni, M. F., & Yani, P. 2021. Characteristics of Lactic Acid Bacteria and Acetic Acid Bacteria Isolated Before and After Fermentation of Cacao Beans from Pidie, Indonesia and Detection of the Flavour Compounds. *IOP Conference Series: Earth and Environmental Science*, 711(1). 1–6.