

## DAFTAR PUSTAKA

- Achaw, O.-W. dan Danso-Boateng, E. 2021. *Chemical and Process Industries with Examples of Industries in Ghana*. Switzerland: Springer Nature Switzerland AG.
- Afoakwa, E. O. 2014. *Cocoa Production and Processing Technology*. New York: CRC Press.
- Afoakwa, E. O. 2016. *Chocolate Science and Technology : Second Edition*. United Kingdom: Wiley Blackwell.
- Afoakwa, E. O., Kongor, J. E., Takrama, J. F. dan Budu, A. S. 2013. *Changes In Nib Acidification and Biochemical Composition During Fermentation of Pulo Pre-Conditioned Cocoa (Theobroma Cacao) Beans*. *International Food Research Journal* 20(3).
- Afoakwa, E., Mensah-Brown, H., Crentsil, G., Frimpong, K. dan Asante, F. 2013. *Application of ISO 22000 in Comparison with HACCP on Industrial Processing of Milk Chocolate*. *International Food Research Journal* Vol. 20 No.4.
- Afoakwa, E., Peterson, A., Fowler, M. dan Ryan, A. 2008. *Flavor Formation and Character in Cocoa and Chocolate: A Critical Review*. *Crit Rev Food Sci Nutr* 48.
- Apriantono, A., dan Kumara, B. 2004. Identifikasi *Character Impact Odorants* Buah Kawista (*Feronia limonia*). *Jurnal Teknologi dan Industri Pangan* 15(1).
- Apriyanto, M., Sutardi, S., Supriyanto, S. & Harmayani, E. 2017. Fermentasi Biji Kakao Kering Menggunakan *Saccharomyces cerevisiae*, *Lactobacillus lactis* dan *Acetobacter aceti*. *Journal Agritech UGM* 37(3).
- Aprotosoae, A., Luca, S. dan Miron, A. 2016. *Flavor Chemistry of Cocoa and Cocoa Products—an Overview*. *Comprehensive Reviews in Food Science and Food Safety* 15(1).
- Asyik, N. dan Ansi, A. 2020. Proses Pengolahan Sekunder Biji Kakao Menajdi Produk Olahan Kakao Setengah Jadi. Kendari: Prosiding Seminar Nasional Pangan dan Perkebunan: Realitas Pangan dan Perkebunan Saat Ini dan Prospeknya.
- Barać, M., Čabrilo, S., Pešić, M., Stanojević, S., Pavličević, M., Mačej, O., et al. 2011. *Functional Properties of Pea (Pisum sativum, L.) Protein Isolates Modified with Chymosin*. *International Journal of Molecular Sciences* 12.

- Beg, M., Ahmad, S., Jan, K. dan Bashir, K. 2017. *Status, Supply Chain and Processing of Cocoa - A Review. Trends in Food Science and Technology* 66.
- Biehl, B., dan Passern, D. 1982. *Proteolysis during Fermentation-Like Incubation of Cocoa Seeds. J Sci Food Agric* 33(12).
- Biehl, B., Heinrichs, H., Ziegeler-Berghausen, H., Srivastava, S., Xiong, Q. dan Passern, D. 1993. *The Proteases of Ungerminated Cocoa Seeds and Their Role in the Fermentation Process. Angewandte Botanik* 67(1-2).
- Caligani, A., Marseglia, A. dan Palla, G. 2016. *Cocoa: Production, Chemistry, and Use. Encycl. Food & Health*.
- Camu, N., DeWinter, T., Verbrugghe, K., Cleenwerk, I., Vandamme, P., Takrama, J., et al. 2007. *Dynamics and Biodiversity of Populations of Lactic Acid Bacteria and Acetic Acid Bacteria Involved in Spontaneous Heap Fermentation of Cocoa Beans in Ghana. Applied and Environmental Microbiology* 73(6).
- Castro-Alayo, E., Indrogo-Vasquez, G., Siche, R. dan Cardenas-Toro, F. 2019. *Formation of Aromatic Compounds Precursors during Fermentation of Criollo and Forastero Cocoa. Heliyon* 5(1).
- Coultate, T. 2009. *Food: The Chemistry of Its Components 5th Edition*. Cambridge: RSC Publishing.
- de Andrade, A., da Cruz, M., de Souza Oliveira, F., Soares, S., Druzian, J., de Santana, L., et al. 2021. *Influence of Underfermented Cocoa Mass in Chocolate Production: Sensory Acceptance and Volatile Profile Characterization during the Processing. LWT - Food Science and Technology* 149.
- Direktorat Jenderal Perkebunan. 2020. *Statistik Perkebunan Unggulan Nasional*.
- Direktorat Statistik Tanaman Pangan, Hortikultura, dan Perkebunan. 2022. *Statistik Kakao Indonesia 2021*. Jakarta: BPS RI.
- Domínguez-Pérez, L., Beltrán-Barrientos, L., González-Córdova, A., Hernández-Mendoza, A. dan Vallejo-Cordoba, B. 2020. *Artisanal Cocoa Bean Fermentation: From Cocoa Bean Proteins to Bioactive Peptides with Potential Health Benefits. Journal of Functional Foods* 73.
- D'Souza, R., Grimbs, A., Grimbs, S., Behrends, B., Corno, M., Ullrich, M., et al. 2018. *Degradation of Cocoa Proteins into Oligopeptides during Spontaneous Fermentation of Cocoa Beans. Food Research International Journal*.

- EFSA Panel on Food Contact Materials, Enzymes and Processing Aids (CEP). 2022. *Safety Evaluation of a Food Enzyme Containing Chymosin, Pepsin and Gastricsin from the Abomasum of a Suckling Goats*. *EFSA Journal* 20(1).
- Fang, Y., Li, R., Chu, Z., Zhu, K., Gu, F. dan Zhang, Y. 2020. *Chemical and Flavor Profile Changes of Cocoa Beans (Theobroma cacao L.) during Primary Fermentation*. *Journal of Food and Nutrition* Vol. 8 No. 8.
- Fennema, O., Damodaran, S. dan Parkin, K. 2017. *Introduction to food chemistry*. In *Fennema's food chemistry 5th Edition*. Boca Raton: CRC Press.
- Haslaniza, H., Maskat, M., Wan Aida, W. dan Mamot, S. 2010. *The Effects of Enzyme Concentration, Temperature and Incubation Time on Nitrogen Content and Degree of Hydrolysis of Protein Precipitate from Cockle (Anadara granosa) Meat Wash Water*. *International Food Research Journal* 17(1).
- Hayati, R., Yusmanizar, Mustafir dan Fauzi, H. 2012. *Kajian Fermentasi dan Suhu Pengeringan pada Mutu Kakao (Theobroma cacao, L)*. *Jurnal Keteknik Pertanian* 26(2).
- Hayatudin, H., Hadayani, H. dan Rauf, R. 2020. *Analisis Komparatif Pendapatan Usahatani Kakao Fermentasi dan Non Fermentasi (Studi Kasus di Desa Sintuwu Kecamatan Paolo Kabupaten Sigi)*. *Agroland : Jurnal Ilmu-Ilmu Pertanian* 27(1).
- Horne, D. S. dan Lucey, J. A. 2017. *Rennet-Induced Coagulation of Milk*. Dalam *P. F. Fox, Cheese: Chemistry, Physics and Microbiology* (hal. 115-143). San Diego: Springer New York.
- Hubble, J. dan Mann, P. 1984. *Destabilisation of Microbial Rennet*. *Biotechnology Letters* 6(6).
- Janek, K., Niewianda, A., Wöstemeyer, J. dan Voight, J. 2016. *The Cleavage Specificity of the Aspartic Protease of Cocoa Beans Involved in the Generation of the Cocoa-Specific Aroma Precursors*. *Food Chemistry* 211.
- Jinap, S., Ikrawan, Y., Bakar, J., Saari, N. dan Lioe, H. 2008. *Aroma Precursors and Methylpyrazines in Underfermented Cocoa Beans Induced by Endogenous Carboxypeptidase*. *Journal of food and science* 73(7).
- John, W., Kumari, N., Böttcher, N., Koffi, K., Grimbs, S., Vrancken, G., et al. 2016. *Aseptic Artificial Fermentation of Cocoa Beans Can Be Fashioned*

*to Replicate the Peptide Profile of Commercial Cocoa Bean Fermentations. Food Research International 89(1).*

- Jumnongpon, R., Chaiseri, S., Hongsprabhas, P., Healy, J., Meade, S. dan Gerrad, J. 2012. *Cocoa Protein Crosslinking Using Maillard Chemistry. Food Chem.*
- Kadow, D. 2020. *The Biochemistry of Cocoa Flavor – a Holistic Analysis of Its Development along the Processing Chain. Journal of Applied Botany and Food Quality 93.*
- Kchaou, H., Benbettaieb, N., Jridi, M., Nasri, M. dan Debeaufort, F. 2019. *Influence of Maillard Reaction and Temperature on Functional, Structure and Bioactive Properties of Fish Gelatin Films. Food Hydrocolloids 97.*
- Kongor, J. E., Hinneh, M., Van der Walle, D., Afoakwa, E. O., Boeckx, P. dan Dewettinck, K. 2016. *Factors Influencing Quality Variation in Cocoa (Theobroma cacao) Bean Flavour Profile: a Review. Food Research International 82 .*
- Krähmer, A., Engel, A., Kadow, D., Ali, N., Umaharan, P., Kroh, L. W., et al. 2015. *Determination of Biochemical Quality Parameters in Cocoa Using Near Infrared Spectroscopy. Food Chemistry 181.*
- Krysiak, W., Adamski, R., & Zyzelewicz, D. 2013. *Factors Affecting The Color of Roasted Cocoa Bean. Journal of Food Quality 36.*
- Kumari, N., Kofi, K., Grimbs, S., D'Souza, R., Kuhnert, N., Vrancken, G., et al. 2016. *Biochemical Fate of Vicilin Storage Protein during Fermentation and Drying of Cocoa Beans. Food Research International Vol. 90.*
- Kurniawati, E., Rohman, A. dan Triyana, K. 2014. *Analysis Of Lard In Meatball Broth Using Fourier Transform Infrared Spectros-Copy And Chemometrics. Journal of Meat Sci. 96(2).*
- Kusumaningrum, I., Wijaya, C., Kusnandar, F. dan Sari, A. 2014. *Profil Aroma dan Mutu Sensori Citarasa Pasta Kakao Unggulan dari Beberapa Daerah di Indonesia. Journal of Food Technology & Industry 25(1).*
- Lawless, H. T. dan Heymann, H. 2010. *Sensory Evaluation: Principles and Practices 2nd Edition.* New York: Springer Science+Business Media, LLC.
- Lindsay, R. (1996). *Food Chemistry.* New York: Marcel Dekker Inc.
- Liu, X., Xia, B., Hu, L., Ni, Z., Thakur, K. dan Wei, Z. 2020. *Maillard Conjugates and Their Potential in Food and Nutritional Industries: A Review. Food frontiers 1(4).*

- Magi, E., Bono, L. and Di Carro, M. 2012. *Characterization of Cocoa Liquors by GC-MS and LC-MS/MS: Focus on Alkylpyrazines and Flavonols*. *Journal of Mass Spectrometry* 47.
- Mamo, A. dan Balasubramanian, N. 2018. *Calf Rennet Production and Its Performance Optimization*. *Journal of Applied and Natural Science* 10(1).
- Manalu, R. 2018. Pengolahan Biji Kakao Produksi Perkebunan Rakyat untuk Meningkatkan Pendapatan Petani. *Jurnal Ekonomi dan Kebijakan Publik* 9(2).
- Marseglia, A., Dellafiora, L., Prandi, B., Lolli, V., Sforza, S., Cozzini, P., et al. 2019. *Simulated Gastrointestinal Digestion of Cocoa: Detection of Resistant Peptides and In Silico/In Vitro Prediction of Their Ace Inhibitory Activity*. *Nutrients* 11(5).
- Melati, P. 2017. *Terampil Budidaya Kakao Unggulan*. Jogjakarta: Zahara Pustaka.
- Miskiyah, S., Usmiati dan Mulyorini. 2011. Pengaruh Enzim Proteolitik dengan Bakteri Asam Laktat Probiotik terhadap Karakteristik Dadih Susu Sapi. *Jurnal Ilmu Ternak dan Veteriner*.
- Misnawi. 2005. Peranan Pengolahan Terhadap Pembentukan Citarasa Cokelat. *Warta Pusat Penelitian Kopi dan Kakao Indonesia Vol. 21 No. 3*.
- Misnawi, dan Ariza 2011. Use of Gas Chromatography–Olfactometry in Combination with Solid Phase Micro Extraction for Cocoa Liquor Aroma Analysis. *International Food Research Journal* 18.
- Misnawi, S. 2008. *Physico-Chemical Changes during Cocoa Fermentation and Key Enzymes Involved*. *Review Penelitian Kopi dan kakao* 24(1).
- Misnawi, S., Jinap, B. Jamilah. dan S., Nazamid. 2003. *Effects of Incubation and Polyphenol Oxidase Enrichment on Colour, Fermentation Index, Procyanidins and Astrigency of Unfermented and Partly Fermented Cocoa Beans*. *International Journal of Food Science and Technology* Vol. 38.
- Misnawi, S., Nazamid , S., dan Jamilah, B. 2002. *Activation of Remaining Key Enzymes in Dried Under-Fermented Cocoa Beans and Its Effect on Aroma Precursor Formation*. *Food Chemistry* 78(4).
- Mohsin, F., Schmitt, J., Kanzler, C., Hoehl, A. dan Hornemann, A. 2019. *PCA-based Identification and Differentiation of FTIR Data from Model Melanoidins with Specifics Molecular Composition*. *Food Chemistry* 281.

- Munoz, M. S., Cortina, J. R., Vaillant, F. E. dan Parra, S. E. 2019. *An Overview of The Physical And Biochemical Transformation of Cocoa Seeds to Beans and to Chocolate: Flavor Formation. Critical Reviews in Food Science and Nutrition*.
- Murtadlo, F. M. 2021. Aplikasi PCA (*Principal Component Analysis*) Pada Profil *Sensory* Kakao Bubuk *Refermented*. Skripsi. Jurusan Teknologi Industri Pertanian Fakultas Teknologi Pertanian Universitas Negeri Jember.
- Noor-Soffalina, S., Jinap, S., Nazamid, S. dan Nazimah, S. 2008. *Effect of Polyphenol and pH on Cocoa Maillard-Related Flavour Precursors in a Lipidic Model System. International Journal of Food Science and Technology* 44.
- Nugroho, S. 2008. *Statistika Multivariant Terapan*. Bengkulu: UNIB Press.
- Pamaya, D., Muchlissin, S., Maharani, E., Darmawati, S., & Ethica, S. (t.thn.). Isolasi Bakteri Penghasil Enzim Protease *Bacillus Amyloliquefaciens* Irod2 pada Oncom Merah Pasca Fermentasi 48 Jam. *Prosiding Seminar Nasional & Internasional Universitas Muhammadiyah Semarang* 1(1).
- Papalexandratou, Z., & De Vuyst, L. (2011). Assessment of the yeast species composition of cocoa bean fermentations in Different Cocoa-Producing Regions using Denaturing Gradient Gel Electrophoresis. *FEMS Yeast Research* 11(7).
- Pereira, G., Miguel, M., Ramos, C. dan Schwan, R. 2012. *Microbiological and Physicochemical Characterization of Small-Scale Cocoa Fermentations and Screening of Yeast and Bacterial Strains to Develop a Defined Starter Culture. Applied and Environmental Microbiology* 78 (15).
- Pracaya, P. K. 2016. *Budi Daya Kakao*. Jakarta: PT Sunda Kelapa Pustaka.
- Pratiwi, E. dan Harjoko, A. 2013. Implementasi Pengenalan Wajah Menggunakan PCA (*Principal Component Analysis*). *Program Studi Elektronika dan Instrumentasi, FMIPA UGM, Yogyakarta. IJEIS* 3(2).
- Pribadi, E. M. 2014. Evaluasi dan Pemetaan Pemanfaatan Teknologi pada Industri Kakao. *Jurnal Infomatek Vol. 16 No. 2*.
- Purbaningrum, K., Hidayat, C., Witasari, L. dan Utami, T. 2023. *Flavor Precursors and Volatile Compounds Improvement of Unfermented Cococa Beans by Hydrolysis using Bromelain. Foods* 12(820).
- Putra, G., Wartini, N. dan Dewi Anggreni, A. 2010. Karakterisasi Enzim Polifenol Oksidase Biji Kakao (*Theobroma cocoa Linn.*). *Agritech* 3(3).

- Ramllah, S. 2016. Karakteristik Mutu dan Citasara Cokelat Kaya Polifenol. *Jurnal Industri Hasil Perkebunan Vol. 11*.
- Rottiers, H., Sosa, D. A., de Vyver, V., Hinneh, M., Everaert, H., De Wever, J., et al. 2018. *Discrimination of Cocoa Liquors Based on Their Odor Fingerprint: a Fast GC Electronic Nose Suitability Study. Food Anal. Methods*.
- Rottiers, H., Sosa, D. A., De Winne, A., Ruales, J., De Clipperleer, J., De Leersnyder, I., et al. 2019. *Dynamics of Volatile Compounds and Flavor Precursors during Spontaneous Fermentation of Fine Flavor Trinitario Cocoa Beans. European Food Research and Technology*.
- Rukmana, H. dan Yudirachman, H. 2016. *Untung Selangit dari Agribisnis Kakao*. Jogjakarta: Lily Publisher.
- Sabahannur, S., Syam, N. dan Alimuddin, S. 2018. *Teknologi Fermentasi Biji Kakao*. Bogor: IPB Press Printing.
- Sandhaya, M., Yallapa, B., Varadaraj, M., Puranaik, J., Jaganmohan, L., Janardhan, P., et al. 2016. *Inoculum of the Starter Consortia and Interactive Metabolic Process in Enhancing Quality of Cocoa Bean (Theobroma Cacao) Fermentation. LWT - Food Science and Technology* 65.
- Sari, A., Belgis, M., Amilia, W. dan Murtadlo, F. 2023. *The Sensory Profile of Unfermented Cocoa Beans and Its Changes After Moisture Treatments. AIP Conference Proceedings* 2583(1).
- Sari, D. N. 2020. Analisis Komponen Utama untuk Menentukan Faktor – Faktor yang Mempengaruhi Pemilihan Transportasi Online. *Skripsi. Program Studi Matematika Jurusan Matematika, Fakultas Sains dan Teknologi, Universitas Sanata Dharma, Yogyakarta*.
- Satander M., M., Rodríguez, C., Vaillant, F. dan Escobar, S. 2019. *An Overview of the Physical and Biochemical Transformation of Cocoa Seeds to Beans and to Chocolate : Flavor Formation. Food Science And Nutrition* 21.
- Setyaningsih, D., Apriyanto, A. dan Sari, M. P. 2010. *Analisis Sensori untuk Industri Pangan dan Agro*. Bogor: IPB Press.
- Soodam, K., Ong, L., B. Powell, I., E. Kentish, S. dan L. Gras, S. 2015. *Effect of Rennet on the Composition, Proteolysis and Microstructure of Reduced-Fat Cheddar Cheese During Ripening. Dairy Sci. & Technol.* 95.
- Spillane, J. 1995. *Komoditi Kakao dan Peranan Dalam Perekonomian Indonesia*. Jogjakarta: Kanisius.

- Spotti, M., Loyeau, P., Marangon, A., Noir, H., Rubiolo, A. dan Carrara, C. 2019. *Influence of Maillard Reaction Extent on Acid Induced Gels of Whey Proteins and Dextrans*. *Food Hydrocolloids* 91.
- Sumaya-Martinez, M., Thomas, S., Linard, B., Binet, A. dan Guerard, F. 2005. *Effect of Maillard Reaction Conditions On Browning and Antiradical Activity of Sugar Tuna Stomach Hydrolysate Model System*. *Food Research International* 38(8).
- Syafii, M., Cartika, I. dan Ruswandi, P. 2015. *Multivariate Analysis of Genetic Diversity among some Maize Genotypes under Maize-Albizia Cropping System in Indonesia*. *Asian Journal of Crop Science* 7(4).
- Toker, O., Palabiyik, I., Pirouzan, H dan Aktar, T. 2020. *Chocolate Aroma : Factors, Importance and Analysis*. *Trends in Food Science and Technology* 99.
- Voigt, J. dan Lieberei, R. 2014. *Biochemistry of cocoa fermentation*. New York: CRC Press.
- Voigt, J., Biehl, B., Heinrichs, H., Kamaruddin, S., Marsoner, G. dan Hugli, A. 1994. *In-Vitro Formation of Cocoa-Specific Aroma Precursors: Aroma-Related Peptides Generated from Cocoa-Seed Protein by Co-Operation of an Aspartic Endoprotease and a Carboxypeptidase*. *Food Chemistry* 49(2).
- Voigt, J., Heinrichs, H., Voigt, G. dan Biehl, B. 1994. *Cocoa-Specific Aroma Precursors Are Generated By Proteolytic Digestion Of Vicilin-Like Globulin Of Cocoa Seeds*. *Food Chemistry* 50(2).
- Voigt, J., Textoris-Taubeb, K. dan Wöstemeyera, J. 2018. *pH-Dependency Of The Proteolytic Formation Of Cocoa- And Nutty-Specific Aroma Precursors*. *Food Chemistry* 255.
- Widyastuti, A. dan Utama, Z. 2020. Korelasi Kadar Asam Fitat dan Protein Terlarut Tepung Tempe Kedelai Lokal Kuning (*Glycine max*) dan Hitam (*Glycine soja*) selama Fermentasi. *Prosiding Pendidikan Teknik Boga Busana Vol. 15*.
- Wijanarti, S., Rahmatika, A. M. dan Hardiyanti, R. 2018. Pengaruh Lama Penyangraian Manual Terhadap Karakteristik Kakao Bubuk. *Jurnal Nasional Teknologi Terapan Vol. 2 No. 2*.
- Wijaya, M. dan Wiharto, M. 2017. *Preparation and Characterization of Cacao Waste as Cacao Vinegar and Charcoal*. *UNEJ 3-Proceeding* 259-261.

- Yuneta, R. dan Putra, S. 2010. Pengaruh Suhu pada Lipase dari Bakteri *Bacillus subtilis*. *Prosiding Kimia FMIPA Surabaya Institut Teknologi Sepuluh Nopember*.
- Yuniar, L., Rachman, S. dan Soedjaanatmadja, R. 2018. Pengaruh Fermentasi Biji Kakao dengan Menggunakan *Kluyveromyces Sp.*, *Lactibacillus Plantarum*, *Acetobacter Xylinum*, Enzim Papain Dan Bromelain Serta Sistein Terhadap Prekursor Cita Rasa Serta Kandungan Nutrisi dan Polifenolnya. *Chimica et Natura Acta* 6(3).
- Yuniwati, M. dan Yusran, R. 2013. Pemanfaatan Enzim Papain sebagai Penggumpal dalam Pembuatan Keju. *Prosiding Seminar Nasional Aplikasi Sains dan Teknologi IST AKPRIND Yogyakarta*.