UNIVERSITAS GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Agate, A. D. & Bhat, J. V (1966). Role of pectinolytic yeasts in the degradation of mucilage layer of Coffea robusta cherries. Applied microbiology, 14(2), 256–60.

Ahmed, T.,Kanwal, R.,& Ayub, N. (2006) .Influence of Temperature on Growth Pattern of *Lactococcus lactis*, *Streptococcus cremoris* and *Lactobacillus acidophilus* Isolated from Camel Milk. Biotechnology, 5(4), 481–488.

Akiyama, M.,Murakami, K.,Ikeda, M.,Iwatsuki, K.,Kokubo, S.,Wada, A.,Tokuno, K.,Onishi, M.,Iwabuchi, H.,& Tanaka, K. (2005). Characterization of flavor compounds released during grinding of roasted robusta coffee beans. Food Science and Technology Research, 11(3), 298–307.

Amanpour, A. & Selli, S. (2016). Differentiation of Volatile Profiles and Odor Activity Values of Turkish Coffee and French Press Coffee. Journal of Food Processing and Preservation, 40(5), 1116–1124.

Amorim, H. V & Amorim, V. L. (1977). Coffee enzymes and coffee quality, in Enzymes in Food and Beverage Processing. Washington DC. American Chemical Society, 259–274.

Anonim (2015). Acetic Acid. https://coffeechemistry.com/chemistry/acids/acetic-acid. Diakses tanggal 4 September 2019.

Anonim (2016). Kopi Gayo; Goodbye 2016, Welcome 2017. http:// lintasgayo.co/2016/12/22/kopi-gayo-goodbye-2016-welcome-2017. Diakses tanggal 28 June 2018.

Anonim (2018). Upah Buruh Sortir Biji Kopi Gayo. https://antarafoto.com/seni-budaya/v1519213502/upah-buruh-sortir-biji-kopi-gayo. Diakses tanggal 28 Juni 2018.

Anonim (2019a). Flavornet. http://flavornet.org/flavornet.html. Diakses tanggal 10 Oktober 2019.

Anonim (2019b). Odor & Flavor Detection Thresholds in Water (In Parts per Billion). http://leffingwell.com/odorthre.htm. Diakses tanggal 10 Oktober 2019.

Anonim (2019c) TGSC Information System. www.thegoodscentscompany.com. Diakses tanggal 10 Oktober 2019.

Arunga, R. O. (1982). Coffee, in Fermented Foods. London, Academic Press, 259–274.

Arya, M. & Rao, L. J. M. (2010). An Impression of Coffee Carbohydrates An

PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica)
GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

Impression of Coffee, Critical Reviews in Food Science and Nutrition, 47(1), 51–67.

Ashik, M.,Khan, I.,Ueno, K.,Horimoto, S.,& Komai, F. (2009). CIELAB color variables as indicators of compost stability. Waste Management. Elsevier Ltd, 29(12), 2969–2975.

Asther, M.,Isabel, M.,Alvarado, E.,Haon, M.,Navarro, D.,Lesage-meessen, L.,& Record, E. (2005) .Purification and characterization of a chlorogenic acid hydrolase from Aspergillus niger catalysing the hydrolysis of chlorogenic acid. Journal of Biotechnology, 115, 47–56.

Avallone, S.,Brillouet, J.-M.,Olguin, E.,Guyot, B.,Guiraud, J.-P.,& Avallone, S. (2001) .Microbiological and Biochemical Study of Coffee Fermentation. Current Microbiology, 42(4), 252–256.

Avallone, S.,Brillouet, J. M.,Guyot, B.,Olguin, E.,& Guiraud, J. P. (2002). Involvement of pectolytic micro-organisms in coffee fermentation. International Journal of Food Science and Technology, 191–198.

Baggenstoss, J. U. B.,Oisson, L. U. P.,Aegi, R. U. T. H. K.,Erren, R. A. P.,& Scher, F. E. E. (2008) .Coffee Roasting and Aroma Formation: Application of Different Time-Temperature Conditions, Journal of Agricultural and Food Chemistry, 56(14), 5836–5846.

Balzer, H. . (2001). Acids in coffee, in Coffee. Recent Developments. London, Blackwell Science, 18–32.

Batista, L. R.,Chalfoun, S. M.,Silva, C. F.,Cirillo, M.,Varga, E. A.,& Schwan, R. F. (2009) .Ochratoxin A in coffee beans (*Coffea arabica* L .) processed by dry and wet methods, Food Control. Elsevier Ltd, 20(9), 784–790.

Bennat, C.,Engelhardt, U. H.,Kiehne, A.,Wirries, F. M.,& Maier, H. G. (1994) .HPLC Analysis of chlorogenic acid lactones in roasted coffee. Zeitschrift für Lebensmittel-Untersuchung und -Forschung, 199(1), 17–21.

Bertrand, B.,Vaast, P.,Alpizar, E.,Etienne, H.,Davrieux, F.,& Charmetant, P. (2006) .Comparison of bean biochemical composition and beverage quality of Arabica hybrids involving Sudanese-Ethiopian origins with traditional varieties at various elevations in Central America. Tree Physiology, 26(9), 1239–1248.

Bertrand, B.,Boulanger, R.,Dussert, S.,Ribeyre, F.,Berthiot, L.,Descroix, F.,& Joët, T. (2012). Climatic factors directly impact the volatile organic compound fingerprint in green Arabica coffee bean as well as coffee beverage quality. Food Chemistry. Elsevier Ltd, 135(4), 2575–2583.

Bhumiratana, N.,Adhikari, K.,& Iv, E. C. (2011) .Evolution of sensory aroma

UNIVERSITAS GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

attributes from coffee beans to brewed coffee, LWT - Food Science and Technology. Elsevier Ltd, 44(10), 2185–2192.

Blank, I.,Sen, A.,& Grosch, W. (1992) .Potent odorants of the roasted powder and brew of Arabica coffee. Zeitschrift für Lebensmittel-Untersuchung und - Forschung, 195(3), 239–245.

Borém, F. .,Isquierdo, E. .,Fernandes, S. .,& Fernandes, M. (2008) .Armazenamento do café, in Pós-colheita do café. Lavras, Brazil, Editoria UFLA.

Bosselmann, A. S.,Dons, K.,Oberthur, T.,Olsen, C. S.,Ræbild, A.,& Usma, H. (2009) .The influence of shade trees on coffee quality in small holder coffee agroforestry systems in Southern Colombia. Agriculture, Ecosystems and Environment, 129(1–3), 253–260.

Bradbury, A. G. (2001) .Chemistry I : Non-volatile compounds, in Coffee: Recent developments. Oxford, Blackwell Science, 1–17.

Bressani, P.,Paula, A.,Juliana, S.,Reis, S.,Ribeiro, D.,& Freitas, R. (2018) .Characteristics of fermented coffee inoculated with yeast starter cultures using different inoculation methods. LWT - Food Science and Technology. Elsevier, 92(October 2017), 212–219.

Bruyn, F. De,Zhang, S. J.,Pothakos, V.,Torres, J.,Lambot, C.,Moroni, A. V.,Callanan, M.,Sybesma, W.,Weckx, S.,& Vuysta, L. De (2017). Exploring the Impacts of Postharvest Processing on the Microbiota and Metabolite Profiles during Green Coffee Bean Production. Applied and Environmental Microbiology, 83(1), 1–16.

Buffo, R. A. & Cardelli-freire, C. (2004) .Coffee flavour : an overview. Flavour and Fragrance Journal, 19(2), 99–104.

Caporaso, N.,Whitworth, M. B.,Cui, C.,& Fisk, I. D. (2018) .Variability of single bean coffee volatile compounds of Arabica and robusta roasted coffees analysed by SPME-GC-MS. Food Research International. Elsevier, 108, 628–640.

Cappucio, R. (2005) .Physiology of perception, in Espresso coffee: The science of quality. San Diego, CA, USA, Elsevier, 316–351.

Casal, S.,Oliveira, M. B.,& Ferreira, M. A. (2000) .HPLC / diode-array applied to the thermal degradation of trigonelline , nicotinic acid and caffeine in coffee, 68, 481–485.

De Castro, R. D. & Marraccini, P. (2006) .Cytology, biochemistry and molecular changes during coffee fruit development. Brazilian Journal of Plant Physiology, 18(1), 175–199.

UNIVERSITAS GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

Cheong, M. W.,Hin, K.,Jian, J.,Ong, M.,Quan, S.,Curran, P.,& Yu, B. (2013) .Volatile composition and antioxidant capacity of Arabica coffee. Food Research International. Elsevier Ltd, 51(1), 388–396.

Clarke, R. . & Macrae, R. (1985) .Coffee : Chemistry, in Coffee. 1st edn. London, Elsevier Applied Science Publishers, 115.

Clarke, R. & Vitzthum, O. G. (2008) *Coffee: Recent developments*. London, John Wiley and Sons.

Clifford, M. N. (1985) .Chlorogenic acids, in Coffee. Netherlands, Springer, 153–202.

Clifford, M. N. (1999) .Chlorogenic acids and other cinnamates - Nature, occurrence and dietary burden. Journal of the Science of Food and Agriculture, 79(3), 362–372.

Costa Freitas, A. M. & Mosca, A. I. (1999) .Coffee geographic origin - An aid to coffee differentiation. Food Research International, 32(8), 565–573.

Dadali, G.,Demirhan, E.,& Özbek, B. (2007) .Color change kinetics of spinach undergoing microwave drying. Drying Technology, 25(10), 1713–1723.

Djossou, O.,Ouzari, I.,Rodriguez-Serrano, G.,Boudabous, A.,Roussos, S.,Lakhal Mirleau, F.,Karou, G.,Niamke, S.,& Perraud-Gaime, I. (2011) .Robusta coffee beans post-harvest microflora: *Lactobacillus plantarum* sp. as potential antagonist of *Aspergillus carbonarius*. Anaerobe. Elsevier Ltd, 17(6), 267–272.

Duarte, G.,Pereira, A.,& Adriana, F. (2010) .Chlorogenic acids and other relevant compounds in Brazilian coffees processed by semi-dry and wet post-harvesting methods, Food Chemistry. Elsevier Ltd, 118(3), 851–855.

Dulsat-Serra, N.,Quintanilla-Casas, B.,& Vichi, S. (2016) .Volatile thiols in coffee: A review on their formation, degradation, assessment and influence on coffee sensory quality. Food Research International, 89, 982–988.

Eira, M. T. S.,Amaral Da Silva, E. A.,De Castro, R. D.,Dussert, S.,Walters, C.,Bewley, J. D.,& Hilhorst, H. W. M. (2006). Coffee seed physiology. Brazilian Journal of Plant Physiology, 18(1), 149–163.

Ellyanti,Karim, A.,& Basri, H. (2012) .Analisis Indikasi Geografis Kopi Arabika Gayo Ditinjau dari Rencana Tata Ruang Wilayah Kabupaten. Jurnal Agrista, 16(2), 46–61.

Evangelista, S. R.,Silva, C. F.,Miguel, M. G. P. C.,Cordeiro, C. S.,Pinheiro, A. C. M.,Duarte, W. F.,& Schwan, R. F. (2014). Improvement of coffee beverage quality by using selected yeasts strains during the fermentation

PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica)
GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

in dry process. Food Research International. Elsevier Ltd, 61, 183–195.

Evangelista, S. R.,Miguel, M. G. P. C.,Cordeiro, C. S.,Silva, C. F.,Pinheiro, A. C. M.,& Schwan, R. F. (2014) .Inoculation of starter cultures in a semi-dry coffee (*Coffea arabica*) fermentation process. Food Microbiology, 44, 87–95.

Fadai,Melrose, J.,Please, C. P.,Schulman, A.,& Gorder, R. A. Van (2017) .International Journal of Heat and Mass Transfer A heat and mass transfer study of coffee bean roasting. International Journal of Heat and Mass Transfer. Elsevier Ltd, 104, 787–799.

Fadai, N. T.,Melrose, J.,Please, C. P.,Schulman, A.,& Van Gorden, R. A. (2017) .A heat and mass transfer study of coffee bean roasting. International Journal of Heat and Mass Transfer, 104, 787–799.

Farah, A.,Monteiro, M. C.,Calado, V.,Franca, A. S.,& Trugo, L. C. (2006). Correlation between cup quality and chemical attributes of Brazilian coffee, Food Chemistry, 98(2), 373–380.

Farah, A. (2012) .Coffee constituents, in Coffee. Wiley-Blackwell, 21–58.

Flament (2001) .The Individual Constituent : Structure, nomenclature, origin, chamical and organoleptic properties, in Coffee Flavor Chemistry. New York, John Wiley and Sons, 81–335.

Folmer, B.,Blank, I.,Farah, A.,Giuliano, P.,Sanders, D.,& Wille, C. (2017) *the Craft of Sciece of Coffee*. London, Elsevier Ltd.

Franca, A. S.,Mendonc, J. C. F.,& Oliveira, S. D. (2005) .Composition of green and roasted coffees of different cup qualities. Lebensmittel-Wissenschaft & Technologie-Food Science and Technology, 38, 709–715.

Frank, H. A.,Lum, N. A.,& Dela Cruz, A. S. (1965) .Bacteria responsible for mucilage-layer decomposition in Kona coffee cherries. Applied Microbiology, 13, 201–207.

Ginz, M.,Balzer, H. H.,Bradbury, A. G. W.,& Maier, H. G. (2000). Formation of aliphatic acids by carbohydrate degradation during roasting of coffee. European Food Research and Technology, 211(6), 404–410.

Glassner, D. A.,Elankovan, P.,Beacom, D. R.,& Berglund, K. A. (1995) .Purification Process for Succinic Acid Produced by Fermentation, 51(2).

Gonzalez-Rios, O.,Suarez-Quiroz, M. L.,Boulanger, R.,Barel, M.,Guyot, B.,Guiraud, J. P.,& Schorr-Galindo, S. (2007) .Impact of 'ecological' post-harvest processing on coffee aroma: II. Roasted coffee. Journal of Food Composition and Analysis, 20(3–4), 297–307.

Gretsch, C.,Sarrazin, C.,& Liardon, R. (1999). Evolution of coffee aroma

PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica)
GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

characteristics during roasting, in Proceedings of the 18th International Scientific Colloquium on Coffee. Helsinki, Finland, ASIC, Paris, France, 27–34.

Grosch, W. (1998). Flavour of coffee. A review, Nahrung - Food, 42(6), 344–350.

Grosch, W. (2001). Chemistry III: Volatile compounds, in Coffee: Recent developments. Oxford, Blackwell Science, 68–89.

Hameed, A.,Hussain, S. A.,Ijaz, M. U.,Ullah, S.,Pasha, I.,& Suleria, H. A. R. (2018). Farm to Consumer: Factors Affecting the Organoleptic Characteristics of Coffee. II: Postharvest Processing Factors. Comprehensive Reviews in Food Science and Food Safety, 17(5), 1184–1237.

Herrera, J. C.,Combes, M. C.,Cortina, H.,Alvarado, G.,& Lashermes, P. (2002) .Gene introgression into *Coffea arabica* by way of triploid hybrids (C. *arabica* x C. *canephora*). Heredity, 89(6), 488–494.

Higdon, J. V. & Frei, B. (2006). Coffee and Health: A Review of Recent Human Research. Critical Reviews in Food Science and Nutrition, 46(2), 101–123.

Hofmann, T. & Hufnagel, J. C. (2008). Quantitative Reconstruction of the Nonvolatile Sensometabolome of a Red Wine. Journal of Agricultural and Food Chemistry, 56, 9190–9199.

Holscher, W. & Steinhart, H. (1992). Investigation of roasted coffee freshness with an improved headspace technique. Zeitschrift für Lebensmittel-Untersuchung und-Forschung, 195(1), 33–38.

Hulupi, R.,Nugroho, D.,& Yusianto (2013). Keragaan Beberapa Varietas Lokal Kopi Arabika di Dataran Tinggi Gayo. Pelita Perkebunan, 29(2), 69–81.

Illy, A. & Viani, R. (1995). Espresso Coffee: The Chemistry of Quality, in. London / San Diego, Academic Press, 253.

Ismayadi, C.,Marsh, A.,& Clarke, R. (2005). Influence of Storage of Wet Arabica Parchment Prior to Wet Hulling on Moulds Development, *Ochratoxin* A Contamination, and Cup Quality of Mandheling Coffee. Pelita Perkebunan (a Coffee and Cocoa Research Journal), 21(2), 131–146.

Joët, T.,Laffargue, A.,Descroix, F.,Doulbeau, S.,Bertrand, B.,De, A.,& Dussert, S. (2010). Influence of environmental factors , wet processing and their interactions on the biochemical composition of green Arabica coffee beans. Food Chemistry. Elsevier Ltd, 118(3), 693–701.

Karo, H. S. A. B. (2009). Hosanna Sri Arta Br Karo : Analisis Usahatani Kopi Di Kecamatan Simpang Empat Kabupaten Karo, 2010. Universitas

UNIVERSITAS GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

Sumatera Utara.

Kaufmann, H. P. & Gupta, A. K. S. (1964). Über die lipoide der kaffeebohne V: die triterpene und kohlenwasserstoffe,. Fette Seifen Anstrichm, 66, 461–466.

Kaufmann, H. P. & Hamsagar, R. S. (1962). Zur kenntnis der lipoide der kaffeebohne I: Über fettsäure-ester des cafestols,. Fette Seifen Anstrichm, 64, 206–213.

Kennes, C.,Veiga, M. C.,Dubourguier, H. C.,Touzel, J. P.,Albagnac, G.,Naveau, H.,& Nyns, E. J. (1991). Trophic relationships between Saccharomyces cerevisiae and Lactobacillus plantarum and their metabolism of glucose and citrate. Applied and Environmental Microbiology, 57, 1046–1051.

Kleinwächter, M. & Selmar, D. (2010). Influence of drying on the content of sugars in wet processed green Arabica coffees. Food Chemistry. Elsevier Ltd, 119(2), 500–504.

Knopp, S.,Bytof, G.,& Selmar, D. (2006). Influence of processing on the content of sugars in green Arabica coffee beans. European Food Research and Technology, 223, 195–201.

Kulapichitr, F.,Borompichaichartkul, C.,Suppavorasatit, I.,& Cadwallader, K. R. (2019). Impact of drying process on chemical composition and key aroma components of Arabica coffee. Food Chemistry. Elsevier, 291, 49–58.

Lean, M. E. & Crozier, A. (2012). Coffee, caffeine and health: What's in your cup?. Maturitas, 171–172.

Lee, K.-G. & Shibamoto, T. (2002) .Analysis of volatile components isolated from Hawaiian green coffee beans (*Coffea arabica* L.). Food and Fragrance Journal, 17, 349–351.

Lee, L. W.,Cheong, M. W.,Curran, P.,Yu, B.,& Liu, S. Q. (2015) .Coffee fermentation and flavor--An intricate and delicate relationship. Food chemistry. Elsevier Ltd, 185, 182–91.

Lee, L. W.,Cheong, M. W.,Curran, P.,Yu, B.,& Liu, S. Q. (2016) .Modulation of coffee aroma via the fermentation of green coffee beans with Rhizopus oligosporus: I. Green coffee. Food Chemistry. Elsevier Ltd, 211, 916–924.

Lee, L. W.,Yu, G.,Wai, M.,Curran, P.,& Yu, B. (2017) .Modulation of the volatile and non-volatile profiles of coffee fermented with Yarrowia lipolytica : I . Green coffee. LWT - Food Science and Technology. Elsevier Ltd, 77, 225–232.

PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica)
GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

Leong, K.,Yanagida, F.,Pan, S.,Chen, J.,Chen, Y.,Chang, Y.,& Wu, H. (2014) .Diversity of Lactic Acid Bacteria Associated with Fresh Coffee Cherries in Taiwan, Current Microbiology, 68(4), 440–447.

Leroy, T.,Ribeyre, F.,Bertrand, B.,Charmetant, P.,Dufour, M.,Montagnon, C.,Marraccini, P.,& Pot, D. (2006) .Genetics of coffee quality, Brazilian Journal of Plant Physiology, 18(1), 229–242.

Liu, Y. & Kitts, D. D. (2011) .Confirmation that the Maillard reaction is the principle contributor to the antioxidant capacity of coffee brews, Food Research International. Elsevier Ltd, 44(8), 2418–2424.

Lopez, C.,Bautista, E.,Moreno, E.,& Dentan, E. (1989) .Factors related to the formation of ‘overfermented coffee beans‘ during the wet processing method and storage of coffee, in Proceedings of 13th ASIC. Paipa, Colombia, 373–384.

Maier, H. G. (2005) .Chapter 4. Roasting, 4.3 Changes produced by roasting, in Espresso coffee: The science of quality. London: UK: Elsevier Academic Press, 191–197.

Malta, M. . & Chagas, S. J. d. R. (2009) .Colheita, preparo e secagem do café, in Café Arábica- do plantio a colheita. Belo Horizonte: EPAMIG.

Martinez, J.,Paula, A.,Bressani, P.,Gabriela, M.,Miguel, P.,Ribeiro, D.,& Freitas, R. (2017). Different inoculation methods for semi-dry processed coffee using yeasts as starter cultures. Food Research International. 102, 333–340.

Masoud, W. & Jespersen, L. (2006). Pectin degrading enzymes in yeasts involved in fermentation of *Coffea arabica* in East Africa. International Journal of Food Microbiology, 110(3), 291–296.

Masoud, W. & Kaltoft, C. H. (2006). The effects of yeasts involved in the fermentation of *Coffea arabica* in East Africa on growth and ochratoxin a (OTA) production by *Aspergillus ochraceus*. International Journal of Food Microbiology, 106(2), 229–234.

Masoud, W.,Poll, L.,& Jakobsen, M. (2005). Influence of volatile compounds produced by yeasts predominant during processing of *Coffea arabica* in East Africa on growth and *Ochratoxin* A (OTA) production by *Aspergillus ochraceus*. Yeast, 22(14), 1133–1142.

Massawe, G. A. & Lifa, S. J. (2010). Yeasts and lactic acid bacteria coffee fermentation starter cultures. International Journal of Postharvest Technology and Innovation, 2(1), 41–82.

Mazzafera, P. & Padilha, R. P. (2004). Post harvest processing methods and alterations in coffee fruit, in Proceedings of 20th Colloque Coffee. India.

UNIVERSITAS GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

Moon, J. K. & Shibamoto, T. (2010). Formation of volatile chemicals from thermal degradation of less volatile coffee components: Quinic acid, caffeic acid, and chlorogenic acid. Journal of Agricultural and Food Chemistry, 58(9), 5465–5470.

Najiyati, S. & Danarti (2012) Kopi, Budidaya dan Penanganan Lepas Panen. Jakarta, PT Penebar Swadaya. Available at: books.google.co.id/books/about/Kopi.html?id=xnwwYAAACAAJ&redi_esc=y.

Neta, E. R. D. C.,Johanningsmeier, S. D.,& Mcfeeters, R. F. (2007). The Chemistry and Physiology of Sour Taste — A Review. Journal of Food Science, 72(2), 33–38.

Oestreich-Janzen, S. (2010). Chemistry of coffee, in Comprehensive natural products II. Oxford, Elsevier Ltd, 1085–1117.

Ogawa, M. (2014) *Coffee and hippuric acid*. Academic Press.

Pereira, G. V. D. M.,Neto, D. P. D. C.,Júnior, A. I. M.,Vásquez, Z. S.,Medeiros, A. B. P.,Vandenberghe, L. P. S.,& Soccol, C. R. (2019). Exploring the impacts of postharvest processing on the aroma formation of coffee beans – A review. Food Chemistry. Elsevier, 272, 441–452.

Pereira, G. V. de M.,Soccol, V. T.,Gollo, A. L.,Pandey, A.,Soccol, C. R.,Medeiros, A. B. P.,& Lara, J. M. R. A. (2014). Isolation, selection and evaluation of yeasts for use in fermentation of coffee beans by the wet process. International Journal of Food Microbiology. Elsevier B.V., 188, 60–66.

Pereira, G. V. de M.,de Carvalho Neto, D. P.,Medeiros, A. B. P.,Soccol, V. T.,Neto, E.,Woiciechowski, A. L.,& Soccol, C. R. (2016). Potential of lactic acid bacteria to improve the fermentation and quality of coffee during on-farm processing. International Journal of Food Science and Technology, 51(7), 1689–1695.

Pereira, G. V. de M.,Soccol, V. T.,Brar, S. K.,Neto, E.,& Soccol, C. R. (2017). Microbial ecology and starter culture technology in coffee processing. Critical Reviews in Food Science and Nutrition. Taylor & Francis, 57(13), 2775–2788.

Pereira, G. V. M.,Miguel, M. G. C. .,Ramos, C. .,& Schwan, R.(2012). Microbiological and Physicochemical Starter Culture Bacterial Strains To Develop a Defined Fermentations and Screening of Yeast and Characterization of Small-Scale Cocoa. Applied Environmental Microbiology, 78, 5395–5405.

Pereira, G. V. M.,Magalh~aes, K. T.,Almeida, E. G.,Coelho, I. S.,& Schwan, R. F. (2013). Spontaneous cocoa bean fermentation carried out in a novel-

PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica)
GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

design stainless steel tank: Influence on the dynamics of microbial populations and physical–chemical properties. International Journal of Food Microbiology. Elsevier B.V., 161(2), 121–133.

Pereira, G. V. M.,Neto, E.,Soccol, V. T.,Medeiros, A. B. P Woiciechowski, A. L.,& Soccol, C. R. (2015). Conducting starter culture-controlled fermentations of coffee beans during on-farm wet processing : Growth , metabolic analyses and sensorial effects. Food Research International. Elsevier Ltd, 75, 348–356.

Poisson, L.,Auzanneau, N.,Mestdagh, F.,Blank, I.,& Davidek, T. (2017). New insight into the role of sucrose in the generation of α-diketones upon coffee roasting. Journal of Agricultural and Food Chemistry, 66, 2422–2431.

Puerta Quintero, G. (2005). Quality and safety of coffee processed by the wet method and dried in solar dryers, in Workshop Improvement of Coffee Quality Through Prevention of Mould Growth 1. Salvador, Brasil.

Reineccius, G. (1995). The Maillard reaction and coffee flavor, in The the 16th ASIC Colloquium Kyoto. Kyoto.

Reineccius, G. & Henry, B. (2006) *Flavor Chemistry and Technology*. New York, Taylor & Francis.

Ribeiro, J. S.,Augusto, F.,Salva, T. J. G.,Thomaziello, R. A.,& Ferreira, M. M. C. (2009). Prediction of sensory properties of Brazilian Arabica roasted coffees by headspace solid phase microextraction-gas chromatography and partial least squares. Analytica Chimica Acta Journal, 634(2), 172–179.

Ribeiro, L. S.,Miguel, M. G. da C. P.,Evangelista, S. R.,Martins, P. M. M.,Mullem, J. van,Belizario, M. H.,& Schwan, R. F. (2017). Behavior of yeast inoculated during semi-dry coffee fermentation and the effect on chemical and sensorial properties of the final beverage. Food Research International. Elsevier Ltd, 92, 26–32.

Romano, P.,Fiore, C.,Paraggio, M.,Caruso, M.,& Capece, A. (2003). Function of yeast species and strains in wine flavour. International Journal of Food Microbiology, 86, 169–180.

Rotzoll, N.,DUnkel, A.,& Hofmann, T. (2006). Quantitative Studies , Taste Reconstitution , and Omission Experiments on the Key Taste Compounds in Morel Mushrooms (*Morchella deliciosa* Fr .). Journal of Agricultural and Food Chemistry, 54, 2705–2711.

Savonitti, O. (2005). Chapter 6. Storage and packaging, 6.1.3 Other physico-chemical changes, in Espresso Coffee: The science of quality. London, UK, Elsevier Academic Press, 241–245.

UNIVERSITAS GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

SCA (2013). *Specialty Coffee Association*. Available at: https://sca.coffee/ (Accessed: 29 August 2019).

Schwan, R. .,Pereira, G. V. M.,& Fleet, G. (2014a). Botany and Production of Coffee, in Cocoa and Coffee Fermentations. London, Elsevier Ltd, 344–346.

Schwan, R. .,Pereira, G. V. M.,& Fleet, G. (2014b). Microbial activities during cocoa fermentation, in Cocoa and Coffee Fermentations. Boca Raton, FL, CRC Press, 130–184.

Schwan, R. .,Pereira, G. V. M.,& Fleet, G. . (2014c). Microbial Activity during Coffffee Fermentation, in Cocoa and Coffee Fermentations. London, Elsevier Ltd, 401.

Schwan, R. .,Silvav Ferreira, C.,& Batista, L. R. (2012). Coffee fermentation. In: Handbook of Plant-Based Fermented Food and Beverage Technology, in. Boca Raton, FL, CRC Press, 677–690.

Selmar, D.,Bytof, G.,& SE Knopp (2002). New aspects of coffee processing: the relation between seed germination and coffee quality, in Dixneuvième Colloque Scientifique International sur le Café. Paris, ASIC.

Selmar, D.,Kleinwächter, M.,& Bytof, G. (2015). Metabolic responses of coffee beans during processing and their impact on coffee flavor, in Cocoa and Coffee Fermentations. New York, CRC Press, 431–476.

Sesta, G. (2006). Determination of sugars in royal jelly by HPLC. Apidologie, 37(1), 84–90.

Shibamoto, T. (1983). Heterocyclic compounds in browning and browning/nitrite model systems: Occurrence, formation mechanisms, flavor characteristics and mutagenic activity, in Instrumental Analysis of Foods, Vol. I. New York, Academic Press, 229–278.

Shimizu, M. M. & Mazzafera, P. (2000). A Role for Trigonelline During Imbibition and Germination of Coffee Seeds. Plant Biology, 2, 605–611.

Silva, C. F.,Schwan, R. F.,Dias, S.,& Wheals, A. E. (2000). Microbial diversity during maturation and natural processing of coffee cherries of Coffea arabica in Brazil. International Journal of Food Microbiology, 60, 251–260.

Silva, C. F.,Batista, L. R.,Abreu, L. M.,Dias, E. S.,& Schwan, R. F. (2008). Succession of bacterial and fungal communities during natural coffee (*Coffea arabica*) fermentation. Food Microbiology, 25(8), 951–957.

Silva, C. F.,Duarte, W. F.,Vilela, D. M.,Dias, D. R.,Schwan, R. F.,& de Souza Cordeiro, C. (2013). Evaluation of a potential starter culture for enhance

PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica)
GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

quality of coffee fermentation. World Journal of Microbiology and Biotechnology, 29(2), 235–247.

Silva, C. F. (2014) .Microbial activity during coffee fermentation. In: Cocoa and Coffee Fermentations, in Microbial activity during coffee fermentation. Boca Raton, FL: CRC Press, 368–423.

Silva, E. . A. Da,Toorop, P. E.,Lammeren, A. A. M. Van,& Hilhorst, H. W. M. (2008) .ABA Inhibits Embryo Cell Expansion and Early Cell Division Events During Coffee (*Coffea arabica* ‘ Rubi ’) Seed Germination. Annals of Botany, 102, 425–433.

Simkin, A. J.,Kuntz, M.,Moreau, H.,& Mccarthy, J. (2010). Plant Physiology and Biochemistry Carotenoid profiling and the expression of carotenoid biosynthetic genes in developing coffee grain. Plant Physiology and Biochemistry. Elsevier Masson SAS, 48(6), 434–442.

Sivetz, M. (1963) *Coffee processing technology*. Westport, Connecticut, AVIC.

Somporn, C.,Kamtuo, A.,Theerakulpisut, P.,& Siriamornpun, S. (2011). Effects of roasting degree on radical scavenging activity , phenolics and volatile compounds of Arabica coffee beans (*Coffea arabica* L . cv . *Catimor*). International Journal of Food Science and Technology, 46, 2287–2296.

Spadone, J. .,Takeoka, G.,& Liardon, R. (1990). Analytical investigation of Rio off-flavor in green coffee. Journal of Agricultural and Food Chemistry, 38(1), 226–233.

Stegen, G. v. d & Duijn, J. v (1987). Analysis of normal organic acids in coffee, in The 12 th International Scientific Colloquium on Coffee, 3–7.

Sua´rez-Quiroz, M.,Gonza´lez-Rios, O.,Barel, M.,Guyot, B.,Schorr-Galindo, S.,& Guiraud, J.-P. (2004). Study of *ochratoxin* A-producing strains in coffee processing. International Journal of Food Science and Technology, 39, 501–507.

Sunarharum, W.,Williams, D. J.,& Smyth, H. E. (2014). Complexity of coffee flavor: A compositional and sensory perspective. Food Research International, 62, 315–325.

Tadesse, F. T.,Jemal, Y.,& Abebe, H. (2015). Effect of Green Coffee Processing Methods and Roasting Temperatures on Physical and Cup Quality of Sidama Coffee, Southern Ethiopia. Journal of Nutritional Ecology and Food Research, 3(1), 44–50.

Tang, H.,Ma, J.-K.,Chen, L.,Jiang, L.-W.,Xie, J.,Li, P.,& He, J. (2018). GC-MS Characterization of Volatile Flavor Compounds in Stinky Tofu Brine by Optimization of Headspace Solid-Phase Microextraction Conditions. Molecules, 23(3155), 1–14.

UNIVERSITAS GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

Taniwaki, M. H.,Pitt, J. I.,Teixeira, A. A.,& Iamanaka, B. T. (2003). The source of ochratoxin A in Brazilian coffee and its formation in relation to processing methods. International Journal of Food Microbiology, 82, 173–179.

Taylor, A. J. & Roozen, J. P. (1996). Volatile flavor release from foods during eating. Critical Reviews in Food Science and Nutrition, 36(8), 765–784.

Teixeira, A. A.,Brando, C. H. J.,Thomaziello, R. A.,& Teixiera, R. (1995). Espresso Coffee: The Science of Quality, in. Rome, Elsevier Ltd, 91–95.

Toci, A. T. & Farah, A. (2014). Volatile fingerprint of Brazilian defective coffee seeds: Corroboration of potential marker compounds and identification of new low quality indicators,. Food Chemistry. Elsevier Ltd, 153, 298–314.

Toledo, P. R. A. B.,Pezza, L.,Pezza, H. R.,& Toci, A. T. (2016). Relationship Between the Different Aspects Related to Coffee Quality and Their Volatile Compounds. Comprehensive Reviews in Food Science and Food Safety, 15(4), 705–719.

Tressl, R. (1980). Formation of aroma compounds by the Maillard reaction, in The 9th International Scientific Colloquium on Coffee, 55–76.

Trugo, L. C. & Macrae, R. (1984) .Chlorogenic Acid Composition of Instant Coffees. Analyst, 109, 263–266.

Trugo & Macrae, R. (1984) .A Study of the Effect of Roasting on the Chlorogenic Acid Composition of Coffee Using HPLC. Food Chemistry, 15, 219–227.

Ugliano, M. & Henschke, P. (2009). Yeasts and wine flavor, in Wine Chemistry and Biochemistry. New York, Springer Science, 313–391.

Urgert, R.,van der Weg, G.,Kosmeijer-Schuil, T. G.,van de Bovenkamp, P.,Hovenier, R.,& Katan, M. B. (1995). Levels of the Cholesterol-Elevating Diterpenes Cafestol and Kahweol in Various Coffee Brews. Journal of Agricultural and Food Chemistry, 43(8), 2167–2172.

Variyar, P. S.,Ahmad, R.,Bhat, R.,Niyas, Z.,& Sharma, A. (2003). Flavoring Components of Raw Monsooned Arabica Coffee and Their Changes during Radiation Processing. Journal of Agricultural and Food Chemistry, 51(27), 7945–7950.

Velmourougane, K. (2013). Impact of natural fermentation on physicochemical, microbiological and cup quality characteristics of Arabica and Robusta coffee. Proceedings of the National Academy of Sciences India Section B - Biological Sciences, 83(2), 233–239.

Viani, R. & Petracco, M. (2007). Coffee, in Ullmann's Encyclopedia of Industrial

PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica)
GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

Chemistry. Wiley- VCH Verlag GmbH & Co, 1–32.

Vilela, D. M.,Pereira, G. V. de M.,Silva, C. F.,Batista, L. R., & Schwan, R. F. (2010). Molecular ecology and polyphasic characterization of the microbiota associated with semi-dry processed coffee (*Coffea arabica* L.). Food Microbiology. Elsevier Ltd, 27(8), 1128–1135.

Vitzthum, O. G. (1976) .Chemie und bearbeitung des kaffees, in Kaffee und Coffein. Berlin, Springer, 3–64.

Vitzthum, O. G.,Weissmann, C.,Becker, R.,& Kohler, H. S. (1990). Identification of an aroma key compound in Robusta coffees, in Cafe Cacao Tea, 27–36.

Van der Vossen, H. A. M. (2009). The Cup Quality of Disease-Resistant Cultivars ff Arabica Coffee (*Coffea arabica*). Experimental Agriculture, 45(3), 323–332.

Vuyst, L. De,Lefeber, T.,Papalexandratou, Z.,& Camu, N. (2010). The Functional Role of Lactic Acid Bacteria in Cocoa Bean Fermentation, in Biotechnology of Lactic Acid Bacteria , Novel Applications. Blackwell Publishing, 301–325.

Wahyudi T. (2008). Sambutan Direktur Puslitkoka Indonesia pada buku Panduan budidaya dan pengolahan kopi arabika Gayo, Pusat Penelitian Kopi dan Kakao Indonesia. BAPPEDA NAD dan UNDP.

Wang, C.,Sun, J.,Lassabliere, B.,Yu, B.,Zhao, Feifei,Zhao, Fangju,Chen, Y.,& Liu, S. Q. (2019). Potential of lactic acid bacteria to modulate coffee volatiles and effect of glucose supplementation: fermentation of green coffee beans and impact of coffee roasting. Journal of the Science of Food and Agriculture, 99(1), 409–420.

Wasserman, G. (1992). Coffee, Encyclopedia Of Chemical Technology. John Wiley & Sons, Inc.

Yeretzian, C.,Jordan, A.,Badoud, R.,& Lindinger, W. (2002). From the green bean to the cup of coffee: Investigating coffee roasting by on-line monitoring of volatiles. European Food Research and Technology, 214(2), 92–104.

Yusianto,Hulupi, R.,Mawardi, S.,& Ismayadi, C. (2005). Sifat Fisiko-Kimia dan Cita Rasa Beberapa Varietas Kopi Arabika. Pelita Perkebunan, l(3), 200–222.

Yusianto,Hulupi, R.,Mawardi, S.,& dan Ismayadi, C. (2007). Mutu Fisik dan Cita Rasa Beberapa Varietas Kopi Arabika Harapan pada Beberapa Periode Penyimpanan. Pelita Perkebunan, 3(90), 205–230.

Zheng, X. & Ashihara, H. (2004). Distribution , biosynthesis and function of

UNIVERSITAS
GADJAH MADA
PERLAKUAN FERMENTASI PADA PROSES PENGOLAHAN KERING DAN SEMI KERING KOPI ARABIKA (Coffea arabica) GAYO VARIETAS ATENG SUPER TERHADAP PROFIL SENYAWA VOLATIL, NON VOLATIL, DAN KARAKTERISTIK SENSORIS
BUDI MULYARA, Prof. Dr. Sri Anggrahini, MS; Dr. Ir. Supriyadi, M.Sc
Universitas Gadjah Mada, 2019 | Diunduh dari http://etd.repository.ugm.ac.id/

purine and pyridine alkaloids in *Coffea arabica* seedlings. Plant Science, 166, 807–813.