UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

DAFTAR PUSTAKA

Ahmed, S., Khan, A., Hussain, M. S., dan Almatroudi, A., 2024, Antimicrobial resistance: global burden, mechanisms, and future perspectives, *Antibiotics*, 13(2), 1–25.

Alam, B., Gachon, C. M. M., dan van den Burg, H. A., 2021, Fungal endophytes: from biology to applications, *Plant Molecular Biology*, 107(4–5), 1–23.

Allard, P. M., Péresse, T., Bisson, J., Gindro, K., Marcourt, L., Pham, V. C., Roussi, F., Litaudon, M., dan Wolfender, J. L., 2016, Integration of molecular networking and in-silico MS/MS fragmentation for natural products dereplication, *Analytical Chemistry*, 88(6), 3317–3323.

Almeida, R.P.D., Koolen, H.H.F., Filho, E.R., Ferreira, M.C., dan de Oliveira, A.L.L., 2025, Endophytic Fungi of *Calea pinnatifida*: Dereplication of Crude Extracts, Antimicrobial Properties, and Identification of New Tetronic Acid Derivative, *Molecules*, 30(3), 495.

Aly, A. H., Debbab, A., Kjer, J., dan Proksch, P., 2010, Fungal endophytes from higher plants: A prolific source of phytochemicals and other bioactive natural products, *Fungal Diversity*, 41(1), 1–16

Amalraj, A., Pius, A., Gopi, S., dan Gopi, S., 2016, Biological activities of curcuminoids, other biomolecules from turmeric and their derivatives – a review, *Journal of Traditional and Complementary Medicine*, 7(2), 205–233.

Ancheeva, E., Daletos, G., dan Proksch, P., 2020, Bioactive secondary metabolites from endophytic fungi, *Current Medicinal Chemistry*, 27(11), 1836–1854.

Arya, N., Singh, D., Sharma, S., dan Rani, A., 2018, Phytochemical and pharmacological aspects of Curcuma caesia Roxb.: a review, *Journal of Pharmacognosy and Phytochemistry*, 7(1), 2415–2420.

Atanasov, A. G., Zotchev, S. B., Dirsch, V. M., dan Supuran, C. T., 2021, Natural products in drug discovery: advances and opportunities, *Nature Reviews Drug Discovery*, 20(3), 200–216.

Bader, C. D., Nichols, A. L., Yang, D., dan Shen, B., 2023, Interplay of emerging and established technologies drives innovation in natural product antibiotic discovery, *Current Opinion in Microbiology*, 75, 102359.

Bamisile, B. S., Dash, C. K., Akutse, K. S., Keppanan, R., dan Wang, L., 2018, Fungal endophytes: beyond herbivore management, *Frontiers in Microbiology*, 9, 544.

Barba, F. J., Putnik, P., Bursać Kovačević, D., dan Lorenzo, J. M., 2024, Antimicrobial resistance: current status and future challenges, *Foods*, 13(1), 1–18.

Bhatti, M. F., Jamal, A., dan Ahmad, M., 2017, Comparative evaluation of culture media for fungal growth and sporulation, *Journal of Plant Pathology and Microbiology*, 8(6), 1–6.

Błaszczyk, L., Siwulski, M., Sobieralski, K., Lisiecka, J., dan Jędryczka, M., 2021, Techniques for isolation and identification of endophytic fungi, *Journal of Fungi*, 7(4), 1–20.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Balouiri, M., Sadiki, M., dan Ibnsouda, S. K., 2016, Methods for in vitro evaluating antimicrobial activity: A review, *Journal of Pharmaceutical Analysis*, 6(2), 71–79.

Bode, H. B., Bethe, B., Höfs, R., dan Zeeck, A., 2002, Big effects from small changes: possible ways to explore the chemical potential of microorganisms, *ChemBioChem*, 3(7), 619–627.

Borah, A., Paw, M., Gogoi, R., Loying, R., Sarma, N., Munda, S., dan Lal, M., 2019, Chemical composition, antioxidant, antimicrobial, and cytotoxic activities of essential oil of Curcuma caesia Roxb. leaves, *Journal of Essential Oil Bearing Plants*, 22(2), 334–348.

Brakhage, A. A., 2013, Regulation of fungal secondary metabolism, *Nature Reviews Microbiology*, 11(1), 21–32.

Breijyeh, Z., Jubeh, B., dan Karaman, R., 2020, Resistance of Gram-negative bacteria to current antibacterial agents and approaches to resolve it, *Molecules*, 25(6), 1–23.

Broadhurst, D., dan Kell, D., 2006, Statistical strategies for avoiding false discoveries in metabolomics and related experiments, *Metabolomics*, 2(4), 171–196.

Budhathoki, U., dan Shrestha, B., 2020, Evaluation of different culture media for growth and sporulation of fungi, *Nepal Journal of Biotechnology*, 8(1), 1–8.

Butler, M. S., Blaskovich, M. A. T., dan Cooper, M. A., 2024, Antibiotics in the clinical pipeline at the end of 2023, *Journal of Antibiotics*, 77, 1–22.

Cajka, T., dan Fiehn, O., 2016, Toward merging untargeted and targeted methods in mass spectrometry-based metabolomics and lipidomics, *Analytical Chemistry*, 88(1), 524–545.

Capon, R. J., Skene, C., Stewart, M., Ford, J., O'Hair, R. A. J., Williams, L., Lacey, E., Gill, J. H., Heiland, K., dan Friedel, T., 2003, Aspergillicins A–E: five novel desipeptides from the marine-derived fungus *Aspergillus carneus*, *Organic and Biomolecular Chemistry*, 1(11), 1856–1862.

Chis, A. A., Rus, L. L., Morgovan, C., Arseniu, A. M., Frum, A., Gligor, F. G., dan Muntean, A. C., 2022, Microbial resistance mechanisms and challenges in antibiotic discovery, *Antibiotics*, 11(7), 857.

CLSI, 2024, Performance Standards for Antimicrobial Susceptibility Testing, 34th Edition, *Clinical and Laboratory Standards Institute*, Wayne.

Compant, S., Samad, A., Faist, H., dan Sessitsch, A., 2019, A review on the plant microbiome: ecology, functions, and emerging trends in microbial application, *Journal of Advanced Research*, 19, 29–37.

Cos, P., Vlietinck, A. J., Berghe, D. V., dan Maes, L., 2006, Anti-infective potential of natural products: How to develop a stronger in vitro proof-of-concept, *Journal of Ethnopharmacology*, 106(3), 290–302.

Creek, D. J., Dunn, W. B., Fiehn, O., Griffin, J. L., Hall, R. D., Lei, Z., Mistrik, R., Neumann, S., Schymanski, E. L., Sumner, L. W., dan Villas-Bôas, S. G., 2014, Metabolite identification: are you sure? And how do your peers gauge your confidence?, *Metabolomics*, 10(3), 350–353.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Das, K., Dang, R., Pal, M., dan Singh, M., 2013, Curcuma caesia Roxb. and its medicinal uses: a review, *International Journal of Research in Pharmacy and Chemistry*, 3(2), 370–375.

Davoudpour, Y., Hossain, M. S., Khalil, H. P. S. A., Haafiz, M. K. M., Ishak, Z. A. M., Hassan, A., dan Sarker, Z. I., 2020, Evaluation of sterilization methods for plant tissue and endophyte isolation, *Scientific Reports*, 10, 1–12.

Demain, A. L., dan Fang, A., 2000, The natural functions of secondary metabolites, *Advances in Biochemical Engineering/Biotechnology*, 69, 1–39.

Deshmukh, S. K., Gupta, M. K., Prakash, V., dan Saxena, S., 2023, Endophytic fungi: a source of potential antimicrobial compounds against multidrug-resistant pathogens, *Journal of Fungi*, 9(4), 1–33.

Devi, H. P., dan Mazumder, P. B., 2016, Methanolic extract of *Curcuma caesia* Roxb. prevents the toxicity caused by cyclophosphamide to bone marrow cells, liver and kidney of mice, *Pharmacognosy Research*, 8(1), 43–49.

Dijksterhuis, J., Houbraken, J., dan Samson, R. A., 2011, Guttation and fungal exudates: Physiological and ecological aspects, *Studies in Mycology*, 70, 1–16.

Dong, M. W., 2006, Modern HPLC for Practicing Scientists, *Wiley-Interscience*, Hoboken.

Dührkop, K., Fleischauer, M., Ludwig, M., Aksenov, A. A., Melnik, A. V., Meusel, M., Dorrestein, P. C., Rousu, J., dan Böcker, S., 2019, SIRIUS 4: a rapid tool for turning tandem mass spectra into metabolite structure information, *Nature Methods*, 16(4), 299–302.

Dührkop, K., Nothias, L. F., Fleischauer, M., Reher, R., Ludwig, M., Hoffmann, M. A., Petras, D., Gerwick, W. H., Rousu, J., Dorrestein, P. C., dan Böcker, S., 2021, Systematic classification of unknown metabolites using high-resolution fragmentation mass spectra, *Nature Biotechnology*, 39(4), 462–471.

Estrela, C., Estrela, C. R. A., Barbin, E. L., Spanó, J. C. E., Marchesan, M. A., dan Pécora, J. D., 2002, Mechanism of action of sodium hypochlorite, *Brazilian Dental Journal*, 13(2), 113–117.

Fan, X., Gao, J., Wang, Y., dan Zhang, L., 2020, Validation methods for endophytic fungi isolation and surface sterilization, *Mycobiology*, 48(4), 245–256.

Frisvad, J. C., Hubka, V., Ezekiel, C. N., Hong, S. B., Nováková, A., Chen, A. J., Arzanlou, M., Larsen, T. O., Sklenář, F., Mahakarnchanakul, W., dan Samson, R. A., 2018, Taxonomy of Aspergillus section Nigri and its significance, *Studies in Mycology*, 89, 1–73.

Gomez, G. B., dan Hernandez, S. B., 2025, Horizontal gene transfer and dissemination of antimicrobial resistance genes: current perspectives, *Frontiers in Microbiology*, 16, 1–18.

Gong, L. J., Gou, M., Zhang, H., Tian, S., dan Li, T., 2019, Effects of culture media on isolation of endophytic fungi from medicinal plants, *MicrobiologyOpen*, 8(4), 1–11.

Gouda, S., Das, G., Sen, S.K., Shin, H.S., dan Patra, J.K., 2016, Endophytes: a treasure house of bioactive compounds of medicinal importance, *Frontiers in Microbiology*, 7, 1538.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Gowrishankar, S., Sivaranjani, M., Kamaladevi, A., Ravi, A.V., Balamurugan, K., dan Karutha Pandian, S., 2016, Cyclic dipeptide cyclo(L-leucyl-L-prolyl) from marine *Bacillus amyloliquefaciens* mitigates biofilm formation and virulence in *Listeria monocytogenes*, *Pathogens and Disease*, 74(4), ftw017

Goyal, S., Sharma, P., Sharma, V., dan Singh, B., 2023, Antibacterial activity and metabolite profiling of Bipolaris axonopicola isolated from *Curcuma caesia* Roxb., *Current Microbiology*, 80, 1–14.

Greco, C., Pfannenstiel, B.T., Liu, J.C., dan Keller, N.P., 2019, Depsipeptide aspergillicins revealed by chromatin reader protein deletion, *ACS Chemical Biology*, 14(6), 1121–1128.

Gupta, A., Meshram, V., Gupta, M., Goyal, S., Qureshi, K. A., Jaremko, M., dan Shukla, K. K., 2023, Fungal endophytes: Microfactories of novel bioactive compounds with therapeutic interventions; A comprehensive review on the biotechnological developments in the field of fungal endophytic biology over the last decade, *Biomolecules*, 13(7), 1038.

Hata, K., dan Sone, K., 2008, Isolation of endophytic fungi from plants and their ecology, *Springer*, Berlin, 201–216.

Hamzah, T. N. T., Lee, S. Y., Hidayat, A., Terhem, R., Faridah-Hanum, I., dan Mohamed, R., 2018, Diversity and characterization of endophytic fungi isolated from medicinal plants, *Mycology*, 9(4), 245–254.

Hardoim, P. R., van Overbeek, L. S., dan van Elsas, J. D., 2015, Properties of bacterial endophytes and their proposed role in plant growth, *Trends in Microbiology*, 23(8), 463–471.

Harvey, A. L., Edrada-Ebel, R., dan Quinn, R. J., 2015, The re-emergence of natural products for drug discovery in the genomics era, *Nature Reviews Drug Discovery*, 14(2), 111–129.

Heimann, K., dan Lewis, K., 2025, Challenges and opportunities in antibacterial drug discovery, *Nature Reviews Drug Discovery*, 24, 1–19.

Hoeksma, S., Otten, L. G., dan Pirovano, W., 2019, Metabolites from fungal endophytes: structural diversity and bioactivity, *Natural Product Reports*, 36(10), 1397–1420.

Huang, M. T., Lu, Y. P., dan Lou, Y. R., 2010, Biological activities of curcumin and related compounds, *Journal of Cellular Biochemistry*, 111(2), 315–321.

Hussain, H., Al-Harrasi, A., Al-Rawahi, A., dan Green, I. R., 2021, Endophytic fungi and their bioactive metabolites: recent advances and future prospects, *Molecules*, 26(20), 1–32.

Ibrahim, S. R. M., Mohamed, G. A., dan Ross, S. A., 2022, Bioactive metabolites from endophytic fungi: chemical diversity and therapeutic potential, *Journal of Fungi*, 8(3), 1–35.

Isha, V., Venkatesan, K., Rajashree, V., Senthil, N., Renuka, R., dan Chandrakumar, K., 2025, Black turmeric (*Curcuma caesia* Roxb.) *Zingiberaceae:* unveiling mystical phytochemicals and their pharmacological wonders, *Discover Applied Sciences*, 7, 612.

Keller, N. P., 2019, Fungal secondary metabolism: regulation, function and drug discovery, *Nature Reviews Microbiology*, 17(3), 167–180.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Kellogg, J. J., Kvalheim, O. M., dan Cech, N. B., 2016, Composite score analysis for unsupervised comparison and network visualization of metabolomics data, *Metabolomics*, 12, 1–13.

Khare, C. P., 2007, *Indian Medicinal Plants: An Illustrated Dictionary*, Springer, New York.

Kind, T., dan Fiehn, O., 2007, Seven golden rules for heuristic filtering of molecular formulas obtained by accurate mass spectrometry, *BMC Bioinformatics*, 8, 105.

King, A. D., Hocking, A. D., dan Pitt, J. I., 1979, Dichloran-rose bengal medium for enumeration and isolation of molds, *Applied and Environmental Microbiology*, 37(5), 959–964.

Kjer, J., Debbab, A., Aly, A. H., dan Proksch, P., 2010, Methods for isolation of marine-derived endophytic fungi and their bioactive secondary products, *Nature Protocols*, 5(3), 479–490.

Kraker, M. E. A., Davey, P. G., dan Grundmann, H., 2011, Mortality and hospital stay associated with resistant *Staphylococcus aureus* and *Escherichia coli bacteremia*, *PLoS Medicine*, 8(10), e1001104.

Kusari, S., Hertweck, C., dan Spiteller, M., 2012, Chemical ecology of endophytic fungi: origins of secondary metabolites, *Chemistry and Biology*, 19(7), 792–798.

Leslie, J. F., dan Summerell, B. A., 2006, The Fusarium Laboratory Manual, *Blackwell Publishing*, Ames.

Li, H. Y., Wei, D. Q., Shen, M., dan Zhou, Z. P., 2016a, Endophytes and their role in plant health and productivity, *World Journal of Microbiology and Biotechnology*, 32(2), 1–14.

Li, W. C., Zhou, J., dan Guo, S. Y., 2016b, Isolation and characterization of fungal endophytes from medicinal plants, *Mycology*, 7(1), 1–10.

Li, X. Z., Plésiat, P., dan Nikaido, H., 2023, The challenge of efflux-mediated antibiotic resistance in Gram-negative bacteria, *Clinical Microbiology Reviews*, 36(1), e0004222.

Luo, H., Zhao, Y., Wang, X., dan Xu, Q., 2022, Advances in fungal endophyte genomics and metabolomics for natural product discovery, *Frontiers in Microbiology*, 13, 1–15.

Madigan, M. T., Martinko, J. M., Dunlap, P. V., dan Clark, D. P., 2008, *Brock Biology of Microorganisms*, 12th Edition, Pearson Education, San Francisco.

Magiorakos, A. P., Srinivasan, A., Carey, R. B., Carmeli, Y., Falagas, M. E., Giske, C. G., Harbarth, S., Hindler, J. F., Kahlmeter, G., Olsson-Liljequist, B., Paterson, D. L., Rice, L. B., Stelling, J., Struelens, M. J., Vatopoulos, A., Weber, J. T., dan Monnet, D. L., 2012, Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance, *Clinical Microbiology and Infection*, 18(3), 268–281.

Mahato, D., dan Sharma, H. P., 2018, Kali Haldi (*Curcuma caesia* Roxb.): An ethnomedicinal plant of Jharkhand State-A review, *Indian Journal of Traditional Knowledge*, 17(2), 322–326.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Majeed, M., Majeed, S., Nagabhushanam, K., dan Mundkur, L., 2019, Calebin-A producing endophytic fungus Ovatospora brasiliensis isolated from *Curcuma caesia* Roxb., *Journal of Traditional and Complementary Medicine*, 9(4), 1–8.

Man, H. J., Kim, S. Y., dan Lee, J. H., 2015, Influence of culture media on endophytic fungal isolation and diversity, *Journal of Microbiology*, 53(3), 179–187.

Man, Y., Zhang, W., Liu, X., dan Chen, H., 2024, Comparative isolation efficiency of endophytic fungi from cucumber using different culture media, *Journal of Fungi*, 10(2), 1–15.

Martins, M.B. dan Carvalho, I., 2007, Diketopiperazines: biological activity and synthesis, *Tetrahedron*, 63(40), 9923–9932.

Menezes, R., Santos, A., Schneider, A., Rodrigues, L., Borges, R., Zanetti, A., 2022, Dereplication of cytochalasans and octaketides in cytotoxic extracts of endophytic fungi from *Casearia arborea*, *Marine Drugs*, 20(11), 700.

Mohanty, S., Mishra, S., Jena, P., Jacob, B., Sarkar, B., dan Sonawane, A., 2021, An overview of bacterial resistance to antibiotics and mechanisms of resistance, *Journal of Medical Microbiology*, 70(5), 001344.

Mullowney, M. W., McClure, R. A., Robey, M. T., dan Kelleher, N. L., 2023, Artificial intelligence and omics-guided antibiotic discovery, *ACS Infectious Diseases*, 9(6), 1041–1055.

Munita, J. M., dan Arias, C. A., 2016, Mechanisms of antibiotic resistance, *Microbiology Spectrum*, 4(2), VMBF-0016-2015.

Murray, C. J. L., Ikuta, K. S., Sharara, F., Swetschinski, L., Aguilar, G. R., Gray, A., Han, C., Bisignano, C., Rao, P., Wool, E., dan lain-lain, 2022, Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis, *The Lancet*, 399(10325), 629–655.

Naghavi, M., Vollset, S. E., Ikuta, K. S., Swetschinski, L. R., Gray, A. P., Wool, E. E., 2024, Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050, *The Lancet*, 404(10459), 1199–1226.

Newman, D. J., dan Cragg, G. M., 2020, Natural products as sources of new drugs over nearly four decades from 1981 to 2019, *Journal of Natural Products*, 83(3), 770–803.

Nielsen, K. F., Månsson, M., Rank, C., Frisvad, J. C., dan Larsen, T. O., 2011, Dereplication of microbial natural products by LC-DAD-TOFMS, *Journal of Natural Products*, 74(11), 2338–2348.

Nilsson, R. H., Larsson, K. H., Taylor, A. F. S., Bengtsson-Palme, J., Jeppesen, T. S., Schigel, D., Kennedy, P., Picard, K., Glöckner, F. O., Tedersoo, L., Saar, I., Kõljalg, U., dan Abarenkov, K., 2019, The UNITE database for molecular identification of fungi, *Nucleic Acids Research*, 47(D1), D259–D264.

Nisa, H., dan Kamili, A. N., 2019, Fungal endophytes as prolific source of phytochemicals and bioactive natural products: a review, *Microbial Pathogenesis*, 129, 199–211.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Nothias, L. F., Petras, D., Schmid, R., Dührkop, K., Rainer, J., Sarvepalli, A., Protsyuk, I., Ernst, M., Tsugawa, H., Fleischauer, M., Aicheler, F., Aksenov, A. A., Alka, O., Allard, P. M., Barsch, A., Cachet, X., Caraballo-Rodríguez, A. M., 2020, Feature-based molecular networking in the GNPS analysis environment, *Nature Methods*, 17(9), 905–908.

Paliwal, P., Pancholi, S. S., dan Patel, R. K., 2011, Pharmacognostic parameters for evaluation of the rhizomes of *Curcuma caesia* Roxb., *Journal of Advanced Pharmaceutical Technology & Research*, 2(1), 56–61.

Pang, Z., Raudonis, R., Glick, B. R., Lin, T. J., dan Cheng, Z., 2019, Antibiotic resistance in Pseudomonas aeruginosa: Mechanisms and alternative therapeutic strategies, *Biotechnology Advances*, 37(1), 177–192.

Pan, R., Bai, X., Chen, J., Zhang, H., dan Wang, H., 2019, Exploring structural diversity of microbe secondary metabolites using OSMAC strategy: A literature review, *Frontiers in Microbiology*, 10, 294.

Patti, G. J., Yanes, O., dan Siuzdak, G., 2012, Metabolomics: the apogee of the omics trilogy, *Nature Reviews Molecular Cell Biology*, 13(4), 263–269.

Pietro-Souza, W., Mello, I. S., Vendruscolo, F., dan Azevedo, J. L., 2017, Surface sterilization methods for isolation of endophytic fungi, *Brazilian Journal of Microbiology*, 48(2), 1–10.

Pitt, J. I., dan Hocking, A. D., 2009, *Fungi and Food Spoilage*, 3rd Edition, Springer, New York.

Pluskal, T., Castillo, S., Villar-Briones, A., dan Orešič, M., 2010, MZmine 2: modular framework for processing, visualizing, and analyzing mass spectrometry-based molecular profile data, *BMC Bioinformatics*, 11, 395.

Puopolo, G., Cimmino, A., Palmieri, M. C., Giovannini, O., Evidente, A., dan Pertot, I., 2014, Maculosin, a secondary metabolite of Alternaria alternata acting as a biocontrol agent against plant pathogenic bacteria, *Journal of Applied Microbiology*, 117(2), 353–362

Quinn, R. A., Nothias, L. F., Vining, O., Meehan, M., Esquenazi, E., dan Dorrestein, P. C., 2020, Molecular networking as a drug discovery, drug metabolism, and precision medicine strategy, *Trends in Pharmacological Sciences*, 38(2), 143–154.

Rajamma, A. G., Bai, V., dan Nambisan, B., 2012, Antioxidant and antibacterial activities of oleoresins isolated from nine *Curcuma* species, *Phytopharmacology*, 2(2), 312–317.

Reis, T. A., Oliveira, T. B., Silva, C. H., dan Lopes, F. A. C., 2022, Surface sterilization methods and validation approaches for isolation of endophytic fungi: A review, *Journal of Fungi*, 8(10), 1–29.

Ribeiro, J. A., Costa, M. P., dan Silva, R. R., 2025, Culture media effects on fungal endophyte recovery and diversity, *Journal of Applied Microbiology*, 138(1), 1–15.

Romano, S., Jackson, S. A., Patry, S., dan Dobson, A. D. W., 2018, Extending the "One Strain Many Compounds" (OSMAC) principle to marine microorganisms, *Marine Drugs*, 16(7), 244.

Sahu, P. K., Tilgam, J., Mishra, S., Hamid, S., Gupta, A., K., J., Verma, S. K., dan Kharwar, R. N., 2022, Surface sterilization for isolation of endophytes:

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Ensuring what (not) to grow, *Journal of Basic Microbiology*, 62(6), 647–668.

Samson, R. A., Noonim, P., Meijer, M., Houbraken, J., Frisvad, J. C., dan Varga, J., 2007, *Diagnostic tools to identify black aspergilli*, *Studies in Mycology*, 59, 129–145

Samson, R. A., Visagie, C. M., Houbraken, J., Hong, S. B., Hubka, V., Klaassen, C. H. W., Perrone, G., Seifert, K. A., Susca, A., Tanney, J. B., Varga, J., Kocsubé, S., Szigeti, G., Yaguchi, T., dan Frisvad, J. C., 2014, Phylogeny, identification and nomenclature of the genus *Aspergillus*, *Studies in Mycology*, 78, 141–173.

Sarangthem, K., dan Haokip, M. J., 2010, Bioactive components in *Curcuma caesia* Roxb. grown in Manipur, *The Bioscan*, 5(1), 113–115

Schoch, C. L., Seifert, K. A., Huhndorf, S., Robert, V., Spouge, J. L., Levesque, C. A., dan Chen, W., 2012, Nuclear ribosomal internal transcribed spacer (ITS) region as a universal DNA barcode marker for fungi, *Proceedings of the National Academy of Sciences USA*, 109(16), 6241–6246.

Schymanski, E. L., Jeon, J., Gulde, R., Fenner, K., Ruff, M., Singer, H. P., dan Hollender, J., 2014, Identifying small molecules via high resolution mass spectrometry: communicating confidence, *Environmental Science and Technology*, 48(4), 2097–2098.

Shu, X., Li, Z., Kang, J., Bi, X., Li, Y., Lu, Z., Wang, Y., 2023, Antibacterial polyketides isolated from the marine-derived fungus *Fusarium solani* 8388, *Journal of Fungi*, 9(9), 875.

Sica, V. P., Rees, E. R., Tchegnon, E., et al., 2016, In situ adsorption of fungal secondary metabolites using Amberlite XAD-16 resin to improve metabolite recovery, *Journal of Industrial Microbiology & Biotechnology*, 43, 1291–1301.

Singh, V. K., dan Kumar, A., 2023, Secondary metabolites from endophytic fungi: Production, methods of analysis, and diverse pharmaceutical potential, *Symbiosis*, 90(2), 111–125.

Smedsgaard, J., 1997, Micro-scale extraction procedure for standardized screening of fungal metabolite production in cultures, *Journal of Chromatography A*, 760(2), 264–270.

Snyder, L. R., Kirkland, J. J., dan Dolan, J. W., 2010, *Introduction to Modern Liquid Chromatography*, 3rd Edition, John Wiley & Sons, Hoboken.

Strobel, G., dan Daisy, B., 2003, Bioprospecting for microbial endophytes and their natural products, *Microbiology and Molecular Biology Reviews*, 67(4), 491–502.

Stierle, A.C., Cardellina, J.H., dan Strobel, G.A., 1988, Maculosin, a host-specific phytotoxin for spotted knapweed from *Alternaria alternata*, *Proceedings of the National Academy of Sciences USA*, 85(21), 8008–8011.

Stierle, A., Strobel, G., dan Stierle, D., 1993, Taxol and taxane production by *Taxomyces andreanae*, an endophytic fungus of Pacific yew, *Science*, 260(5105), 214–216.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

Still, W. C., Kahn, M., dan Mitra, A., 1978, Rapid chromatographic technique for preparative separations with moderate resolution, *Journal of Organic Chemistry*, 43(14), 2923–2925.

Sumner, L. W., Amberg, A., Barrett, D., Beale, M. H., Beger, R., Daykin, C. A., Fan, T. W. M., Fiehn, O., Goodacre, R., Griffin, J. L., Hankemeier, T., Hardy, N., Harnly, J., Higashi, R., Kopka, J., dan Viant, M. R., 2007, Proposed minimum reporting standards for chemical analysis, *Metabolomics*, 3(3), 211–221.

Szűcs, Z., Plaszkó, T., Cziáky, Z., Kiss-Szikszai, A., Emri, T., Bertóti, R., Sinka, L. T., Vasas, G., dan Gonda, S., 2018, Endophytic fungi from the roots of horseradish (*Armoracia rusticana*) and their interactions with the defensive metabolites of the glucosinolate–myrosinase–isothiocyanate system, *BMC Plant Biology*, 18(1), 85.

Tiwari, P., dan Bae, H., 2022, Endophytic fungi: Key insights, emerging prospects, and challenges in natural product drug discovery, *Microorganisms*, 10(2), 360.

Uruén, C., Chopo-Escuin, G., Tommassen, J., Mainar-Jaime, R. C., dan Arenas, J., 2021, Biofilms as promoters of bacterial antibiotic resistance and tolerance, *Antibiotics*, 10(1), 3.

van Beek, T. A., dan Montoro, P., 2009, Chemical analysis and quality control of herbal medicines and nutraceuticals, *Journal of Chromatography A*, 1216(11), 1963–1970.

van Santen, J. A., Jacob, G., Singh, A. L., Aniebok, V., Balunas, M. J., Bunsko, D., Neto, F. C., Castaño-Espriu, L., Chang, C., Clark, T. N., dan lain-lain, 2019, The Natural Products Atlas: an open access knowledge base for microbial natural products discovery, *ACS Central Science*, 5(11), 1824–1833.

Venugopal, A., Rinu, K. A., dan Joseph, D., 2017, Medicinal properties of black turmeric: A review, *Innoriginal International Journal of Sciences*, 4(3), 1–4.

Waller, F., Achatz, B., Baltruschat, H., Fodor, J., Becker, K., Fischer, M., Heier, T., Hückelhoven, R., Neumann, C., Wettstein, D., Franken, P., dan Kogel, K. H., 2005, The endophytic fungus Piriformospora indica reprograms barley to salt-stress tolerance, disease resistance, and higher yield, *Proceedings of the National Academy of Sciences USA*, 102(38), 13386–13391.

Wang, M., Carver, J. J., Phelan, V. V., Sanchez, L. M., Garg, N., Peng, Y., Nguyen, D. D., Watrous, J., Kapono, C. A., Luzzatto-Knaan, T., dan lain-lain, 2016, Sharing and community curation of mass spectrometry data with Global Natural Products Social Molecular Networking, *Nature Biotechnology*, 34(8), 828–837.

Wang, X., Serrano, R., González-Menéndez, V., Mackenzie, T. A., Ramos, M. C., Frisvad, J. C., dan Larsen, T. O., 2022, A molecular networking based discovery of diketopiperazine heterodimers and aspergillicins from *Aspergillus caelatus*, *Journal of Natural Products*, 85, 1389–1400.

Wang, X., Wang, C., Sui, J., Liu, Z., Li, Q., Ji, C., dan Song, X., 2014, Improved production of secondary metabolites by in situ adsorption with macroporous

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

resin during microbial fermentation, *Applied Microbiology and Biotechnology*, 98, 6847–6858.

Watanabe, T., 2010, *Pictorial Atlas of Soil and Seed Fungi*, 3rd Edition, CRC Press, Boca Raton.

Wiegand, I., Hilpert, K., dan Hancock, R. E. W., 2008, Agar and broth dilution methods to determine the minimum inhibitory concentration (MIC) of antimicrobial substances, *Nature Protocols*, 3(2), 163–175.

White, T. J., Bruns, T., Lee, S., dan Taylor, J. W., 1990, *Amplification and direct sequencing of fungal ribosomal RNA genes for phylogenetics*, dalam Innis, M. A., Gelfand, D. H., Sninsky, J. J., dan White, T. J. (Ed.), *PCR Protocols: A Guide to Methods and Applications*, Academic Press, New York, hlm. 315–322.

WHO, 2024*, Bacterial Priority Pathogens List 2024: Bacterial Pathogens of Public Health Importance*, World Health Organization, Geneva.

Wolfender, J.-L., Nuzillard, J.-M., van der Hooft, J.J.J., Renault, J.-H., dan Bertrand, S., 2019, Accelerating metabolite identification in natural product research: towards an ideal combination of liquid chromatography–high-resolution tandem mass spectrometry and NMR profiling, in silico databases and chemometrics, *Analytical Chemistry*, 91(1), 704–742

Worley, B., dan Powers, R., 2013, Multivariate analysis in metabolomics, *Current Metabolomics*, 1(1), 92–107.

Yao, Y., Tian, M., Liu, J., Liu, X., dan Wang, G., 2017, Evaluation of surface sterilization methods for endophytic fungi isolation, *Mycosystema*, 36(6), 715–724.

Zhang, H. W., Song, Y. C., dan Tan, R. X., 2011, Biology and chemistry of endophytes, *Natural Product Reports*, 28(2), 315–330.

UNIVERSITAS
GADJAH MADA
Profiling Metabolit Antibakteri Jamur Endofit Rimpang Kunyit Hitam (Curcuma caesia Roxb.) Menggunakan Pendekatan Bioactivity-Guided Molecular Networking Berbasis LC-HRMS/MS
NOFRIDA IRENE MALAIFANI, Prof. Dr. Winarto Haryadi, M.Si; Dr.rer.nat. Gian Primahana, M.Sc
Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/