



## DAFTAR PUSTAKA

- Adiningsih, W., R. L. Vifta, dan R. Yuswantina. 2021. Uji aktivitas antibakteri ekstrak etanol 70% dan ekstrak etanol 90% buah *strawberry* (*Fragaria x Ananassa*) terhadap bakteri *Propionibacterium acnes*. Journal of Research in Pharmacy 1(1):2-9.
- Amin, N., Asman, dan A. Thamrin. 2011. Isolasi dan identifikasi cendawan endofit dari klon tanaman kakao tahan VSD M.05 dan klon rentan VSD M.01. Fakultas Pertanian. Universitas Hasanuddin, Makassar.
- Amaria, W., R. Harni, dan Samsudin. 2015. Evaluasi jamur antagonis dalam menghambat pertumbuhan *Rigidoporus microporus* penyebab penyakit jamur akar putih pada tanaman karet. Jurnal Tanaman Industri dan Penyegar, 51-60.
- Antari, N. M., I. B. G. Darmayasa, dan J. Hardini. 2020. Efektivitas *Trichoderma asperellum* TKD dengan metode pupuk kandang untuk mengendalikan penyakit layu *fusarium* pada tanaman cabai merah (*Capsicum annum* L.). Simbiosis VIII 2:63-71.
- Alvarez-Garcia, S., S. Mayo-Prieto, G. Carro-Huerga, A. Rodriguez-Gonzalez, O. Gonzalez-Lopez, S. Gutierrez, & P. A. Casquero. 2021. Volatile Organic Compound Chamber: A Novel Technology for Microbiological Volatile Interaction Assays. Journal of Fungi 7: 1-19.
- Ajilogba, C. F., and O. O. Babalola. 2019. GC-MS analysis of volatile organic compounds from Bambara groundnut rhizobacteria and their antibacterial properties. Word Journal of Microbiology and Biotechnology 35(83):83-102.
- Benbelkhir, F. Z., and S. Medjekal. 2022. Microalgal carotenoids: A promising alternative to synthetic dyes. Algal Research 66:102823.
- Boelt, B., S. Shrestha, Z. Salimi, J. R. Jorgensen, M. Micolaisen, and J. M. Carstensen. 2018. Multispectral imaging-a new tool in seed quality assessment. Journal Seed 28(3):222-228.
- Briguglio, I., S. Piras, P. Corona, E. Gavini, M. Nieddu, G. Boatto, and A. Carta. 2015. Benzotriazole: An overview on its versatile biological behavior. European Journal of Medicinal Chemistry 97:612-648.
- Clough, S. R. 2005. Encyclopedia of Toxicology. National Library of Medicine, Bethesda. Amerika Serikat.
- Contarino, R., S. Brighina, B. Fallico, G. Cirvilleri, L. Parafati, and C. Restuccia. 2019. Volatile organic compound (VOCs) produced by biocontrol yeasts. Food Microbiology 82: 70-74.



- Dendang, B. 2015. Uji antagonisme *Trichoderma spp.* terhadap *Ganoderma sp.* yang menyerang tanaman sengon secara *in-vitro*. Jurnal Penelitian Kehutanan Wallacea 4(2):147-156.
- Devy, L., Y. P. Roswanjaya, N. A. Saryanah, A. Suhendra, dan A. L. Putri. 2020. Formulasi biopestisida *Trichoderma asperellum* Samuels, Lircfk, dan Nirenberg. Agroscript 2(2):91-104.
- Deveau, A., G. Bonito, J. Uehling, M. Paoletti, M. Becker, S. Bindschedler, S. Hacquard, V. Hervé, J. Labbé, O. A. Lastovetsky, S. Mieszkin, L. J. Millet, B. Vajna, P. Junier, P. Bonfante, B. P. Krom, S. Olsson, J. D. van Elsas, and L. Y. Wick. 2018. Bacterial-fungal interactions: ecology, mechanisms and challenges. FEMS Microbiology Review 42: 335-352.
- Etebu, E., and I. Arikekpar. 2016. Antibiotics: Classification and mechanisms of action with emphasis on molecular perspectives. International Journal of Applied Microbiology and Biotechnology Research 4(6): 90-101.
- Effmert, U., J. Kalderás, R. Warnke, and B. Piechulla. 2012. Volatile mediated interactions between bacteria and jamur in the soil. Journal of Chemical Ecology 38: 665– 703.
- Fareza, M. S., E. D. Utami, E. M. Gita, V. R. Permatasari, T. Telaumbanua, dan N. A. Choironi. 2019. Perbandingan kandungan senyawa kimia dan aktivitas antibakteri terhadap MRSA (*Methicillin-resistant Staphylococcus aureus*) beberapa minyak atsiri daun salam (*Syzygium polyanthum*). Jurnal Penelitian Kimia 15(2):302-314.
- Ferdosi, M. F. H., I. H. Khan, A. Javaid, H. M. Saeed, I. Butt, and A. Munir. 2021. GC-MS analysis and bioactive components of flowers of bergenia ciliate a weed of rock crevices in Pakistan. Journal of Research in Weed Science 27(4):527-535
- Fisher, M. M., and E. W. Triplett. 1999. Automated approach for ribosomal intergenic spacer analysis of microbial diversity and its application to freshwater bacterial communities. Applied and Environmental Microbiology 65(10):4630-4636.
- Frank, J. A., C. I. Reich, S. Sharma, J. S. Weisbaum, B. A. Wilson and G. J. Olsen. 2008. Critical evaluation of two primer commonly used for amplification of bacterial 16S rRNA genes. Applied and Environmental Microbiology 74: 2461-2470.
- Frey-Klett, P., P. Burlinson, A. Deveau, M. Barret, M. Tarkka, and A. Sarniguet. 2011. Bacterial-fungal interactions: hyphens between agricultural, clinical, environmental, and food microbiologist. Microbiology and Molecular Biology Reviews 75: 583-609.



Ganuza, M., Pastor, N., Boccolini, M., Erazo, J., Palacios, S., Oddino, C., Reynoso, M.M., Rovera, M., Torres, A.M., 2019. Evaluating the impact of the biocontrol agent *Trichoderma harzianum* ITEM 3636 on indigenous microbial communities from field soils. *Journal of Applied Microbiology* 126:608–623.

Gu, Z., R. Elis, & M. Schlesner. 2016. Complex heatmaps reveal patterns and correlation in multidimensional genomic data. *Bioinformatics* 32: 2847-2849.

Gonzalez-Estrada, R. R., F. J. Blancas-Benitez, L. Aguirre-Guitron, L. G. Hernandez-Montiel, C. Moreno-Hernandez, H. J. Cortes-Rivera, J. A. Herrera-Gonzalez, E. Rayon-Diaz, R. M. Valazquez-Estrada, M. A. Santoyo-Gonzalez, and P. Gutierrez-Martinez. Food Losses, Sustainable Postharvest and Food Technologies 153-190.

Hastuti, U. S., Aisaroh, S., dan E. Yusnawan. 2014. Antagonisme antara kapang *Trichoderma spp.* terhadap *Fusarium solani* secara *In Vitro* serta mekanisme antagonismenya. Prosiding Seminar Hasil Penelitian Tanaman Aneka Kacang dan Umbi. Malang.

Hammerbacher, A., T. A. Coutinho, and J. Gershezon. 2019. Roles of plant volatiles in defence against microbial pathogens and microbial exploitation of volatiles. *Plant, Cell, and Environment* 42: 2827-2843.

Holderman, M, V., E. D. Queljoe, dan S. B. Rondonuwu. 2017. Identifikasi bakteri pada pegangan escalator di salah satu pusat perbelanjaan di kota Manado. *Jurnal Ilmiah Sains* 17(1):13-18.

Kamaruzzaman, M., M.. S. Islam., S. Mahmud, S. A. Polash, R. Sultana, M. A. Hasan, C. Wang, dan C. Jiang. 2021. *In vitro* and *in silico* approach of fungal growth inhibition by *Trichoderma asperellum* HbGT6-07 derived volatile organic compounds. *Arabian Journal of Chemistry* 14:1-21.

Kim, Y.J., H. J. Lee., and Y. Shin. 2013. Optimization and validation of high-performance liquid chromatography method for individual curcuminoids in turmeric by heat-refluxed extraction. *Journal of Agricultural and Food Chemistry* 61(46):10911-8

Kluger, B., S. Zeilinger, G. Wiesenberger, D. Schöfbeck, and R. Schuhmacher. 2013. Detection and Identification of Fungal Microbial Volatile Organic Compounds by HS-SPME-GC-MS. In: V. Gupta, M. Tuohy, M. Ayyachamy, K. Turner, A. O'Donovan (eds) *Laboratory Protocols in Fungal Biology*. Springer, New York.



Lammers, A., M. Lalk, and P. Garbeva. 2022. Air ambulance: antimicrobial power of bacterial volatiles. *Antibiotics* 11: 1-15.

Li, X., P. Garbeva, X. Liu, P. J. A. Klein-Gunnewiek, A. Clocchiatti, M. P. J. Hundscheid, X. Wang, & X. de Boer. 2020. Volatile-mediated antagonism of soil bacterial communities against fungi. *Environmental Microbiology* 22: 1025–1035.

Lin, L. and J. Xu. 2020. Fungal pigments and their roles associated with human health. *Journal of Fungi* 6: 1-37.

Lin, J., Yan, Y., and Chen, S. 2017. Understanding the impact of social commerce website technical features on repurchase intention: a Chinese guanxi perspective. *Journal of Electronic Commerce Research* 18(3):225.

Makar S., T. Saha, and S. K. Singh. 2019. Naphthalene, a versatile platform in medicinal chemistry: Sky-high perspective. *European Journal of Medicinal Chemistry* 161:252-276.

Medina-Romero, Y. M., G. Roque-Flores, M. Macías-Rubalcava. 2017. Volatile organic compounds from endophytic jamur as innovative postharvest control of *Fusarium oxysporum* in cherry tomato fruits. *Applied Microbiology and Biotechnology* 101: 8209–8222.

Moretti, A. N. 2009. Taxonomy of *Fusarium* genus, a continous fight between lumpers and splitters. *Journal Zbornik Matice Srpske za Prirodne Nauke* 117:7-13.

Mukherjee, P.K., H. Wang, M. Retuerto, H. Zhang, B. Burkey, M. A. Ghannoum and C. Eng. 2017. Bacteriome and mycobiome associations in oral tongue cancer. *Oncotarget* 8: 1-17.

Nasr, Z. S., H. El-shershaby, K. M. Sallam, N. Abed, I. A. El-ghany, and N. Sidkey. 2022. Evaluation of antimicrobial potential of tetradecane extracted from *Pediococcus acidilactici* DSM: 20284 - CM isolated from curd milk. *Egyptian Journal of Chemistry* 65: 705-713.

Nazzaro, F., F. Fratianni, L. D. Martino, R. Coppola, and V. D. Feo. 2013. Effect of essential oils on pathogenic bacteria. *Pharmaceuticals* 6: 1451-1474.

Ningsih, S. A., M. Shiddiq, D. S. Arief, dan I. R. Husein. 2020. Penggunaan pencitraan multispektral pada panjang gelombang 520 nm dan 800 nm untuk mengevaluasi Tingkat kematangan TBS kelapa sawit. *Komunikasi Fisika Indonesia* 17(3):144-149.

Nurwijayanto, H. 2020. Studi reaksi metilasi pada senyawa n-Oktanol menggunakan dimetil karbonat. *Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Islam Indonesia. Skripsi*.



- Padma, M. S. Ganesan, T. Jayaseelan, S. azhagumadhavan, P. Sasikala, S. Senthikumar, and P Mani. 2019. Phytochemical screening and GC-MS analysis of bioactive compounds present in ethanolic leaves extract of *Silybum marianum* (L). Journal of Drug Delivery and Therapeutics 9(1):85-89.
- Pasalo, N. M., F. E. F. Kandou, dan M. F. O. Singkoh. 2022. Uji antagonisme Jamur *Trichoderma* sp. terhadap patogen *Fusarium* sp. pada tanaman bawang merah *Allium cepa* Isolat Lokal Tonsewer Secara In Vitro. Jurnal Ilmu Alam dan Lingkungan, 13(2): 1-7.
- Pagans, E., X. Font, and A. Sánchez. 2006. Emission of volatile organic compounds from composting of different solid wastes: abatement by biofiltration. Journal of Hazardous Materials 131: 179–186. Applied and Environmental Microbiology 66:5334-5339.
- Pimentel, M.F., Arnao, E. Warner, A. J. Subedi, A. Rocha, L.F. Srour, A. Bond, A. Fakhoury. 2020. Trichoderma isolates inhibit *Fusarium virguliforme* growth, reduce root rot, and induce defense-related genes on soybean seedlings. Plant Dis., 104, 1949–1959.
- Putri, A. A. D. A., M. W. Proborini, dan P. S. Devi. 2022. Efektivitas filtrat *Trichoderma asperellum* TKD terhadap pertumbuhan *Aspergillus flavus* pada biji kopi arabika (*Coffea arabica*). Jurnal Ilmiah Ilmu-Ilmu Hayati 7(3):189-198.
- Prasetyaningsih, A., D. Rahardjo, and T. Jayadi. 2018. Pemanfaatan Sargassum dari Pantai sepanjang Gunungkidul sebagai antimikroba kulit. Prosiding Seminar Nasional Biologi dan Pembelajarannya. Universitas Negeri Medan.
- Rahmiyani, I., T. Rizki, D. H. Nurlaili, dan A. Yuliana. 2020. Isolasi dan identifikasi senyawa minyak atsiri daun gamal (*Gliricidia sepium* [Jacq] Walp). Jurnal Farmasi Udayana 9(3):134-143.
- Ranjard, L., E. Brothier, and S. Nazaret. 2000. Sequencing bands of Ribosomal Intergenic Spacer Analysis (RISA) fingerprints for characterization and microscale distribution of soil bacterium populations responding to mercury spiking. Applied and Environmental Microbiology 66(12):5334-5339.
- Ranjard, L. F. Poly, J. C. Lata, C. Mougl, J. Thioulouse, & S. Nazaret. 2001. Characterization of bacterial and fungal soil communities by automated ribosomal intergenic spacer analysis fingerprints: biological and methodological variability. Applied and Environmental Microbiology 67:4479-4487.



- Riandinata, S. K., Sunarpi, E. S. Prasedya, dan S. P. Astuti. 2018. Uji Aktivitas Antiproliferasi Ekstrak Alga Merah *Gelidium* sp terhadap pertumbuhan sel kanker *Caco-2* secara in vitro. Fakultas Matematika dan Ilmu Pengetahuan Alam. Universitas Mataram. Skripsi.
- Ruangwong, O., P. Wonglom., N. Suwannarach, J. Kumla, N. Taochan, P. Chommuanti, K. Pitija, and A. Sunpapao. 2021. Volatile organic compound from *Trichoderma asperelloides* TSU1: impact on plant pathogenic jamur. Journal of Jamur 7(187):1-13.
- Safitri, I. O., D. A. Suroto, S. Sardjono, M. N. Cahyanto, and J. Widada. 2022. Draft genome sequence of *Trichoderma asperellum* MLT1J1, isolated from coconut husk in Maluku, Indonesia. Korean Journal of Microbiology 58(3):208-210.
- Shen, D., M. Cho, and C. Tsai. 2013. Unpacking online learning experiences: online learning self-efficacy and learning satisfaction. The Internet and Higher Education 19:10-17.
- Schulz-Bohm, K., O. Tyc, W. de Boer, N. Peereboom, F. Debets, N. Zaagman, Thierry K.S. Janssens & P. Garbeva. 2016. Fungus-associated bacteriome in charge of their host behavior. Fungal Genetics and Biology 102: 38-48.
- Schmidt, R., V. Cordovez, W. de Boer, J. Raajimakers, and P. Garbeva. 2015. Volatile affairs in microbial interactions. The International Society for Microbial Ecology Journal 9: 2329-2335.
- Stotzky, G., and S. Schenck. 1976. Volatile organic compound and microorganisms. Critical Reviews in Microbiology 4(4): 333-82.
- Suanda, I. W. 2016. Karakterisasi morfologis *Trichoderma* sp. isolate JB dan daya antagonisme terhadap patogen penyebab penyakit rebah kecambah (*Sclerotium rolfsii* Sacc.) pada tanaman tomat. Prosiding Seminar Nasional MIPA FMIPA Undiksha 251-257.
- Suanda, I. W. dan N. W. Ratnadi. 2015. Daya antagonism *Trichoderma* sp. Isolat lokal terhadap jamur patogen penyebab penyakit rebah kecambah (*Sclerotium rolfsii* Sacc.) pada tanaman tomat (*Lycopersicum esculentum* Mill.). Prodi Pendidikan Biologi FPMIPA IKIP PGRI Bali. Jurnal EmaSains IV(2):155-162.
- Sudarma, I. M., D. N. Suprapta, I. M. Sudana, dan I. G. R. M. Temaja. 2012. Aplikasi *polymerase chain reaction-ribosomal intergenic spacer analysis* (PCR-RISA) untuk menentukan keragaman mikroba tanah pada habitat tanaman pisang dengan dan tanpa gejala layu *Fusarium*. Jurnal Bumi Lestari 12(2):313-320.



- Sukmawati, N., J. Widada, D. Widianto. 2018. Potensi senyawa organik volatil dari *Streptomyces sp.* GMR22 dan HMY01 dalam menghambat pertumbuhan *Fusarium oxysporum f.sp. cubense* (Foc). Fakultas Pertanian, Universitas Gadjah Mada. Skripsi.
- Taskin, H., E. Kafkas, Ö. Çakiroğlu, S. Büyükalaca. 2013. Determination of volatile aroma compounds of *Ganoderma lucidum* by gas chromatography mass spectrometry (HC-GC/MS). African Journal of Traditional Complement Alternative Medicine 10: 353-355.
- Togashi, N., A. Shiraishi, M. Nishizaka, K. Matsuoka, K. Endo, H. Hamashima, and Y. Inoue. 2007. Antibacterial activity of long-chain fatty alcohols against *Staphylococcus aureus*. Molecules 12(2):139-148.
- Tunmuni, D., N. P. A. Astiti, dan S. K. Sudirga. 2021. Aktivitas antioksidan ekstrak kulit jeruk keprok (*Citrus reticulata Blanco*) So'e sebagai the tradisional. Metamorfosa:Journal of Biological Sciences 8(2):274-283.
- Ullah, I., A. L. Khan, L. Ali, A. R. Khan, M. Waqas, J. Hussain, I. J. Lee, and J. H. Shin. 2015. Benzaldehyde as an insecticidal, antimicrobial, and antioxidant compound produced by *Photorhabdus temperata* M1021. The Journal of Microbiology 53: 127-133.
- Wang, H., R. Zhang, Y. Duan, W. Jiang, X. Chen, X. Shen, C. Yin, and Z. Mao. 2021. The endophytic strain *Trichoderma asperellum* 6S-2: An efficient biocontrol agent against apple replant disease in China and a Potential Plant-Growth-Promoting Fungus. Journal of Jamur 7(1050): 1-27.
- Weisskopf, L., S. Schulz, and P. Garbeva. 2021. Microbial volatile organic compounds in intra-kingdom and inter-kingdom interactions. Nature Reviews Microbiology 19: 391-404.
- Wu, Q., R. Sun, M. Ni, J. Yu, C. Yu, K. Dou, J. Ren, and J. Chen. 2017. Identification of a novel fungus, *Trichoderma asperellum* GDFS 1009, and comprehensive evaluation of its biocontrol efficacy. PLoS ONE 12(6):1-20.
- Wulansari, H. 2020. Analisis senyawa metabolit sekunder dan uji aktivitas larvasida alami pada ekstrak etanol daun bidara (*Zisiphus mauritiana Lamk.*) terhadap larva *Aedes aegypti*. Fakultas Sains dan Teknologi. Universitas Islam Negeri Maulana Malik Ibrahim. Skripsi.
- Xie, Z., C. Koysomboon, H. Zhang, Z. Lu, X. Zhang, and F. Chen. 2022. Vinegar volatile organic compounds: analytical methods, constituents, and formation processes. Front in Microbiology 13:907883.



Yulia, E., N. Istifadah, F. Widiani, dan H. S. Utami. 2017. Antagonisme *Trichoderma* spp. terhadap jamur *Rigidoporus lingnous* (Klotzsch) imazeki dan penekanan penyakit jamur akar putih pada tanaman karet. *Jurnal Agrikultura* 28(1):47-55.

Yu, Z., & W. W. Mohn. 2001. Bacterial diversity and community structure in an aerated lagoon revealed by ribosomal intergenic spacer analyses and 16S ribosomal DNA sequencing. *Applied and Environmental Microbiology* 67: 1565-1574.

Zhang, B., L. Yan, Q. Li, J. Zou, H. Tan, W. Tan, W. Peng, X. Li, & X. Zhang. 2018. Dynamic succession of substrate-associated bacterial composition and function during *Ganoderma lucidum* growth. *Peer Journal* 6: 1-23.

Zhu, H., J. Zhu, L. Wang, & Z. Li. 2016. Development of a SPME-GC-MS method for the determination of volatile compounds in Shanxi aged vinegar and its analytical characterization by aroma wheel. *Journal of Food Science Technology* 53: 171-183.