

DAFTAR PUSTAKA

- Abadulla, E., Robra, K-H, Gübitz, G.M., Silva, L.M., & Cavaco-Paulo, A. 2000a. Enzymatic decolorization of textile dyeing effluents. *Textile Res J* .70 (5): 409-414.
- Abadulla, E., Tzanov, T., Costa, S., & Karl-he. 2000b. Decolorization and detoxification of textile dyes with a laccase from *Trametes hirsute*. *Appl. Environ. Microbiol.* 66(8): 3357–3362.
- Akhtar, M., Blanchette, R.A. & Kirk, T.K. 1997. Fungal delignification and biomechanical pulping of wood. *Advances in Biochemical Engineering Biotechnology.* 57:159-195.
- Aksu, Z., & Donmez G.A. 2003. Comparative study on the biosorption characteristics of some yeasts for Remazol Blue reactive dye. *Chemosphere.* 50:1075–1083.
- Aksu, Z., & Karabayir, G. 2008. Comparison of biosorption properties of different kinds of fungi for the removal of Gryfalan Black RL metal-complex dye. *Bioresour Technol.* 99:7730–7741.
- Aksu, Z., & Tezer, S. 2000. Equilibrium and kinetic modeling of biosorption of Remazol Black B by *Rhizopus arrhizus* in a batch system: effect of temperature. *Process Biochem.* 36: 431-439.
- Alberida, H. 1997. *Biodegradasi Pewarna Azo Mordant Yellow 3 Oleh Jamur Lignolitik*. Thesis. Fakultas Biologi Universitas Gadjah Mada, Yogyakarta.
- Alexopoulos, C. J., Mims, C.W. & Blackwell, M. 1996. *Introductory Mycology* (4th Ed.). John Wiley and Sons, New York, USA. 868p.
- Ali, H., Ahmad, W. & Haq, T. 2009a. Decolorization and degradation of malachite green by *Aspergillus flavus* and *Alternaria solani*. *AfrJ Biotechnol.* 8 (8): 1574-1576.
- Ali, N., Hameed, A., Ahmed, S., & Khan, A.G. 2008. Decolorization of structurally different textile dyes by *Aspergillus niger* SA1. *World J Microbiol Biotechnol.* 24:1067–1072.
- Ali, N., Hameed, A., Siddiqui, M.F., Ghumro P.B. & Ahmed, S. 2009b. Application of *Aspergillus niger*SA1 for the enhanced bioremoval of azo dyes in Simulated Textile Effluent. *African Journal of Biotechnology.*8 (16):3839-3845.

- Allen, R.L.M. 1971. *Colour Chemistry*. Appleton Centuri Crofts, New York.
- Anderson, I.C. & Parkin, P.I. 2007. Detection of Sol active fungi by RT-PCR amplification of precursor RNA molecule. *J. Microbiol Methods*. 68 : 248-253.
- Andleeb, S.A.A.D.I.A., Atiq, N.A.M.I., Ali, M.I., Razi-ul-Hussnain, R.A.J.A., Shafique, M., Ahmad, B.A.S.H.I.R., Ghumro, P.B., Hussain, M.A.S.R.O.O.R., Hameed, A. and Ahmad, S., 2010. Biological treatment of textile effluent in stirred tank bioreactor. *Int. J. Agric. Biol.* 12(2):256-260.
- Anonim. 1996. Ecological and toxicological association of dyes and pigments manufacturers, textile chemists and colorist. *German Ban of Use of Certain Azo Compounds in Some Consumer Goods: ETAD Information Notice No. 6*. 28 (4):11.
- Anonim, 2011. Indigo Sol Vat .<http://www.jagson.com/indigo-sol-vat.php>. diakses 5/27/2016.
- Archana, A.G., Jai, S.G. & Girish, S.K. 2011. Decolorization of Textile Dye Vat Blue 66 by *Pseudomonas desmolyticum* NCIM 2112 and *Bacillus megaterium* NCIM 2087. *Res. J. Appl. Sci. Eng. Technol.* 3(7): 689-692.
- Arikunto, S. 2010. *Prosedur Penelitian Suatu Pendekatan Praktik*. Rineka Cipta, Jakarta.
- Aryani, Y., & Sunarto, T.W. 2004. Toksisitas Akut Limbah Cair Pabrik Batik CV. Giyant Santoso Surakarta dan Efek Sublethalnya terhadap Struktur Mikroanatomi Branchia dan Hepar Ikan Nila (*Oreochromis niloticus* T.). *BioSMART*. 6(2).
- Astirin, O.P & Winarno, K.. 2000. Peran *Pseudomonas* dan khamir dalam perbaikan kualitas dan dekolonisasi limbah cair industri batik tradisional. *BioSMART*. 2(1): 13-19.
- Baeyer, A. & Drewsen. V. 1882. Darstellung von Indigblau aus Orthonitrobenzaldehyd. *Berichte der deutschen chemischen Gesellschaft*. 15 (2): 2856–2864
- Balan, D.S., & Monteiro, R.T. 2001. Decolorization of textile indigo dye by ligninolytic fungi. *J Biotechnol*. 89: 141–145.

- Bankole, P. O., Adekunle, A. A., Obidi, O. F., Olukanni, O. D., & Govindwar, S. P. 2017. Degradation of indigo dye by a newly isolated yeast, *Diutina rugosa* from dye wastewater polluted soil. *Journal of environmental chemical engineering*. 5(5): 4639-4648.
- Bergbauer M., Eggert C., Kraepelin G. 1991. Degradation of chlorinated lignin compounds in a bleach plant effluent by the white-rot fungus *Trametes versicolor*. *Appl. Microbiol. Biotechnol.* 35: 105-109.
- Barnett, H.L. & B.B. Hunter. 1998. *Illustrated genera of imperfect fungi*. 4th ed. Prentice-Hall, Inc, USA.
- Ben Younes, S., Mechichi, T., Sayadi, S. 2007. Purification and characterization of the laccase secreted by the white rot fungus *Perenniporia tephropora* and its role in the decolorization of synthetic dyes. *Journal of applied microbiology*. 102(4):1033-1042.
- Bennett, J.W., 2010. An overview of the genus *Aspergillus*. *Aspergillus: molecular biology and genomics*:1-17.
- Blackburn, R.S., Bechtold, T. & John, P. 2009. The development of indigo reduction methods and pre-reduced indigo products. *Coloration Technology*. 125(4):193-207.
- Bonugli-santos, R.C., Durrant, L.R., Sette, L.D. 2010. Textile dyes decolorization and ligninolytic activity by marine-derived *Peniophora* sp. CBMAI 1063. *ICCC-12 Conference*.
- Bourbonnais R. & M.G. Paice. 1990. Oxidation of nonphenolic substrates : an expanded role for laccase in lignin biodegradation. *FEBS Letters*. 267:99-102.
- Bradford MM. 1976. A rapid and sensitive method for the quantitation of microorganisms quantities of protein in utilizing the principle of protein-dye binding. *Anal. Biochem*. 72:248-254.
- Bragulat, M.R., Abarca, M.L., Bruguera, M.T., Cabanes, F.J. 1991. Dyes as fungal inhibitors: effect on colony diameter. *Appl Environ Microbiol*. 57(9): 2777-2780.
- Brahimi-Horn, M.C., Lim, K.K., Liang, S.L. & Mou, D.G. 1992. Binding of textile azo dyes by *Myrothecium verrucaria*. *J. Ind. Microbiol*. 10(1):31-36.
- Braun S, & Vecht-Lifshitz, S.E. 1991. Mycelial morphology and metabolite production. *Trends Biotechnol*. 9: 63-68.

- Brown, M.A., & DeVito, S.C. 1993. Predicting azo dye toxicity. *Crit. Rev. Environ.Sci. Technol.* 23: 249–324.
- Budiyono, Sudibyo, W., Herlina, S., Handayani, S., Parjiyah, Pudiastuti, W., Syamsudin, Irawati, Parjiyati, & Palupi, D.S. 2008. *Kriya Tekstil untuk SMK Jilid 1*. Direktorat Pembinaan Sekolah Menengah Kejuruan, Direktorat Jenderal Manajemen Pendidikan Dasar dan Menengah, Departemen Pendidikan Nasional, Jakarta.
- Butinar, L., Frisvad, J.C., & Gunde-Cimerman, N. 2011. Hypersaline waters—a potential source of foodborne toxigenic aspergilli and penicillia. *FEMS microbiology ecology.* 77(1):186-199.
- Caesar-TonThat, T.C., Lartey, R.T., Solbert-Rodier, L., & Caesar, A.J. 2009. Effects of basidiomycete laccase on cercosporin. *J Plant Pathol.* 91 (2): 347-355
- Camarero, S., Ibarra, D., Marti'nez, M.J., & Marti'nez, A.T. 2005. Lignin-derived compounds as efficient laccase mediators for decolorization of different types of recalcitrant dyes. *Appl. Environ. Microbiol.* 71(4): 1775–1784.
- Campos, R., Kandelbauer, A., Robra, K.H., Cavaco-Paulo, A. & Gubitz, G.M. 2001. Indigo degradation with purified laccases from *Trametes hirsuta* and *Sclerotium rolfsii*. *J. Biotechnol.* 89: 131–139.
- Chahal P.S. & Chahal, D.S. 1998. *Lignocellulosic Waste: Biological Conversion*. In: Martin, A.M. [eds]. *Bioconversion of Waste Materials to Industrial Products*. Ed ke-2. Blackie Academic & Professional, London.
- Christian, G.D. 2004. *Analytical Chemistry 6th Edition*. John Wileys & Sons, Inc., U.S.A.
- Christie, R.M. 2001. *Colour Chemistry*. Royal Society of Chemistry, Cambridge, UK.
- Ciferri, O. 1999. Microbial degradation of paintings. *Appl. Environ. Microbiol.* 65:879–885.
- Claus, H. 2003. Laccases and their occurrence in prokaryotes. *Arch. Microbiol.* 179:145- 150.
- Clifford, J.C., Olaf, A.R., & Campbell, M. 1982. *Analisis Spektrum Senyawa Organik*. Diterjemahkan oleh Kosasih Padmawinata. ITB, Bandung.
- Coulibaly, L., Germain, G., Spiros, A.N. 2003. Utilization of fungi for biotreatment of raw wastewaters. Review. *Afr. J. Biotechnol.* 2(12): 620-630.

- Cripps, C., Bumpus, J.A., Aust, S.D. 1990. Biodegradation of azo and heterocyclic dyes by *Phanerochaete chrysosporium*. *Appl. Environ. Microbiol.* 56:1114–1118.
- Cui, F. & Dolphin, D. 1990. The role of manganese in model systems related to lignin biodegradation. *Holzforschung.* 44:279-283.
- Da Silva, M., Passarini, M.R.Z., Bonugli, R.C., & Sette, L.D. 2008. Cnidarian-derived filamentous fungi from brazil: isolation, characterisation and RBBR Decolourisation Screening. *Environmental technology.* 29(12):1331-1339.
- Darliana, I. 2011. Isolasi dan seleksi jamur *indigenous* asal limbah batik untuk dekolorasi zat warna Remazol biru. Laporan Penelitian (dipublikasikan). Fakultas Pertanian Universitas Bandung Raya, Bandung.
- Darliana, I., Rossiana, N., & Miranti, M. 2011. Dekolorisasi zat warna remazol biru menggunakan isolat jamur *indigenous* asal limbah batik. *IJAS.* 1(2) : 84-96.
- Das, S.K., Bhowal, J, Das, A.R., & Guha, A.K. 2006, Adsorption behavior of Rhodamine B on *Rhizopus oryzae* biomass. *Langmuir.* 22:7265-7272.
- Deak, T. 2006. *Environmental Factors Influencing Yeasts.*: 15. In: Rosa, C. & G. Peter (eds.). 2006. *The yeast handbook: Biodiversity and Ecophysiology of Yeasts.* Springer-Verlag, Berlin.pp155-174.
- de Hoog, G.S. & Guarro, J., 1995. *Atlas of clinical fungi.* Centraalbureau voor schimmelcultures.
- Demirel, R. 2016. Comparison of rDNA regions (ITS, LSU, and SSU) of some *Aspergillus*, *Penicillium*, and *Talaromyces* spp. *Turkish Journal of Botany.* 40(6), 576-583.
- Dewi, R.S. & Hana. 2013. Formulasi agensia penghilang warna dan logam berat pada limbah cair batik dengan bahan aktif fungi, serta kajian aktivitas enzim dan uji toksisitasnya. Laporan Penelitian Kerjasama Antar Perguruan Tinggi (Pekerti). Fakultas Biologi Universitas Jenderal Soedirman, Purwokerto.
- Doğan, D. & Türkdemir, H. 2005. Electrochemical oxidation of textile dye indigo. *J. Chem. Technol. Biotechnol.* 80:916-923.
- Domsch, K.H., Gams, W., & Anderson, T.H. 1980. *Compendium of soil fungi. Volume 1.* Academic Press Ltd, London.

- Eggert, C., Temp, U., Dean, J.F., & Eriksson, K.E.L. 1996. A fungal metabolite mediates degradation of nonphenolic lignin structures and synthetic lignin by laccase. *FEBS Lett.* 391:144-148.
- Faryal, R. & Hameed, A. 2005. Isolation and characterization of various fungal strains from textile effluent for their use in bioremediation. *Pak. J. Bot.*, 37(4): 1003-1008.
- Field, J.A., Boelsma, F., Baten, H. & Rulkens, W.H. 1995. Oxidation of anthracene in water/solvent mixtures by the white-rot fungus *Bjerkandera* sp. strain BOS55. *Appl. Microbiol Biotechnol.* 44: 234–240.
- Fu, Y., & Viraraghavan, T. 2001. Fungal decolorization of dye wastewaters: a review. *Bioresour Technol.* 79: 251–262.
- Fu, Y., & Viraraghavan, T. 2002. Removal of congo red from an aqueous solution by fungus *Aspergillus niger*. *Adv. Environ. Res.* 7: 239–247.
- Gadd, G.M., 1988. Accumulation of metals by microorganisms and algae. *Biotechnology. Special Microbial Processes.* 6b: 401-433.
- Gandjar, I. 2006. *Mikologi dasar dan terapan*. Yayasan Obor Indonesia, Jakarta.
- Gandjar, I.G., & Rohman, A. 2007. *Kimia Farmasi Analisis*. Pustaka Pelajar, Yogyakarta.
- Gandjar, I., Samson, R.A., Vermeulen, K., Oetari, A., & Santoso, I. 1999. *Pengenalan Kapang Tropik Umum*. Yayasan Obor Indonesia, Jakarta.
- Gomaa, O.M., Momtaz, O.A., Kareem H.A.E., & Fathy, R. 2011. Isolation, identification, and biochemical characterization of a brown rot fungus capable of textile dye decolorization. *World J Microbiol Biotechnol.* 27 (7):1641-1648.
- Gupta, R. & Mohapatra, H., 2003. Microbial biomass an economical alternative for removal of heavy metals from waste water. *Indian J Exp Biol.* 41(9):945-66.
- Guswandi, J.P., Suhardi, S., Niloperbowo, W., & Setiadi, T. 2007. Penghilangan warna limbah tekstil dengan *Marasmius* sp. dalam bioreaktor unggun tetap termodifikasi (modified packed bed). ITB, Bandung.
- Hai, I., Yamamoto, K., Nakajima, F., & Fukushi, K. 2009. Factors governing performance of continuous fungal reactor during non-sterile operation-

The case of a membrane bioreactor treating textile wastewater. *Chemosphere*. 6: 810-7.

- Hambali, H.C., Suwito, E., Suhardi, S.H., & Setiadi, T. 2009. Textile wastewater decolorization performance using *Marasmius* sp. in immersion and trickling systems. [http://: citeseerx.ist.psu.edu/](http://citeseerx.ist.psu.edu/)
- Hammel K.E. 1996. Extracellular free radical biochemistry of ligninolytic fungi. *New J Chem*. 20:195-198.
- Hammel K.E. 1997. Fungal Degradation of Lignin. *In*: Cadisch G, Giller KE, Editor. *Driven By Nature: Plant Litter Quality And Decomposition*. CAB International, London. 33-45p.
- Hanung, C.D., Osmond, R., Risdianto, H., Suhardi, S.H., Setiadi, T. 2013. Optimasi produksi enzim lakase pada fermentasi kultur padat menggunakan jamur pelapuk putih *Marasmius* sp. : pengaruh ukuran partikel, kelembapan dan konsentrasi Cu. *J Selulosa*. 3(2): 67-74.
- Hardwood, L.M., Moody, C.J. & Percy, J.M. 1999. *Experimental Organic Chemistry, Standard and Microscale*, 2ndEd. BlackwellScience. 622 p.
- Harvey, P.J., Floris, R., Lundell, T., Palmer, J.M., Schoemaker, H.E., & Wever, R. 1992. Catalytic mechanisms and regulation of lignin peroxidase. *Biochemical Society Transactions*. 20(2), 345-349.
- Hasnan, M.S. 2014. *Imobilisasi Biomassa dan Crude Enzyme Jamur Untuk Dekolorisasi Pewarna Limbah Industri Tekstil*. Skripsi. Fakultas Pertanian Universitas Gadjah Mada, Yogyakarta.
- Hao, O.J., Kim, H. & Chiang, P-C. 2000. Decolorization of wastewater. *Crit. Rev. Environ. Sci. Technol*. 30: 449–505.
- Herfiani, Z.H., Rezagama, A. & Nur, M., 2017. Pengolahan limbah cair zat warna jenis Indigosol Blue (CI Vat Blue 4) sebagai hasil produksi kain batik menggunakan metode ozonasi dan adsorpsi arang aktif batok kelapa terhadap parameter COD dan warna. *Jurnal Teknik Lingkungan*. 6(3): 1-10.
- Hernama, & Hermawati, S. 2011. Hubungan lingkungan usaha dengan persepsi kesuksesan pengusaha batik Banyumasan. Seminar Nasional Peningkatan Kehidupan Masyarakat yang Madani dan Lestari pada hari Sabtu, 17 Desember 2011. UII, Yogyakarta.
- Himanshu, D.B. 2011. *Bacterial Degradation of Azo Dyes and Its Derivatives*. A Thesis Submitted For The Degree of Doctor of Philosophy. Microbiology Department of Biosciences Saurashtra University Rajkot, Gujarat India.

- Hmd, R.F.K., 2011. Degradation of Some Textile Dyes using Biological and Physical Treatments. Thesis. Microbiology Department Faculty of Science, Ain-Shams University.
- Hofrichter, M. 2002. Review: Lignin conversion by manganese peroxidase (MnP). *Enzyme Microbiol. Technol.* 30:454-466.
- Holt, J.G. & Krieg, N.R. 1994. *Enrichment and Isolation*. pp. 197-200. In Gerhardt, P. (Ed). *Methods for General and Molecular Bacteriology* ASM Publications, Herndon USA, 791 p.
- Hunger, K. 2003. *Industrial Dyes Chemistry, Properties, Applications*. Wiley-VCH Verlag GmbH & Co. KGaA, Darmstadt.
- Ilyas, S. & Rehman, A., 2013. Decolorization and detoxification of Synozol red HF-6BN azo dye, by *Aspergillus niger* and *Nigrospora* sp. *Iranian journal of environmental health science & engineering*. 10(1):12.
- Irshad, M., Asgher, M., Sheikh, M.A., & Nawaz, H. 2011. Purification and characterization of laccase produced by *Schizophyllum commune* IBL-06 in solid state culture of banana stalks. *BioResources*. 6(3): 2861-2873.
- Johjima, T., Itoh, N., Kabuto, M., Tokimura, F., Nakagawa, T., Wariishi, H., & Tnaka, H. 1999. Direct interaction of lignin and lignin peroxidase from *Phanerochaete chrysosporium*. *Proc. Natl. Acad. Sci.* 96:1989-1994.
- James, S.A. & Stratford, M. 2003. *Spoilage Yeast with Emphasis on the Genus Zygosaccharomyces*. In Boekhout, T. & V. Robert (eds.). 2003. *Yeast in food*. Woodhead Publishing Limited, Cambridge, 171-191p.
- Jarosz-Wilkolazka, A., Kochmanska-Rdest, J., Malarczyk, E., Wardas, W., & Leonowicz, A. 2002. Fungi and their ability to decolourize azo and anthraquinone dyes. *Enzyme Microb. Technol.* 30: 566-572.
- Jasalavich, C. A., Ostrofsky, A., & Jellison, J. 2000. Detection and identification of decay fungi in spruce wood by restriction fragment length polymorphism analysis of amplified genes encoding rRNA. *Appl. Environ. Microbiol.* 66(11): 4725-4734.
- Javanbakht, V., Alavi, S.A., & Zilouei, H. 2014. Mechanisms of heavy metal removal using microorganisms as biosorbent. *Water Science and Technology*. 69(9):1775.

- Johansson, T. & Nyman, P.O., 1993. Isozymes of lignin peroxidase and manganese (II) peroxidase from the white-rot basidiomycete *Trametes versicolor*: I. Isolation of enzyme forms and characterization of physical and catalytic properties. *Archives of biochemistry and biophysics*. 300(1):49-56.
- Kang, S.W., Hong, S.I., & Kim, S.W., 2005. Identification of *Aspergillus* strain with antifungal activity against *Phytophthora* species. *Journal of Microbiology and Biotechnology*. 15(2):227-233
- Kariyajjanavar, P., Narayana, J., & Nayaka, Y.A. 2013. Electrochemical degradation of C.I. Vat Orange 2 Dye on carbon electrode. *Inventi Impact: Water & Environment*.3:106-112.
- Kasam, Y. A., & Rahmayanti, A. E. 2009. Penurunan COD dan warna pada limbah industri batik dengan menggunakan aerobic roughing filter aliran horizontal. *Logika*. 6(1), 27-31.
- Kaushik, P., & Malik, A. 2009. Fungal dye decolourization: Recent advances and future potential. *Environment International*. 35(1):127-141
- Kersten, P.J., Kalyanaraman, B., Hammel, K.E. Reinhammar, B., & Kirk, T.K. 1990. Comparison of lignin peroxidase, horseradish peroxidase and laccase in the oxidation of methoxybenzenes. *Biochem. J*. 268:475-480.
- Khelifi, E., Ayed, L., Bouallagui, H., Touhami, Y., & Hamdi, M. 2009. Effect of nitrogen and carbon sources on Indigo and Congo red decolourization by *Aspergillus alliaceus* strain 121C. *Journal of Hazardous Materials*. 163(2-3):1056-1062.
- Khot, P.D., Ko, D.L., & Fredricks, D.N., 2009. Sequencing and analysis of fungal rRNA operons for development of broad-range fungal PCR assays. *Applied and environmental microbiology*.75(6):1559-1565.
- Kishi, K., Wariishi, H., Marquez, L., Dunford, H.B., & Gold, M.H. 1994. Mechanism of manganese peroxidase compound II reduction. Effect of organic acid chelators and pH. *Biochemistry*.33:8694-8701.
- Kıvanc, M. & Özen, M.D., 2011. Screening of fungi for decolorization of dye wastewater. *International Proceedings of Chemical, Biological and Environmental Engineering*. 100:1-7
- Knapp, J.S., Vantoch-Wood, E.J. & Zhang, F. 2001. *Use of wood-rotting fungi for the decolorization of dyes and industrial effluents*. In Gadd, G.M. ed. *Fungi in Bioremediation*. Cambridge University Press, Cambridge, pp. 242–304.

- Kshirsagar, A.D., 2013. Application of bioremediation process for wastewater treatment using aquatic fungi. *Int. J. Curr. Res.* 5: 1737-1739.
- Kurtzman, C.P. & Fell, J.W. 2006. Yeast systematics and phylogeny – implications of molecular identification methods for studies in ecology. In Rosa, C. & G. Peter (ed.). 2006. *The yeast handbook: Biodiversity and ecophysiology of yeasts*. Springer-Verlag, Berlin, 11-30p.
- Kurtzman, C.P., Boekhout, T., Robert, V., Fell, J.W., & Deak, T. 2003. *Methods to identify yeasts*. In: Boekhout T, Robert V (Ed), *Yeasts in Food: Beneficial and detrimental aspects*. Hamburg: B. Berhr’s Verlag GmbH and Co. KG. 69-121p.
- Leonowicz, A., Cho, N.S., Luterek, J., Wilkolazka, A., Wojtas-Wasilewska, M., Matuszewska, A., Hofrichter, M., Wesenberg, D., & Rogalski, J. 2001. Fungal laccase: properties and activity on lignin. *J Basic Microbiol*, 41:185–22.
- Levin, L., Jordan, A., Forchiassin, F., Viale, A. 2001. Degradation of anthraquinoneblue by *Trametes trogii*. *Rev. Argent. Microbiol.* 33: 223–228.
- Li-Hong, Y., Yu-Jun, W., Lan, L., & Yue-Hua, Z. 2016. Univariate degradation of indigo carmine in aqueous solution by inactivated biomass in *Heterobasidion Insulare*: Preliminary studies. *Polish Journal of Environmental Studies.* 25(5).
- Linsebigler, A. L., Lu, G., & Yates Jr, J. T. 1995. Photocatalysis on TiO₂ surfaces: principles, mechanisms, and selected results. *Chemical reviews.* 95(3), 735-758.
- Lowry, O.H., Rosenbrough, N.J., Farr, A.L., & Randall, R.J. 1951. Protein measurements with the folin phenol reagent. *J Biol Chem.* 193:265–275
- Mahboubi, A., Ferreira, J.A., Taherzadeh, M.J. & Lennartsson, P.R. 2017. Production of fungal biomass for feed, fatty acids, and glycerol by *Aspergillus oryzae* from fat-rich dairy substrates. *Fermentation.* 3(4):48.
- Mäkelä, M., Galkin, S., Hatakka, A. & Lundell, T. 2002. Production of organic acids and oxalate decarboxylase in lignin-degrading white rot fungi. *Enzyme Microb. Technol.* 30:542-549.
- Manikandan, N., Kuzhali, S.S. & Kumuthakalavalli, R. 2012. Decolorisation of textile dye effluent using fungal microflora isolated from spent mushroom substrate (SMS). *J. Microbiol. Biotech. Res.* 2 (1):57-62

- Manurung, R., Hasibuan, R. & Irvan. 2004. Perombakan zat warna azo reaktif secara anaerob-aerob. *e-USU Repository* © 2004 Universitas Sumatera Utara : 1-19.
- Marchant, R., Nigam, P. & Banat, I.M. 1994. An unusual facultatively anaerobic fungus isolated from prolonged enrichment culture conditions. *Mycol. Res.* 98: 757-760.
- Maron D.M. & Ames B.N. 1983. Revised methods for the *Salmonella mutagenicity* test. *Mutat Res.* 113:173-215.
- Martani, E., Margino, S., & Nurnawati, E. 2011. Isolasi dan karakterisasi jamur pendegradasi zat pewarna tekstil. *Jurnal Manusia dan Lingkungan. XVIII* (2):127-136.
- Mazón-Suástegui, J.M., Fernández, N.T., Valencia, I.L., Cruz-Hernández, P. & Latisnere-Barragán, H., 2016. 28S rDNA as an alternative marker for commercially important oyster identification. *Food Control.* 66 :205-214.
- McMurry, J. 2003. *Organic Chemistry*, 6th Ed., Chapter 23. Thomson-Brooks/Cole, Belmont.
- McMullan, G., Meehan, C., Conneely, A., Kirby, N., Robinson, T., Nigam, P., Banat, I.M., Marchant, R., & Smyth, W.F. 2001. Microbial decolorization and degradation of textile dyes: Mini Review. *Appl. Microbiol. Biotechnol.* 56: 81-87.
- Metcalf & Eddy, Inc. 1991. *Wastewater Engineering: Treatment, Disposal and Reuse*, 3th ed., McGraw-Hill, New York.
- Mogollon, L., Rodriguez, R., Larrota, W., Ramirez, N. & Torres, R. 1998. Biosorption of nickel using filamentous fungi. *Appl. Biochem. Biotechnol.* (70-72): 593-60.
- Montero, C. I., Shea, Y. R., Jones, P. A., Harrington, S. M., Tooke, N. E., Witebsky, F. G., & Murray, P. R. 2008. Evaluation of Pyrosequencing® technology for the identification of clinically relevant non-dematiaceous yeasts and related species. *European Journal of Clinical Microbiology & Infectious Diseases.* 27(9): 821-830.
- Mordocco, A., Kuek, C., & Jenkins, R. 1999. Continuous degradation of phenol at low concentration using immobilized *Pseudomonas putida*. *Enzyme Microb Technol.* 25: 530-6.

- Moreira, M.T., Palma, C., Mielgo, I., Feijoo, G., & Lema, J.M. 2001. In vitro degradation of a polymeric dye (poly r-478) by manganese peroxidase. *Biotechnology and Bioengineering*. 75 (3): 362-368.
- Mulja, M.H. dan Suharman, A.I., 1995. *Analisis Instrumental*. Penerbit Erlangga, Surabaya.
- Nascimento, C., Magalhães, D. D. P., Brandão, M., Santos, A. B., Chame, M., Baptista, D., & Silva, M. D. 2011. Degradation and detoxification of three textile azo dyes by mixed fungal cultures from semi-arid region of Brazilian Northeast. *Brazilian Archives of Biology and Technology*. 54(3), 621-628.
- Nigam, P., Banat, I.M. Oxspring, D., Marchant, R., Singh, D., & Smyth, W.F. 1995a. A new facultative anaerobic filamentous fungus capable of growth on recalcitrant textile dyes as sole carbon source. *Microbios*. 84: 171–185.
- Nigam, P., Singh, D., & Marchant, R. 1995b. *An Investigation of the Biodegradation of Textile Dyes by Aerobic and Anaerobic Microorganisms*. In: M. Moo-Young, ed. *Environmental Biotechnology: Principles and Practices*. Kluwer, Dordrecht, The Netherlands. 278–292p.
- Nicolotti, G., Gonthier, P., Guglielmo, F. & Garbelotto, M.M. 2009. A Biomolecular Method for the Detection of Wood Decay Fungi: A Focus on Tree Stability assessment. *Arboriculture and Urban Forestry*. 35(1):14–19.
- Niku-Paavola, M.L., Karhunen, E., Salola, P., & Raunio, V. 1988. Ligninolytic enzymes of the white-rot fungus *Phlebia radiata*. *Biochem J*. 254:877-884.
- Nurainun, H. & Rasyimah. 2008. Analisis industri batik di Indonesia. *Fokus Ekonomi (FE)*. 7(3):124 – 135
- Nyanhongo, G.S., Gomes, J., Gubitz, G.M., Zvauya, R., Read, J., & Steiner, W. 2002. Decolorization of textile dyes by laccases from a newly isolated strain of *Trametes modesta*. *Water Res*. 36:1449-1456.
- O'Neill, C., Hawkes, F.R., Hawkes, D.L., Esteves, S., & Wilcox, S. 1999. Color in textile effluents sources, measurement, discharge consents and simulation: Review. *J. Chem. Technol. Biotechnol*. 74: 1009-1018.
- Paradise, P.R. 1999. Trademark counterfeiting, product piracy, and the billion dollar threat to the U.S. economy. Greenwood Publishing Group, Westport, USA. 73-76p.

- Paszczyński, A. & Crawford, R.L. Degradation of azo compounds by ligninase from *Phanerochaete chrysosporium*: involvement of veratryl alcohol. 1991. *Biochem Biophys Res Commun.* 178:1056-1063.
- Patel, H., Gupte S., Gahlout, M., & Gupte, A. 2014. Purification and characterization of an extracellular laccase from solid-state culture of *Pleurotus ostreatus* HP-1. *3 Biotech.* 4:77-84.
- Pelczar, M.J., Chan E.C.S., & Reid, R.D. 1993. *Microbiology*. 4th ed. McGraw-Hill Publishing Company Ltd., New Delhi, 952 p.
- Perez J., Munoz-Dorado, J., de la Rubia, T. & Martinez, J. 2002. Biodegradation and biological treatments of cellulose, hemicellulose and lignin: an overview. *Int. Microbiol.* 5:53-63.
- Pine, J. 1980. Recording action potentials from cultured neurons with extracellular microcircuit electrodes. *Journal of neuroscience methods.* 2(1), 19-31.
- Pitt, J.I. & Hocking, A.D. 2009. *Fungi and Food Spoilage*. Springer Dordrecht Heidelberg London, New York.
- Pitt, J. I., & Samson, R. A. 2014. *Integration of modern taxonomic methods for Penicillium and Aspergillus classification*. CRC Press.
- Podgornik, H., Poljanšek, I., & Perdih, A. 2001. Transformation of Indigo carmine by *Phanerochaete chrysosporium* ligninolytic enzymes. *Enzyme and Microbial Technology.* 29(2-3): 166-172.
- Prasad, D.Y. & Joyce, T.K. 1991. Color removal from kraft bleach-plant effluents by *Trichoderma* sp. *Tappi J.* 74(1):165-169.
- Prosser, J.I. & Tough, A.J. 1991. Growth mechanisms and growth kinetics of filamentous microorganisms. *Crit Rev Biotechnol.* 10:253–274.
- Rani, B., Kumar, V., Singh, J., Bisht, S., Teotia, P., Sharma, S., & Kela, R. 2014. Bioremediation of dyes by fungi isolated from contaminated dye effluent sites for bio-usability. *Brazilian Journal of Microbiology.* 45(3): 1055-1063.
- Raper, K.B., & Fennell, D.I. 1965. *The genus Aspergillus*. Robert E. Krieger Publishing Co., Inc., Huntington, NY.
- Raghukumar, C. 2000. Fungi from marine habitats: an application in bioremediation. *Mycol. Res.* 104: 1222–1226.

- Ranjitha, J., Shalini, P., Anand, M. & Raghavendra, S.G., 2018. Detoxification of dyes by *Aspergillus niger* isolated from dye contaminated soil effluent from the sites of textile industry. *Research Journal of Chemistry and Environment*. 22 :1-5.
- Rao, N.S.S. 1982. *Organic Matter and Composting. In Biofertilizers in Agriculture*. Oxford dan IBH Publishing Co, New Delhi.
- Rashidi, H.R., Sulaiman, N.N. & Hashim, N.A., 2012. Batik industry synthetic wastewater treatment using nanofiltration membrane. *Procedia Engineering*. 44:2010-2012.
- Rochma, N. & Titah, H.S., 2017. Penurunan BOD dan COD limbah cair industri batik menggunakan karbon aktif melalui proses adsorpsi secara *batch*. *Jurnal Teknik ITS*. 6(2):F325-F329.
- Rogalski, J., Lundell, T., Leonowicz, A., & Hatakka, A.I. 1991. Influence of aromatic compounds and lignin on production of ligninolytic enzymes by *Phlebia radiata*. *Phytochemistry*. 30: 2869-2872.
- Rojek, K., Roddick, F.A., & Parkinson, A. 2004. Decolorization of natural organic matter by *Phanerochaete chrysosporium*: the effect of environmental conditions. *Water Sci. Technol., Water Suppl.* 4(4):175-182.
- Roncero, C. and Duran, A., 1985. Effect of Calcofluor white and Congo red on fungal cell wall morphogenesis in vivo activation of chitin polymerization. *Journal of bacteriology*. 163(3):1180-1185
- Sadhasivam, S., Savitha, S., Swaminathan, K., & Lin, F-H. 2009. Metabolically inactive *Trichoderma harzianum* mediated adsorption of synthetic dyes: Equilibrium and kinetic studies. *Journal of the Taiwan Institute of Chemical Engineers*. 40: 394-402.
- Sahadevan, L.D.M., Misra, C.S., & Thankamani, V. 2013. Ligninolytic enzymes for application in treatment of effluent from pulp and paper industries. *Univ J Environ Res Technol*. 3:14-26.
- Salar, R.K., Kumar, J. & Kumar, S. 2012. Isolation and evaluation of fungal strains from textile effluent disposal sites for decolorization of various azo dyes. *Terrestrial and Aquatic Environmental Toxicology*. 6(2):96-99.
- Samson, R.A., Hoekstra, E.S., Lund, F., Filtenborg, O. & Frisvad, J.C., 2000. Methods for the detection, isolation and characterization of food-borne fungi. *Introduction Fo Food-and Airborne Fungi (eds.: RA Samson, ES Hoekstra, JC Frisvad and O. Filtenborg)*, 283-297p.

- Samson, R.A., Hong, S.B. & Frisvad, J.C., 2006. Old and new concepts of species differentiation in *Aspergillus*. *Medical Mycology*, 44 (Supplement_1) :S133-S148.
- Samson, R.A., Visagie, C.M., Houbraken, J., Hong, S.B., Hubka, V., Klaassen, C.H., Perrone, G., Seifert, K.A., Susca, A., Tanney, J.B., Varga, J., Kocsube, S., Szigeti, G., Yaguchi, T., & Frisvad, J.C. 2014. Phylogeny, identification and nomenclature of the genus *Aspergillus*. *Stud Mycol.* 78:141–173.
- Sang-Kuk, H., Kazuhiro, I., & Utsumi, H. 1998. Quantitative analysis for the anchancement hydroxyl radical generation by phenols during ozonation of water.
- Saranraj, P., Sumanthi, V., Reetha, D., & Stella, D. 2010. Fungal decolorization of direct Azo dyes and biodegradation of textile dye effluent. *J Eobiotechnol.* 2 (7)12-16.
- Sashikala, S. & Shafi S.S. 2014. Synthesis and characterization of chitosan Schiff base derivatives. *Der Pharmacia Lettre.* 6 (2), 90-97.
- Sastrohamidjojo, H. 2007. *Spektroskopi*. Liberty, Yogyakarta.
- Schliephake, K., Lonergan, G.T., Jones, C.L. & Mainwaring, D.E. 1993. Decolorization of a pigment plant effluent by *Pycnopus cinnabarinus* in a packed-bed bioreactor. *Biotechnol. Lett.*15: 1185-1188.
- Schrott, W. 2001. Denim wieder im blickpunt der textilindustrie. *Melliand Textilber.* 82:331-337.
- Shanker, U., Rani, M., & Jassal, V. 2017. Degradation of hazardous organic dyes in water by nanomaterials. *Environmental Chemistry Letters.* 15(4):623-642.
- Shaoxing Biying Textile Technology. 2012. Solubilised Vat Blue 5. (<http://www.worlddyevariety.com/vat-dyes/Solubilised Vat Blue 5.html>). Diakses tanggal 15-01-2016
- Shaul, G.M., Holdsworth, T.J., Dempsey, C.R., & Dostal, K.A. 1991. Fate of water soluble azo dyes in the activated sludge process. *Chemosphere.* 22: 107-119.
- Shenoy, B.D., Jeewon, R. & Hyde, K.D. 2007. Impact of DNA Sequence-Data on the Taxonomy of Anamorphic Fungi. *Fungal Diversity.*26: 1–54.

- Singer M, Berg P. 1991. Genes and Genomes, a Changing Perspective. University Science Books, Mill Valley.
- Singh, H. 2006. *Mycoremediation- Fungal Bioremediation*. John Wiley & Sons, Inc., Hoboken, New Jersey. 592p.
- Singh, S. N., Mishra, S., & Jauhari, N. 2015. Degradation of anthroquinone dyes stimulated by fungi. In *Microbial Degradation of Synthetic Dyes in Wastewaters*. Springer, Cham. 333-356p.
- Singh, L & Singh, V.P. 2010. Biodegradation of textile dyes, bromophenol blue and congored by fungus *Aspergillus Flavus*. *Environ. We Int. J. Sci. Tech.* 5: 235-242.
- Siqueira, J.P.Z., Sutton, D.A., Gené, J., García, D., Wiederhold, N., Peterson, S.W. & Guarro, J., 2017. Multilocus phylogeny and antifungal susceptibility of *Aspergillus* section Circumdati from clinical samples and description of *A. pseudosclerotiorum* sp. nov. *Journal of clinical microbiology*. :JCM-02012.
- Siswanto, Suharyanto, & Fitria, R. 2007. Produksi dan karakterisasi lakase *Omphalina* sp. *Menara Perkebunan*. 75(2): 106-115.
- Smincakova, E., & Raschman, P. 2006. Leaching of Natural Stibnite Using Na₂S and NaOH Solutions. *International Journal of Energy Engineering*.
- Solis, M., Solis, A., Perez, H.I., Manjarrez, N., & Flores, M. 2012. Microbial decolouration of azo dyes: A review. *Process Biochemistry*. 47: 1723–1748.
- Spadaro, J.T., Gold, M.H., & Renganathan, V. 1992. Degradation of azo dyes by the lignin-degrading fungus *Phanerochaete chrysosporium*. *Appl. Environ. Microbiol.* 58: 2397–2401.
- Srikandace, Y. & Mangunwardoyo, W. 2009. Identifikasi molekular isolat kapang penghasil β -glucan berdasarkan daerah Internal Transcribed Spacer (ITS)[Molecular identification of fungal isolate produces β -glucan based on Internal Transcribed Spacer (ITS)]. *Berita Biologi*. 9(5).
- Srinivasan, C., D'souza, T., Boomathan, K., & Reddy, C.A. 1995. Demonstration of laccase in the white rot basidiomycete *Phanerochaete chrysosporium* BKM-F-1767. *Appl Environ Microbiol.* 61:4274–4277.
- Srivastava, P.N., & Prakash, A. 1991. Bio-accumulation of heavy metals by algae and wheat plants fed by textile effluents. *J. Ind. Pollut. Control Fed.* 7: 25–30.

- Srebotnik, E., Jensen, K.A. & Hammel, K.E. 1994. Fungal degradation of recalcitrant nonphenolic lignin structure without lignin peroxidase. *Proc Natl Acad Sci.* 91:12794-12797.
- Steffen, K.T. 2003. Degradation of recalcitrant biopolymers and polycyclic aromatic hydrocarbons by litter-decomposing basidiomycetous fungi. disertasi. Division of Microbiology Department of Applied Chemistry and Microbiology Viikki Biocenter, University of Helsinki, Helsinki.
- Sudarmadji, S., Haryono, B., & Suhardi. 1989. *Analisa Bahan Makanan dan Pertanian*. Liberty, Yogyakarta.
- Suharto. 2010. *Limbah Kimia Dalam Pencemaran Air dan Udara*. Andi, Yogyakarta.
- Sumarko, H.T., Lestari, S. & Dewi, R.S., 2013. Deodorisasi Limbah Cair Batik Menggunakan Limbah Baglog *Pleurotus ostreatus* dengan Kombinasi Volume dan Waktu Inkubasi Berbeda. *Molekul.* 8(2):151-166.
- Sumathi, S., & Manju, B.S.. 2000. Uptake of reactive textile dyes by *Aspergillus foetidus*. *Enzyme Microb. Technol.* 27: 347–355.
- Sunarto, 2008. *Teknologi Pencelupan dan Pencapan Jilid 3*. Departemen Pendidikan Nasional, Jakarta. 425-445p.
- Susanto, S.K.S. 1973. *Seni Kerajinan Batik Indonesia*. Balai Penelitian Batik dan Kerajinan, Lembaga Penelitian dan Pendidikan Industri, Departemen Perindustrian, Jakarta. 269, 442, 495-501. 503p.
- Syam, N.A., Haedar, N., & Abdullah, A. 2016. Isolasi dan seleksi jamur pendegradasi zat warna naphthol dari limbah industri batik di Makassar. <http://repository.unhas.ac.id/handle/123456789/19191>
- Takamatsu, S. 1998. PCR applications in fungal phylogeny. *Applications of PCR in Mycology.* 125-152p.
- Tatarko, M., & Bumpus, J.A. 1998. Biodegradation of congo red by *Phanerochaete chrysosporium*. *Water Res.* 32: 1713–1717.
- Tavares, S., Inácio, J. & Oliveira, C. 2004. Direct detection of *Taphrina deformans* on peach trees using molecular methods. *European journal of plant pathology.* 110(10): 973-982.
- Thurston, C.F. 1994. The structure and function of fungal laccases. *Microbiology.* 140: 19-26.

- Thomas, B., Aurora, T., & Wolfgang, S. 2006. Electrochemical decolourization of dispersed indigo on boron-doped diamond anodes. *Diamond Relat. Mater.* 15:1513-1519.
- Tian, C-E., Tian, R., Zhou, Y., Chen, Q. & Cheng, H. 2013. Decolorization of indigo dye and indigo dye-containing textile effluent by *Ganoderma weberianum*. *African Journal of Microbiology Research.* 7(11): 941-947.
- Tresnadi, C. & Sachari, A. 2015. Identification of values of ornaments in Indonesian batik in visual content of nitiki game. *Journal of Arts & Humanities.* 04. (08): 25-39.
- UNESCO. 2009. Convention for the safeguarding of the intangible cultural heritage intergovernmental committee for the safeguarding of the intangible cultural heritage. website: www.unesco.org/culture/ich/doc/src/01579-EN.doc. Diakses tanggal 16 Januari 2014.
- Vautier, M., Guillard, C., & Herrmann, J.M. 2001. Photocatalytic degradation of dyes in water: case study of indigo and of indigo carmine. *J. Catal.* 201:46-59.
- Vares, T. 1996. *Ligninolytic enzymes and lignin-degrading activity of taxonomically different white-rot fungi*. PhD Thesis. Dep. Appl. Chem. and Microbiol. University of Helsinki, Helsinki.
- Venkov, T.V., Hess, C. & Jentoft, F.C., 2007. Redox properties of vanadium ions in SBA-15-supported vanadium oxide: An FTIR spectroscopic study. *Langmuir.* 23(4):1768-1777.
- Vera, X.C., Escobar J.P., Montoya, M.M., Socorro, M.d., & Pérez, Y. 2012. Native fungi with industrial dye degrading potential in the Aburrá valley, Colombia. *Revista Facultad Nacional de Agronomía, Medellín.* 65:6811–6821.
- Visagie, C.M., Varga, J., Houbraeken, J., Meijer, M., Kocsube, S., Yilmaz, N., Fotedar, R., Seifert, K.A., Frisvad, J.C., & Samson, R.A. 2014. Ochratoxin production and taxonomy of the yellow aspergilli (*Aspergillus* section *Circumdati*). *Stud Mycol.* 78:1– 61.
- Vautier, M., Guillard, C. & Herrmann, J.M. 2001. Photocatalytic degradation of dyes in water: case study of indigo and of indigo carmine. *Journal of Catalysis.* 201(1): 46-59.
- Yagub, M.T., Sen, T.K., Afroze, S., Sen, H.M.A.H.K., Afroze, S., & Ang H.M. 2014. Dye and its removal from aqueous solution by adsorption: A review. *Adv Colloid Interface Sci.* 209 :172–184.

- Yadav, A.N., Verma, P., Sachan, S.G., Kaushik, R., & Saxena, A.K. 2013. *Diversity of psychrophilic and psychrotrophic fungi from cold deserts of Rohtang Pass*. Microbiology, Indian Agricultural Research Institute, Pusa, New Delhi, Delhi 110012, India.
- Yeşilada, Ö., Birhanli, E., Ercan, S., & Özmen, N. 2014. Reactive dye decolorization activity of crude laccase enzyme from repeated-batch culture of *Funalia trogii*. *Turk J Biol.* 38: 103-110.
- Yonezawa, S., Suge, S.S.I., & Nakane, K. 2016. Workshop ‘Batik Banyumas, The Cultural Heritage Innovation and Future’ 17 Maret 2016. Fakultas Ilmu Budaya Universitas Jenderal Soedirman, Purwokerto.
- Yulita, A., Lestari, S., & Dewi, R. S. 2013. Dekolorisasi Limbah Cair Batik Menggunakan Miselium Jamur yang Diisolasi dari Limbah Baglog *Pleurotus ostreatus*. *Majalah Ilmiah Biologi BIOSFERA: A Scientific Journal.* 30(2): 90-95.
- Wahyuningsih, S., Ramelan, A.H., Wardani, D.K., Aini, F.N., Sari, P.L., Tamtama, B.P.N. & Kristiawan, Y.R., 2017, April. Indigo Dye Derived from *Indigofera Tinctoria* as Natural Food Colorant. In *IOP Conference Series: Materials Science and Engineering* (Vol. 193, No. 1, p. 012048). IOP Publishing.
- Wang, Y., & Yu, J. 1998. Adsorption and degradation of synthetic dyes on the mycelium of *Trametes versicolor*. *Water Sci Technol.* 38: 233–238.
- Waring, D.R., & Hallas, G. 1990. *The Chemistry and Application of Dye*, Plenum Press, New York. 235-236p.
- Widihati, I.A.G., Diantariani, N.P. & Nikmah, Y.F.T., 2011. Fotodegradasi metilen biru dengan sinar uv dan katalis Al₂O₃. *Jurnal Kimia.* 5(1):31-42
- Wunch, K.G., Feibelman T., & Bennett J.W. 1997. Screening of fungi capable of removing benzo[a]pyrene in culture. *Appl. Microbiol. Biotechnol.* 47: 620–624.
- Zhao, X., & Hardin, I.R. 2007. HPLC and spectrophotometric analysis of biodegradation of azo dyes by *Pleurotus ostreatus*. *Dyes Pigm.* 73(3):322–325.
- Zhau, W., & Zimmerman, W. 1993. Decolorization of industrial effluents containing reactive dyes by actinomycetes. FEMs. *Microbiol. Lett.* 107: 157-162.

Zille, A. 2005. *Laccase Reaction for Textile Application*. Disertasi. Textile Department Escola de Engenharia Universidade do Minho, Guimarães Portugal.

Zollinger, H. 1991. *Color chemistry*, 2 nd edition., VCH, Weinheim.