DAFTAR PUSTAKA

Abas, A. dan Awang, A. 2017. Air pollution assessment using *lichen* biodiversity index (LBI) in Kuala Lumpur, Malaysia. *Pollution Research*, 36(2): 242-249.

Abas, A., Awang, A., dan Aiyub, K. 2018. *Lichen* as bio-indikator for air pollution in Klang Selangor. *Poll Res*, 37(4): 35-39.

Ahmadjian, V. dan Hale, M.E. 1973. *The Lichens*. New York: Academic Press. pp. 35-40. 458.

Anggraeni, V.D., Muryani, S. dan Amalia, R. 2017. Suhu, kelembaban dan kebisingan pada halaman rumah toko di jalan Godean, Sleman, Yogyakarta. *Sanitasi: Jurnal Kesehatan Lingkungan*, 7(3): 131-136.

Aptroot, A. dan Sparrius, L.B. 2008. Crustose Roccellaceae in the Galapagos Islands, with the new species Schismatomma spierii. *The Bryologist*, 111(4): 659-666.

Aptroot, A., Jungbluth, P, dan Caceres, M. 2014. A word key to the species of Pyxine with lichexanthone, with a new species from Brazil. *The Lichenologist*, 46(5):1-4.

Badan Pusat Statistik Provinsi Jawa Tengah. 2020. Jumlah Kendaraan Bermotor Menurut Kabupaten/Kota dan Jenis Kendaraan di Provinsi Jawa Tengah (Unit), 2019-2021. (Diakses pada 16 Maret 2022)

Basri, I.S. 2010.Pencemaran udara dalam antisipasi teknis pengelolaan sumberdaya lingkungan. *Smartek*, 8(2): 120–129.

Baroon, G. 1999. Understanding lichens. England: The Richmond Publishing Co.

Belguidoum, A., Haichour, R., Lograda, T., dan Ramdani, M. 2022. Biomonitoring of air pollution by *lichen* diversity in the urban area of Setif, Algeria. *Biodiversitas*, 23(2): 970-981.

Bignal, K.L., Ashmore, M.R., Headley, A.D., Stewart, K. dan Weigert, K. 2007. Ecological impacts of air pollution from road transport on local vegetation. *Applied Geochemistry*, 22: 1265-1271.

Boonpragob, K., Sengklek, S., Chaiyong, A., dan Ployiam, W. 2003. *Bark pH of Urban Trees and Existence of the Epiphytic Lichens*. Bangkok: Ramkhamheang University.

Bungartz, F. Lücking, R. dan Aptroot, A. 2009. The *lichen* family Graphidaceae (Ostropales, Lecanoromycetes) in the Galapagos Islands. *Nova Hedwigia*, 90: 1-44.

Bungartz, F., Dutan-Patino, V.L., dan Elix, J.A. 2013. The *lichen* genera *Cryptothecia*, *Herpothallon* and *Helminthocarpon (Arthoniales)* in the Galapagos Islands, Ecuador. *The Lichenologist*, 45(6): 739-762.

Bungartz, F., Hillmann, G., Kalb, K. dan Elix, J.A. 2013. Leprose and leproid *lichen*s of the Galapagos with a particular focus on Lepraria (Stereocaulaceae) and Septotrapelia (Pilocarpaceae). *Phytotaxa*, 150(1): 1–28.

Chrisdayanti, B. dan Suharsono, A. 2015. Peramalan kandungan particulate matter (PM10) dalam udara ambien kota Surabaya menggunakan Double Seasonal ARIMA (DSARIMA), *Jurnal Sains Dan Seni ITS*, 4(2): 242–247.

Conti, M.E. dan Cecchetti, G. 2001. Biolgical monitoring *lichen*s as bioindicator of air pollution assessment- a review. *Environmental Pollution*, 114: 471-492.

Cordero-S, R., Garrido, A., Perez-Molina, J.P., Alan, O.R., dan Chavez, J.L. 2021. *Lichen* community structure and richness in three mid-elevation secondary

forest in Costa Rica. *Revista de Biologia Tropical*, 69(2): 688-699.

Davies, L., Bates, J.W., Bell, J.N.B., James, P.W., dan Purviz, O.W. 2007. Diversity and sensitivity of epiphytes to oxides of nitrogen in London. *Environmental Pollution*, 146: 299-310.

Egger, R., Schlee, D. dan Turk, R. 1994. Changes of physiological and biochemical parameters in the *lichen* Hypogymnia physodes (L) Nyl. due to the action of air pollutants a field study. *Phyton*, 35: 229-242.

EPA. 2003. Ozone: Good Up High, Bad Nearby. https://www.epa.gov/sites/production/files/documents/gooduphigh.pdf. (Diakses pada 15 Maret 2022)

Fachrul, M. F. 2008. *Metode Sampling Biekologi*. Jakarta: Bumi Aksara.

Fandani, S.T., Sulistyowati, H., dan Setiawan, R. 2019. Tingkat pencemaran udara di Desa Silo dan Pace, kecamatan Silo, kabupaten Jember dengan menggunakan *lichen* sebagai bioindikator. *Berkala Saintek*, 7(2): 39-42.

Farmer, A.M., Bates, J.W. dan Bell, J.N.B. 1992. *Eco-physiological effects of acid rain on bryophytes and lichens*. In: Bryophytes and *Lichen*s in a Changing Environment. Bates, J.W., and A. M. Farmer (Eds.). Clarendon Press, Oxford.

Gary, B.P. 2010. Bio-assessing air pollution effects with epiphytic *lichen*s in Raleigh, North Carolina, U.S.A. *The Bryologist*, 113: 39-50.

Garty, J., O. Tamir, I., Hasid, A., Eshel, Y., Ohen, A., Karneli dan Orlovsky, L. 2001. Photosynthesis, chlorophyll integrity and spectral reflectance in lichenexposed to air pollution. *Journal Environmental Quality*, 30: 884-893.

Giordani, P. 2007. Is diversity of epiphytic *lichen*s a reliable indicator of air pollution? A case study from Italy. *Environmental Pollution*: 317-323.

Giordani, P. 2019. *Lichen* diversity and biomonitoring. *Diversity*, 11(171): 1-3.

Gombert, S., Asta, J. dan Seaward, M.R.D. 2004. Assessment of *lichen* diversity by index of atmospheric purity (IAP), index of human impact (IHI) and other environmental factors in an urban area (Grenoble, southeast France). *Science of the Total Environment*, 324: 183-199.

Guidotti, M., Stella, D., Dominici, C., Blasi, G., Owczarek, M., Vitali, M. dan Protano, C. 2009. Monitoring of traffic-related pollution in a province of central Italy with transplanted *lichen* Pseudevernia furfuracea. *Bulletin of Environmental Contamination and Toxicology*, 83: 852-858.

Guo, Y., Zeng, H., Zheng, R., Li, S., Pereira, G., Liu, Q., Chen, W., dan Huxley, R. 2017. The burden of lung cancer mortality attributable to fine particles in China. *Science The Total Environment*, 579: 1460-1466.

Hadiyati, M., Setyawati, T.R. dan Mukarlina. 2013. Kandungan sulfur dan klorofil thallus *lichen Flavoparmelia* sp. dan *Graphis* sp. pada pohon peneduh jalan di Kecamatan Pontianak Utara. Protobiont, 2(1): 12-17.

Hardini, Y. 2010. Keanekaragaman lichen di Denpasar sebagai bioindikator pencemaran udara. *Seminar Nasional Biologi Fakultas Biologi Universitas Gadjah Mada*. UGM Press. pp. 790-793.

Hawksworth, D.L. dan Rose, F. 1976. *Lichens as pollution monitors*. Edward Arnold Ltd. London, UK.

Henskens, F.L., Green, T.G.A., Wilkins, A. 2012. Cyanolichens can have both cyanobacteria and green algae in a common layer as major contributors to photosynthesis. *Annals of Botany*, 110(3): 55-63.

Holopainen, T.H. dan Karenlampi, L. 1984. Injuries to *lichen* ultrastructure caused

by sulphur dioxide fumigations. *New Phytologist*, 98: 285-294.

Indratmoko, S., Harmantyo, D., dan Kusratmoko, E. 2017. Variabilitas curah hujan di Kabupaten Kebumen. *Jurnal Geografi Lingkungan Tropik*, 1(1): 29-40.

Insarova, I.D., Insarov, G.E., Bråkenhielm, S., Hultengren, S., Martinson, P.O. dan Semenov, S. 1992. *Lichen sensitivity and air quality*, USDA Forest Service. General Technical Report RM-224.

Jayalal, U., Oh, S.O., Park, J.S., Sung, J.H., Kim, S.H., dan Hur, J.S. 2016. Evaluation of air quality using lichens in three different types of forest in Korea. Forest Science and Technology, 12(1):1-8.

Jovan, S. 2008. *Lichen Bioindication of Biodiversity, Air Quality, and Climate: Baseline Results from Monitoring in Washington, Oregon, and California*.U.S. Department of Agriculture: Washington.

Kett, A., Dong, S., Andrachuck, H., dan Craig, B. 2005. *Learning with Lichens : Using Epiphytic Lichens as Bioindicators of Air Pollution*. United States: Brook University.

Kovacs, M. 1992. Biological Indicator of Environment Pollution. In: Kovacs M., *Biological Indicator In Environmental Protection*. New York, Horwood.

Kurniasih, A., Munarti, Prasaja, D., dan Lestari, A.A. 2020. Potensi liken sebagai bioindikator kualitas udara di kawasan Sentul Bogor. *Jurnal Penelitian Ekosistem Dipterokarpa*, 6(1): 17-24.

Larsen, R.S., Bell, J.N.B., James, P.W., Chimonides, P.J., Rumsey, F.J., Tremper, A. dan Purvis, O.W. 2007. *Lichen* and bryophyte distribution on oak in London in realtion to air pollution and bark acidity. *Environmental Pollution*, 146: 332-340.

Le Blanc, F. dan De Sloover, J. 1970. Relation between industrialization and the distribution and growth of epiphytic *lichen*s and mosses in Montreal. *Canadian Journal of Botany*, 48: 1485-1496.

Lewis, J.E.J. 2012. *Bio-Monitoring for Atmospheric Nitrogen Pollution Using Epiphytic Lichens and Bryophytes*. University of Nottingham.

Lücking, R., Chaves, J.L., Sipman, H.J.M., Umaña, L., dan Aptroot, A. 2011. A first assessment of the Ticolichen biodiversity inventory in Costa Rica: The genus Graphis, with notes on the genus Hemithecium (Ascomycota: Ostropales: Graphidaceae). *Fieldiana (Botany) New Series*; 46: 1-131.

Manisalidis, I., Stavropoulou, E., Stavropoulous, A., dan Bezirtzoglou, E. 2020. Enviromental and health impacts of air pollution: a review. *Frontiers in Public Health*, 8(14): 1-13.

Marianingsih, P., Amelia, E., dan Nurhayati, N. 2017. Keanekaragaman liken pulau Tunda Banten sebagai konten pembelajaran keanekaragaman hayati berbasis potensi local. *Biodidaktika: Jurnal Biologi dan Pembelajarannya*, 12(1).

Marini, L., Nascimbene, J., dan Nimis, P.L. 2011. Large-scale patterns of epiphytic *lichen*s species richness: Photobiont-dependent response to climate and forest structure. *Science of The Total Environment*, 409: 4381-4386.

Markert, B., Oehlmann, J. dan Roth, M. 1997. *General aspects of heavy metal monitoring by plants and animals*. In: Environmental bio-monitoring - exposure, assesment and specimen banking. ACS Symposium series 654. Subramanian, K.S. and Iyengar, G.V. (Eds.) American Chemical Society, New York. pp. 19-29.

Markert, B.A., Breure, A.M. dan Zechmeister, H.G. 2003. *Definitions, strategies,*

and principles for bio-indication / biomonitoring of the environment. In: Bio-indicators and Bio-monitors. Markert, B.A., Breure, A.M. and Zechmeister, H.G. (Eds.) Elsevier, Oxford. pp. 3-39.

Martuti, N. K. 2013. Peranan tanaman terhadap pencemaran udara di jalan protokol kota Semarang. *Biosantifika - Berkala Ilmiah Biologi*, 36-42.

McCune, B. 2000. *Lichen* communities as indicators of forest health. *Bryologist*, 103: 353-356.

Misra, A. dan Agrawal, R.P. 197. *Lichens* (A Preliminary Text). Oxford & IBH Publishing: India.

Mistry, J. 1998. Corticuous *lichen*s as potential bioindicators of fire history: a study in the Cerrado of the Distrito Federal, Central Brazil. *Journal of Biogeography*, 25(3): 409-411.

Monge-Nájera, J., González, M.I., Rivas, M., dan Méndez-Estrada, V.H. 2002. A newmethod to assess air pollution using *lichen*s as bioindicators. *Revista de Biología Tropical*, 50(1): 321-325.

Morand, C. P. dan Maesano, I. A. 2004. Air pollution: from source of emission to health effects. *Breathe*, 1(2): 108-119.

Muzayyinah. 2005. Keanekaragaman Tumbuhan Tak Berpembuluh. Solo, Jawa Tengah, Indonesia: Lembaga Pengembangan Pendidikan (LPP) UNS.

Nailufa, L.E., Laelasari, I., Fitriani, M., dan Paramadina, A. 2021. Morfologi tipe thalus *lichen* sebagai bioindikator pencemaran udara di Kudus. *Bioma*, 3(1): 36-42.

Nash, T.H., Ryan, B.D., Diederich, P., Gries, C., dan Bungartz, F. 2002. *Lichen Flora of The Greater Sonoran Desert Region Volume 1*. Arizona State University *Lichen* Herbarium: Arizona.

Nash, T.H. 2008. *Lichen Biology*. 2nd ed. New York: Cambridge University Press. pp. 52-58. 286. 311.

Nasriyanti, T. dan Utami, S. 201. Morfologi talus lichen Dirinaria picta (Sw.) Schaer, Ex Clem pada tingkat kepadatan lalu lintas yang berbeda di kota Semarang. 7(4): 20-27.

Nebore, I. D.Y. 2017. *Lichen Corticulous Sebagai Bioindikator Pencemaran Udara di Manokwari, Papua Barat*. Tesis: Universitas Gadjah Mada.

Neurohr, E., Monge-Nájera, J., dan González-Lutz, M. 2011. Air pollution in a tropical city: the relationship between wind direction and *lichen* bio-indicators in San José, Costa Rica. *Revista de Biología Tropical*, 59(2): 889-905.

Niemi, G. dan McDonald, M. 2004. Application of ecological indicators. *Annual Review of Ecology Evolution and Systematics*, 35: 89-111.

Nimis, P.L., Scheidegger, C., dan Wolseley, P.A. 2012. *Monitoring with Lichen*. p. 22.

Nuna, R. dan Amin, N. 2021. Jenis-jenis lichen di Kawasan Pucok Krueng Alue Seulaseh kecamatan Jeumpa Aceh Barat Daya. *Prosiding Seminar Nasional Biotik*, 9(1): 34-38.

Okuyama, C. 2012. Epiphytic lichens associated with different traffic intensities along the highway E4. Uppsala: Swedish University of Agricultural Science.

Paracer, S. dan Vernon, A. 2000. *Symbiosis: An Introduction to Biological Association*. 2nd Ed. New York: Oxford University Press, inc.

Pescott, O.L., Simkin, J.M., August, T.A., Randle, Z., Dore, A.J., dan Botham,

M.S. 2015. Air pollution and its effects on *lichen*s, bryophytes, and *lichen*-feeding Lepidoptera: review and evidence from biological records. *Biological Journal of The Linnean Society*, 115: 611-635.

Peraturan Pemerintah Republik Indonesia. No 41 Tahun 1999 Tentang Pengendalian Pencemaran Udara.

Pratiwi, M. E. 2006. Kajian Lumut Kerak Sebagai Bioindikator Kualitas Udara.Studi Kasus Kawasan Industri Pulo Gadung, Arberetum Cibubur dan Tegakan Mahoni Cikabayan. *Skripsi*. Bogor: Institut Pertanian Bogor.

Purvis, O.W., Chimonides, J., Din, V., Erotokritou, L., Jeffries, T., Jones, G.C., Louwhoff, S., Read, H., dan Spiro, B. 2003. Which factors are responsible for the changing *lichen* floras of London? *Science of the Total Environment*, 310: 179-189.

Riddell, J., Nash III, T.H., dan Padgett, P. 2010. Response of the *lichen Ramalina menziesii* Tayl to ozne fumigation in: Biology of *Lichen*s-Symbiosis, Ecology, Environmental Monitoring, Systematics and Cyber Applications. *Bibliotheca Lichenologica*, 105: 113-123.

Rindita, Sudirman, L.I., dan Koesmaryono,Y. 2015. Air quality bioindikator using the population of ephypitic macrolichens in Bogor City, West Java. *Journal of Bioscience*, 22(2): 53-59.

Roziaty, E. 2016. Kajian *lichen*: morfologi, habitat, bioindikator kualitas udara ambien akibat polusi kendaraan bermotor. *Bioeksperimen*, 2(1): 54-66.

Saipunkaew, W., Wolseley, P., dan Chimonides, P.J. 2005. Epiphytic lichens as indicators of environmental health in the Vicinity of Chiang Mai City, Thailand. *The Lichenologist*, 37: 345-356.

Saputra, R., Handika, R. A., dan Lestari, R. A. 2019. Analisis sebaran polutan particulate matter (PM10) pada harian musim kemarau di kota Jambi. *Jurnal Engineering*, 1(1): 26–31.

Savic, S. 1998. Epiphytic *lichen*s as bioindicators of air pollution in the area of Belgrade. IAL 3. Belgrade: Verlag Alexander Just. pp. 331- 334.

Salvatore, S. 1999. *An Introduction to Lichen*. Herbarium Intern: New York.

Schmitt, C.K. dan Slack, N.G.1990. Host specificity of epiphytic *lichen*s and bryophytes: a comparison of the AdirondackMountains (New York) and the Southern Blue Ridge Mountains (North Carolina). *The Bryologist*, 93(3): 257-274.

Setiawati, I. *et al*. (2019. Preliminary result of air quality identification and analysis of pm10 and pm2.5 in steel industrial area, Cilegon, Banten. *Jurnal Riset Teknologi Pencegahan Pencemaran Industri*, 10(1): 22–28.

Sett, R. dan Kundu, M. 2016. Epiphytic lichen: their usefulness as bio-indicators of air pollution. Donnish *Journal of Research in Environmental Studies*, 3(3): 17-24.

Sipmson, H. 2003. *Key to the lichen genera of Bogor, Cibodas, and Singapore. Lichen determination keys-common Malesian lichen genera.*

Sloof, J.E. dan Wolterbeek, H.T.H. 1991. Patterns in trace elements in *lichen*s. *Water, Air and Soil Pollution*, 58: 785-795.

Sloof, J.E. 1995. *Lichen*s as quantitative Bio-monitors for atmospheric trace-element deposition, using transplants. *Atmospheric Environment*, 29: 11-20.

Sofyan, N. 2017. *Keanekaragaman Lumut Kerak sebagai Bioindikator Kualitas Udara di Kawasan Industri Citeureup dan Hutan Penelitian Dramaga*.

Institut Pertanian Bogor.

Stolte, K., Mangis, D. Doty, R. dan K. Tonnessen, (Eds.) 1993. *Lichens as Bioindicators of Air Quality*. USDA-Forest Service, *Rocky Mountain Forest and Range Experiment Station General Technical Report* RM-224. Fort Collins, Colorado. pp. 131.

Van Dobben, H.F., Wolterbeek, H.Th., Wamelink, G.W.W., dan Ter Braak, C.J.F. 2001. Relationship between epiphytic *lichen*s, trace elements and gaseous atmospheric pollutants. *Environmental Pollution*, 112: 163-169.

Van Herk, C.M. 1999. Mapping of ammonia pollution with epiphytic *lichen*s in the Netherlands. *Lichenologist*, 31: 9-20.

Varela, Z., Lopez-Sanchez, G., Yanez, M., Perez, C., Fernandez, J.A., Matos, P., Branquinho, C., dan Aboal, J. R. 2018. Changes in epiphytic *lichen* diversity are associated with air particulate matter levels: the caase studt of urban areas in Chile. *Ecological Indicators*: 91: 307-314.

Wilson, W.E. dan Suh, H.H. 1997. Fine particles and coarse particles: concentration relationship relevant to epidemiologic studies. *J Air Waste Manag Asoc*, 47(12): 1238-49.

Wolterbeek, H.Th., Garty, J., Reis, M.A., dan Freitas, M.C. 2003. *Bio-monitors in use: lichens and metal air pollution*. In: Bio-indicators and bio-monitors. Markert, B.A., Breure, A.M. and Zechmeister, H.G. (Eds.), Elsevier, Oxford. pp. 377-419.

World Health Organization. 2021. WHO Global Air Quality Guideline: Particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. WHO. Jenewa.

Yuliani, R., Imaningsih, W., dan Yuwati, T.W. 2021. Lichen as bioindicator of air quality at buffer zone of Banjarbaru town. *Jurnal Galam*, 2(1):54-65.