

DAFTAR PUSTAKA

- Abas A., Nizam M.S., Aqif A.W. 2016. Elevated CO₂ Effects on Lichen Frequencies and Diversity Distributions in Free-Air CO₂ Enrichment (FACE) Station. *Journal of Environmental Protection*. 7: 1192-1197.
- Abas, A., Asnawi N.H., Aiyub, K., Awang, A., Abdullah, S.R. 2022. Lichen Biodiversity Index (LBI) for the Assessment of Air Quality in an Industrial City in Pahang, Malaysia. *Atmosphere*. 13: 1905. <https://doi.org/10.3390/atmos13111905>
- Adryanti Felicia Sampe, D., Maria-Deanne Awuy, J., Krista Mustikaning Sekar, T., Febrian Wijaya, S., Zahwa Ananda, A., Trisha Marella, D., Mahanaim Tampubolon, P., Lestari, R. 2020. Pilot study of air quality index assessment of nitrogen pollutant using lichen as bioindicators in Jakarta and Depok, Indonesia. *E3S Web of Conferences*. 211: 02014. <https://doi.org/10.1051/e3sconf/202021102014>
- Allen J. 2001. Ultraviolet Radiation: How it Affects Life on Earth. <https://earthobservatory.nasa.gov/features/UVB>. (Diakses pada 6 Oktober 2021).
- Anggraini F.J., Oktapiani R.R., Ilfan F., Rodhiyah Z. 2021. Lichen Sebagai Bioindikator Pencemaran Udara Di Gerbang Kota (Gateway) Kota Jambi. *Jurnal Daur Lingkungan*. 4(1): 6-11.
- Armstrong, R.A. 2015. The Influence of Environmental Factors on the Growth of Lichens in the Field. *Springer India: Recent Advances in Lichenology*. 1-8p. DOI 10.1007/978-81-322-2181-4_1
- Asta, J., Erhardt, W., Ferreti, M., Fornasier, R., Kirschbaum, U., Nimis, P.L., Purvis, O.W., Van Haluwyn, C., and Wirth, V. 2002. European Guideline For Mapping Lichen Diversity as an Indicator of Environmental Stress. Based on The German VDI Lichen Mapping Guideline (VDI, 1995) and The Italian Guideline of ANPA (Nimis, 1999), With Several Important Modifications (See Asta et al., 2002 for an Abridged Version)

- Ayres J.G., Borm P., Cassee F.R., Castranova F.R., Donaldson K., Ghio A., Harrison R.M., Hider R., Kelly F., Kooter I.M. 2008. Evaluating the Toxicity of Airborne Particulate Matter and Nanoparticles by Measuring Oxidative Stress Potential—A Workshop Report and Consensus Statement. *Inhalation Toxicology*. 20: 75-99.
- Cahyono W.E. 2010. Pengaruh Hujan Asam Pada Biotik Dan Abiotik. *LAPAN*. 48-51
- CDC. 2019. Sulfur Dioxide. <https://www.cdc.gov/niosh/topics/sulfurdioxide/default.html>. (Diakses pada 6 Oktober 2021).
- Chaniago D., Zahara A., Ramadhani I.S. 2020. Indeks Standar Pencemar Udara (Ispu) Sebagai Informasi Mutu Udara Ambien Di Indonesia. <https://ditppu.menlhk.go.id/portal/read/indeks-standar-pencemar-udara-ispu-sebagai-informasi-mutu-udara-ambien-di-indonesia>. (Diakses pada 5 Oktober 2021).
- Chen T.M., Gokhale J., Shofer S., Kuschner W.G. 2007. Outdoor Air Pollution: Nitrogen Dioxide, Sulfur Dioxide, and Carbon Monoxide Health Effects. *The American Journal Of The Medical Sciences*. 333(4): 249-254.
- Conti M.E., Cecchetti G. 2001. Biological monitoring: lichens as bioindicators of air pollution assessment - a review. *Environmental Pollution*. 114(3): 471–492.
- Das K., Nikita., Baweja P., Rani A., Uniyal P.L. 2020. Lichens as Bioindicators and Biomonitoring Agents. *Environ., We Int., J., Sci., Tech*. 1-10.
- Emekwuru, N., Ejohwomu, O., Temperature, Humidity and Air Pollution Relationships during a Period of Rainy and Dry Seasons in Lagos, West Africa. *Climate* 2023. 11: 113. <https://doi.org/10.3390/cli11050113>
- Firmansyah A.A., dan Evendia M. 2014. Politik Hukum Penetapan Baku Mutu Lingkungan Sebagai Instrumen Pencegahan Pencemaran Lingkungan Hidup. *Kanun Jurnal Ilmu Hukum*. 19-35.

- Grimm M., Grube M., Schiefelbein U., Zuhlke D., Bernhardt J., Riedel K. 2021. The Lichens' Microbiota, Still a Mystery? *Front Microbiology*. 12: 1- 25.
- Gunjar B.R., Molina L.T., Ojha C.S. 2010. *Air Pollution: Health and Environmental Impacts*. CRC Press. New York.
- Gupta, V., Gupta, N., Nayaka, S., Lavania S., Srivastava P. K. 2023. *Pyxine cocoes* (Sw.) Nyl. as an ideal lichen species for biomonitoring studies: A systematic review. *J. Indian bot. Soc.* 103 (4): 245-256
- Haryanto B. 2012. Air Pollution - A Comprehensive Perspective. *InTech*. Rijeka
- Hasairin, A. and Siregar, R. 2018. The analysis of level of lead (Pb) on lichens as a bioindicator of air quality in Medan Industrial Area and Pinang Baris Integrated Terminal in Medan, Indonesia. *IOP Conf. Series: Earth and Environmental Science*. 187:7
- Hauck, M., Jürgens, S. R., Brinkmann, M., & Herminghaus, S. 2008. Surface hydrophobicity causes SO₂ tolerance in lichens. *Annals of botany*. 101(4): 531–539. <https://doi.org/10.1093/aob/mcm306>
- Kelishadi R., and Poursafa P. 2010. Air pollution and non-respiratory health hazards for children. *Arch Med Sci*. 4: 483-495.
- Keputusan Menteri Negara Lingkungan Hidup No. KEP- 45/MENLH/10/1997 *Indeks Standar Pencemar Udara*. 13 Oktober 1997. Menteri Negara Lingkungan Hidup. Jakarta.
- Khastini R. O., Sari I. J., Herysca Y., Sulasanah S. 2019. Lichen diversity as indicators for monitoring ecosystem health in Rawa Danau Nature Reserve, Banten, Indonesia. *Biodiversitas*. 20 (2): 489-496
- Kukwa, M. 2006. The lichen genus *Lepraria* in Poland. *The Lichenologist*. 38 (04): 293–305.
- Kumar S. 2017. Acid Rain-The Major Cause of Pollution: Its Causes, Effects. *International Journal of Applied Chemistry*. 13: 53-58.

- Lawal, O., Ogugbue, C. J., Imam, T. S. 2023. Mining association rules between lichens and air quality to support urban air quality monitoring in Nigeria. *Heliyon*. 9(1). e13073. <https://doi.org/10.1016/j.heliyon.2023.e13073>.
- Loppi, S. 1996. Lichens as Bioindicators of Geothermal Air Pollution in Central Italy. *The Briologist*. 99(1): 41-48
- Mafaza H., Murningsih., Jumari. 2019. Keanekaragaman Jenis Lichen di Kota Semarang. *Life Sciences*. 8(1): 10-15.
- Manisalidis I., Stavropoulou E., Stavropoulos A., Bezirtzoglou E. 2020. Environmental and Health Effect of Air Pollution: A Review. *Front Public Health*. 8: 1-10.
- Nash T.H., Gries C. 1991. *Lichens as Indicator Air Pollution*. Springer-Verlag. Berlin
- Nash, T.H., Ryan, B.D., Gries, C., Bungartz, F., (eds.) 2004. Lichen Flora of the Greater Sonoran Desert Region. Vol 2.
- Nash T.H. 2008. *Lichen Biology*. 2nd Edition. Cambridge University Press. Cambridge.
- O'Hare, G. 1973. Lichen Techniques of Pollution Assessment. *Area*. 5(3): 223–229.
- O'Hare, G. P. 1974. Lichens and bark acidification as indicators of air pollution in west central Scotland. *Journal of Biogeography*. 1:135-146
- Ohmura, Y., Kawachi, M., Kasai F., Sugiura, H., Ohtara, K., Kon, Y., Hamada, N. 2009. Morphology and Chemistry of *Parmotrema tinctorum* (Parmeliaceae, Lichenized Ascomycota) Transplanted into Sites with Different Air Pollution Levels. *Bulletin of the National Museum of Nature and Science*, Series B. 35 (2): 91-98
- Okuyama, C. 2012. Epiphytic lichens associated with different traffic intensities along the highway E4. *Thesis*. Department of Ecology Swedish University of Agricultural Sciences. Uppsala.

Peraturan Menteri Lingkungan Hidup dan Kehutanan Republik Indonesia No 14 Tahun 2020 *Indeks Standar Pencemar Udara*. 15 Juli 2020. Berita Negara Republik Indonesia Tahun 2020 Nomor 774. Jakarta.

Peraturan Pemerintah Republik Indonesia Nomor 14 Tahun 1999 *Pengendalian Pencemaran Udara*. 26 Mei 1999. Lembaran Negara Republik Indonesia Tahun 1999 Nomor 86. Jakarta.

Peraturan Pemerintah Republik Indonesia Nomor 22 Tahun 2021 *Penyelenggaraan Perlindungan Dan Pengelolaan Lingkungan Hidup*. 2 Februari 2021. Lembaran Negara Republik Indonesia Tahun 2021 Nomor 32. Jakarta

Pleijel H. 2000. *Ground-level ozone A problem largely ignored in southern Europe*. Swedish NGO Secretariat on Acid Rain. Gothenburg.

Prateeksha., Paliya B.S., Bajpai R., Jadaun V., Kumar J., Kumar S., Upreti D.K., Singh B.R., Nayaka S., Joshi Y., Singh B.N. 2016. The genus *Usnea*: a potent phytomedicine with multifarious ethnobotany, phytochemistry and pharmacology. *Royal Society of Chemistry*. 6: 21672-21696.

Pykala J. 2019. Habitat loss and deterioration explain the disappearance of populations of threatened vascular plants, bryophytes and lichens in a hemiboreal landscape. *Global Ecology and Conservation*. 18: 1-8.

Rancovic B. 2019. *Lichen Secondary Metabolites: Bioactive Properties and Pharmaceutical Potential*. 2nd Edition. Springer. Cham.

Rindita, Sudirman L.I., Koesmaryono Y. 2015. Air Quality Bioindicator Using the Population of Epiphytic Macrolichens in Bogor City, West Java. *Hayati Journal of Biosciences*. 22: 53-58.

Ristic M., Grujic A.P., Antanasijevic D., Ristic M., Urosevic M.A., Tomasevic M. 2013. Plants as Monitors of Lead Air Pollution. *Pollutant Diseases, Remediation and Recycling*. 387-431.

Ritchie H., and Roser M. 2017. Air Pollution. <https://ourworldindata.org/air-pollution>. (Diakses pada 5 Oktober 2021).

- Ritz B., Hoffman B., Peters A. 2019. The Effects of Fine Dust, Ozone, and Nitrogen Dioxide on Health. *Deutsches Arzteblatt international*. 116: 881–886.
- Simanjuntak P.P., Imanuel S., Sari N., Virgianto R.H. 2019. Sebaran Gas SO₂ di Wilayah Jabodetabek Berdasarkan Data Ozone Monitoring Instrument (OMI) pada Satelit Aura. *Seminar Nasional Penginderaan Jauh*. 6: 264 - 270.
- Sipman H.J., Aptroot A. 2001. Where are the missing lichens? *Mycol., Res.* 105(12): 1433-1439.
- Sitaras I.E., Siskos P.A. 2008. The role of primary and secondary air pollutants in atmospheric pollution: Athens urban area as a case study. *Environmental Chemistry Letters*. 6: 59-69.
- Srivastava, S. and Pawaiya A.S. 2020. Air Pollution: Causes, Effect and Controls. *Journal of Critical Review*. 7: 717-721.
- Subbaiyan, R., Ganesan, A., Dhanuskodi. 2023. Ecolichenology of Eastern Ghats diversity against climatic fluctuations in Kolli Hills, India. *Biodiversitas*. 24 (1): 624-635
- Tsai D.H., Wang J.L., Wang C.H., Chan C.C. 2007. A study of ground-level ozone pollution, ozone precursors and subtropical meteorological conditions in central Taiwan. *Journal of Environmental Monitoring*. 10(1): 109-118.
- Untari, L.F. 2024. *The Biology of Lichen*. In *Chemistry, Biology, and Pharmacology of Lichen* (Eds A.K Das, A. Sharma, D Kathuria, M.J. Ansari and G.Ghardwaj). Wiley. New Jersey.
- US EPA. 1999. *Nitrogen Oxides (NOx), Why and How They Are Controlled*. Technical Buletin. North Carolina.
- US EPA. 2003. Ozone: Good Up High, Bad Nearby. <https://www.epa.gov/sites/production/files/documents/gooduphigh.pdf>. (Diakses pada 20 September 2021)

- US EPA. 2021. Basic Information about Lead Air Pollution. <https://www.epa.gov/lead-air-pollution/basic-information-about-lead-air-pollution#:~:text=Lead%20is%20persistent%20in%20the,sources%20of%20lead%20air%20pollution.&text=Elevated%20lead%20in%20the%20environment,and%20neurological%20effects%20in%20vertebrates>. (Diakses pada 6 Oktober 2021).
- US EPA. 2021. Outdoor Air Quality Data. <https://www.epa.gov/outdoor-air-quality-data/air-data-basic-information>. (Diakses pada 1 September 2021).
- US EPA. 2021. Overview of Greenhouse Gases. <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>. (Diakses pada 6 Oktober 2021).
- US EPA. 2021. Sulfur Dioxide Basics. <https://www.epa.gov/so2-pollution/sulfur-dioxide-basics>. (Diakses pada 6 Oktober 2021).
- US EPA. 2021. Technical Overview of Volatile Organic Compounds. <https://www.epa.gov/indoor-air-quality-iaq/technical-overview-volatile-organic-compounds>. (Diakses pada september 2021).
- Vallero, D.A. 2008. *Fundamentals of Air Pollution*. 4th Edition. Academic Press. London
- Wahyuni E., Hanani Y.D., Setiani O. 2018. Analisis Risiko Kesehatan Lingkungan Gas Karbon Monoksida Pada Pedagang Kaki Lima (Studi Kasus Jalan Setiabudi Semarang). *Jurnal Kesehatan Masyarakat*. 6 (6): 87-92.
- Wilbur S., Williams M., Williams R., Scinicariello F., Klotzbach J.M., Diamond G.L., Citra M. 2012. Toxicological Profile for Carbon Monoxide. US Department Of Health And Human Services. Atlanta.
- Wilson W.E. and Suh H.H. 1997. Fine Particles and Coarse Particles: Concentration Relationships Relevant to Epidemiologic Studies. *Journal of the Air & Waste Management Association*. 47: 1238-1249

World Health Organization. 2018. Ambient (outdoor) air pollution. [https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health). (Diakses pada 1 September 2021).

World Health Organization. 2019. Lead poisoning and health. <https://www.who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>. (Diakses pada 6 Oktober 2021).

World Health Organization. 2021. Air Quality on Health: Exposure and Health Impact of Air Pollution. <https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/health-impacts/exposure-air-pollution>. (Diakses pada 4 Oktober 2021)

World Health Organization. 2021. WHO Global Air Quality Guideline: Particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide. *WHO*. Jenewa

Yoshikawa T., and Naito Y. 2002. What is Oxidative Stress? *Jap Med Assoc Journal*. 45(7): 271-276.

Yugatama A., Mawarni A.K., Fadillah H., Zulaikha S.N. 2019. Analisis Kandungan Timbal dalam Beberapa Sediaan Kosmetik yang Beredar di Kota Surakarta. *Journal of Pharmaceutical Science and Clinical Research*. 1: 52-59.

Yuliani, R., Imaningsih, W., dan Yuwati, T.W. 2021. Lichen Sebagai Bioindikator Kualitas Udara di Kawasan Penyangga Kota Banjarbaru. *Jurnal Galam*, 2(1): 54-65.

Zhang J.J., Wei Y., Fang Z. 2019. Ozone Pollution: A Major Health Hazard Worldwide. *Front Immunology*. 10: 1-7