

REFERENCES

- Aptroot, A. and Van Herk, C.M. 2007. Further evidence of the effects of global warming on lichens, particularly those with *Trentepohlia* phycobionts. *Environmental Pollution* 146 : 293 – 298.
- Alfani, A., Baldantoni, D., Maisto, G., Bartoli, G. and Virzo De Santo, A. 2000. Temporal and spatial variation in C, N, S and trace element contents in the leaves of *Quercus ilex* within the urban area of Naples. *Environmental Pollution* 109: 119 - 129.
- Asta, J., Erhardt, W., Ferretti, M., Fornasier, F., Krischbaum, U., Nimis, P. L., Purvis, O. W., Printos, S., Scheidegger, C., Haluwyn, C. V. and Wirth, V. (2002). European guideline for mapping lichen diversity as an indicator of environmental stress. [online]. Available: www.thebls.org.uk/eumap.pdf (01 November 2010)
- Australian Government. 2005. Nitrogen dioxide (No₂). Department of Sustainability, Environment, Water, Population and Communities. [online]. Available: <http://www.environment.gov.au/atmosphere/airquality/publications/nitrogendioxide.html> (15 May 2013)
- Bačkor, M., Paulíková, K. Geralská, A. and Davidson, R. 2003. Monitoring of air pollution in Košice (Eastern Slovakia) using lichens. *Polish journal of Environmental Studies* 12 (2): 141- 150.

Borisuttichun, P. 2008. Construction of Test Kit for Determination of Sulphur Dioxide in Ambient Air by Passive Sampling. M.S. Thesis, Chiang Mai University. Chiang Mai.

Branquinho, C. 2001. Lichens, in M. N. V. *Metals in the Environment: analysis by Biodiversity*, Marcel Dekker, New York. Prasad (ed.). p. 117- 158.

Bootdee, S. 2009. Application of Air Passive Sampler Test Kit for Monitoring of Nitrogen Dioxide Levels in Chiang Mai Province. M.S. Thesis, Chiang Mai University. Chiang Mai.

Bootdee, S., Chalemrrom, P., Chantara, S. 2012. Validation and field application of tailor- made nitrogen dioxide passive samplers. *International Journal of Environmental Science and Technology*. volume 9, issue 3. 515- 526.

Chaithanswad, T. 2002. Distribution and frequency of lichen *Hyperphyscia adglutinata* Flörk and *Lecanora* cf. *leprosa* Fée in Chiang Mai City. Special project of Biology department. Chiang Mai University. Chiang Mai.

Chiang Mai Province official site. 2009. Chiang Mai's Information. [online]. Available: http://www.chiangmai.go.th/meet_file/intro3.pdf (29 November 2010)

Chiang Mai Meteorological Station, 2011. climate. [online]. Available: <http://www.cmmet.tmd.go.th/index1.php> (2011)

Chiang Mai Meteorological Station, 2012. climate. [online]. Available: <http://www.cm-met.tmd.go.th/index1.php> (January – April 2012)

Chiang Mai Province official site. 2012. Chiang Mai's map. [online]. Available: <http://gis.chiangmai.go.th/images/Image/gallery/25CM-Muang%20all.jpg> (2012)

- Chiang Mai Province official site. 2012. Chiang Mai's Lan used. [online]. Available:
<http://gis.chiangmai.go.th/images/Image/gallery/Mua%20Landuse.jpg> (2012)
- Conti, M.E. and Cecchetti, G. 2001. Biological monitoring: lichens as bioindicators of air pollution assessment- a review. *Environmental Pollution* 144: 471 - 492.
- Conti, M.E., Pino, A., Botrè,F., Bocca, B.and Alimontri, A.2009. Lichen *Usnea barbata* as biomonitor of airbone elements deposition in the Province of Tierra del Fuego (southern Patagonia, Argentina). *Ecotoxicology and Environmental Safety* 72: 1082 - 1089.
- Cox, R. M., 2003. The use of passive sampling to monitor forest exposure to O₃, NO₂ and SO₂: a review and some case studies. *Environmental Pollution* 126, 301-311.
- Davies, L., Bates, J.W., Bell, J.N.B., James, P.W. and Purvis, O.W. 2007. Diversity and sensitivity of epiphyte to oxides of nitrogen in London. *Environmental Pollution* 146: 299 - 310.
- Dawson, J., and Irving, S. 2008. Incidence and abundance of epiphytic and epigeic lichens in response to highway traffic in Algonquin Provincial Park, Ontario. Department of Molecular and cellular Biology, College of Biology Science.
- Ferretti, M., Brambilla, E., Brunialti, G., Fornasier, F., Mazzali, C., Giordani, P. and Nimis, P. L. 2004. Reliability of different sampling densities for estimating and mapping lichen diversity in biomonitoing studies. *Envrionmental Pollution* 127: 249 - 256.
- Frati, L., Caprasecca, E., Santoni, S., Gaggi, C., Guttova, A., Gaudino, S., Pati, A., Rosamilia, S., Pirintsos, S.A. and Loppi, S. 2006. Effect of NO₂ and NH₃ from road traffic on epiphytic lichens. *Environmental Pollution* 142: 58 - 64.

- Gair, A.J., Penkett, S.A. and Oyola, P. 1991. Development of a sample passive technique for the determination of nitrogen dioxide in remote continental locations. *Atmospheric Environment* 25A: 1927 – 1939.
- Garty, J., Tomer, S., Levin, T. and Lehr, H. 2003. Lichens as biomonitor around a coal- fired power station in Israael. *Environmental Research* 91: 186 - 198.
- Gilbert, O. 2000. What is a lichen, Lichens. The Bath Press, Harper Collins. Hammersmith London.
- Gombert, S., Asta, J. and Seaward, M.R.D. 2003. Correlation between the nitrogen concentration of two epiphytic lichens and the traffic density in an urban area. *Environmental Pollution* 123: 281– 290.
- Gorecki, T. and Namiesnik, J. 2002. Passive sampling. Trends in Analytical Chemistry 21: 276-291.
- Gries, C. 1996. Lichens as Indicators of Air pollution. In: Nash III, T.H. (ed.), *Lichen Biology*. Cambridge University Press, Cambridge: 240 - 254.
- Hale, M. E., 1970. *The Biology of Lichens*. Edward Arnold Ltd., London.
- Hawksworth, L. D. and Rose, F. 1976. *Lichens as Pollution Monitors*. Edward Arnold (Publishers) Limited, London.
- Huang, Y. K., Luvsan, M. E., Gombojav, E., Ochir, C., Bulgan, J. and Chan, C. C. 2013. Land use patterns and SO₂ and NO₂ pollution in Ulaanbaatar, Mongolia. *Environmental Research* 124; 1- 6.
- Kanjoem, R. 2010. Lichen Diversity and Monitoring of Sulphur Dioxide Around Mae Moh Power Plant Area, Mae Moh District, Lampang Province, in 2009. M.S. Thesis, Department of Biology, Chiang Mai University. Chiang Mai.

- Khaodee, W. 2006. Development of passive samplers for determination of nitrogen dioxide, sulfur dioxide and ozone in ambient air. M.S. Thesis, Chiang Mai University. Chiang Mai.
- Kheawsalab, C. 2010. Lichen Diversity on some Tree Species in Chiang Mai. Special Project of Biology Department. Chiang Mai University. Chiang Mai.
- Kulapirak, T. 2006. Distribution and Frequency of Lichen *Pyxine cocoes* Swartz. And *Lecanora cf. leprosa* Fée in Lamphun Province. Special project of Biology Department. Chiang Mai University. Chiang Mai.
- LeBlanc, F., Rao, D.N. and Comeau, G. 1972. The epiphytic vegetation of *Populus balsamifera* and its significance as an air pollution indicator in Sudbury, Ontario. *Canadian Journal of Botany* 50: 519- 528.
- Loppi S., Ivanovb D. and Boccardia R. 2002. Biodiversity of epiphytic lichens and air pollution in the town of Siena (Central Italy). *Environmental Pollution* 116: 123 - 128.
- Maungsuwun, S. 2006. Growth rate of the lichen *Pyxine cocoes* in Chiang Mai University and Chiang Mai City, Chiang Mai Province. Special Project of Biology Department. Chiang Mai University. Chiang Mai.
- Munzi, S., Ravera, S. and Caneva, G. 2007. Epiphytic lichens as indicators of environmental quality in Rome. *Environmental Pollution* 146: 350 - 358.
- Nash, T. H. III. 1996. Chapter 1; Introduction. Lichen Biology. Ed. T. H. Nash III, p.1. Cambridge: Cambridge University Press.
- Nash, T.H. and Gries, C. 2002. Lichens as bioindicators of sulfur dioxide. *Symbiosis* 33: 1 - 21.

- Nash, T.H. III. 2008. Chapter 4; Thallus Morphology and Anatomy, Lichen Biology. Second ed T.H. Nash III, p. 41- 48. Cambridge: Cambridge University Press.
- Parra, M. A., Elustondo, D., Bermejo, R. and Santamaría, J. M. 2009. Ambient air levels of volatile organic compounds (VOC) and nitrogen dioxide (NO_2) in a medium size city in Northern Spain. *Science of The Total Environment* 407: 999- 1009.
- Pimwong, S. 2002. Distribution and Frequency of Lichen *Pyxine cocoes* Swartz. And *Dirinaria picta* Swartz. In Chiang Mai City. Special project of Biology Department. Chiang Mai University. Chiang Mai.
- Pinho, P., Augusto, S., Branquinho, C., Bio, A., Pereira, M. J., Soares, A. and Catarino, F. 2004. Mapping Lichen Diversity as a First Step for Air Quality Assessment. *Journal of Atmospheric Chemistry* 49: 377 - 389.
- Plaisance, H., Sagnier, I., Saison, J. Y., Galloo, J. C. and Guillermo, R. 2002. Performances and application of a passive sampling method for the simultaneous determination of nitrogen dioxide and sulfur dioxide in ambient air. *Environmental Monitoring and Assessment* 79: 301- 315.
- Pollution Control Department. 2012. Standard nitrogen dioxide concentrations in Thailand. Pollution Control Department, Thailand. [online]. Available: http://www.pcd.go.th/info_serv/reg_std_airsnd01.html#s1 (14 May 2013)
- Pomphueak, K. 2005. Use of Lichen as Bioindicators for Air Quality Monitoring in Amphoe Mueang Lampang. M.S. Thesis, Chiang Mai University. Chiang Mai.
- Pruksakorn, S. 2007. Used of Lichens as Bioindicator for Air Pollution Monitoring in Lamphun Province in 2004. M.S. Thesis, Chiang Mai University. Chiang Mai.

- Purvis, O. W., Coppins, B. J., Hawksworth, D. L., James, P. W. and Moore, D. M. 1992. The lichen flora of great Britain and Ireland. The British lichen Society, London.
- Purvis, O. W. 2000. Lichens. The natural History Museum, London.
- Purvis, O. W. 2007. Lichens in a changing pollution environment: An introduction. *Environmental Pollution*. 146: 291- 292.
- Řezanka, T. and Guschina I., A. 2001. Further glucosides of lichens' acids from Central Asian lichens. *Phytochemistry* 56: 181 - 188.
- Runnawut, S. 2008. Surveying of Lichen Diversity around Mae Mo Power Plant Areas, Mae Mo District, Lampang province. Special Project of Biology Department. Chiang Mai University. Chiang Mai.
- Saipunkaew, W. 1994. Lichen as bioindicators for air pollution monitoring in Doi Suthep mountain and Chiang Mai city. M. S. Thesis. Environmental Risk Assessment for Tropical Ecosystems, Chiang Mai University.
- Saipunkaew, W., Wolseley, P.A., Chimonides, P.J. and Boonpragob, K. 2005. Epiphytic lichens as indicators of environmental health in the vicinity of Chiang Mai city, Northern Thailand. *Lichenologist* 37(4): 345 - 356.
- Saipunkaew, W., Wolseley, P.A., Chimonides, P.J. and Boonpragob, K. 2007. Epiphytic macrolichens as indicators of environmental alteration in northern Thailand. *Environmental Pollution* 146: 366 - 374.
- Samsudin, M. W., Din, L., Zakaria, Z., Latip, J., Lihan, T., Jemain, A. A., Samsudin, F. 2012. Measuring air quality using lichen mapping at Universiti Kebangsaan Malaysia (UKM) Campus. *Procedia- Social and Behavioral Science* 59: 635- 643.

- Sancho, L.G., Allen Green, T.G. and Pintado, A. 2007. Slowest to fastest: Extreme range in lichen growth rates supports their use as an indicator of climate change in Antarctica. *Flora* 22: 667 - 673.
- Sigal, L.L., Nash, T.H. 1983. Lichen communities on conifers in Southern California mountain: an ecological survey relative to oxidant air pollution. *Ecology* 64: 1343 - 1354.
- Sipman, H. 2003. Key to the Lichen of Bogor, Cibodas and Singapore. [online]. Available: <http://www.bgbm.org/Sipman/keys/Javagenera.htm> (June 2010)
- Sloof, J. E. 1995. Lichens as quantitative biomonitor for atmospheric trace-element deposition, using transplant. *Atmospheric Environment* 29: 11 - 25.
- Sommerfeldt, M. and John, V. 2001. Evaluation of a method for the reassessment of air quality by lichen mapping in the city of izmir, Turkey. *Turkey Journal of Botany* 25: 45- 55.
- Stevenson, K., Bush, T. and Mooney, D. 2001 Five years of nitrogen dioxide measurement with diffusion tube samplers at over 1000 sites in the UK. *Atmospheric Environment* 35: 281- 287.
- Stranger, M., Krata, A., Kontozova- Deutsch, V., Bencs, L., Deutsch, F., Worobiec, A., Naveau, I., Roekens, E and Van Grieken, R. 2008. Monitoring of NO₂ in the ambient air with passive samplers before and after a road reconstruction event. *Microchemical Journal* 90: 93- 98.
- Subsri, P. 2001. Lichens as Bioindicators for Air Pollution Monitoring in Urban and Suburban of Chiang Mai City in 2001. M.S. Thesis, Chiang Mai University. Chiang Mai.

Thammapanya, P. 2012. Applications of Lab Made Passive Samplers for Monitoring of Ambient Nitrogen Dioxide in Chiang Mai City. M.S. Thesis, Chiang Mai University. Chiang Mai.

Tourismthailand, 2011. Chiang Mai map. [online]. Available: <http://www.folktravel.com/wp-content/uploads/2009/07/chiangmai-map.gif> (12 January 2011)

Van Dobben, H. F. and Ter Braak, J.F. 1998. Effects to atmospheric NH₃ on epiphytic lichens in The Netherlands: the pitfalls of biological monitoring. *Atmospheric Environment* 32: 551 - 557.

Van Dobben, H. F. and Ter Braak, J.F. 1999. Relationship between epiphytic lichens, trace elements and gaseous atmospheric pollutants. *Environmental Pollution* 112: 163 - 169.

Van Dobben, H. F., Wolterbeek, H. Th., Wamelink, G.W.W. and Ter Braak, J.F. 2001. Ranking of epiphytic lichen sensitive to air pollution using survey data: a comparison of indicator scales. *Lichenologist* 31: 27 - 39.

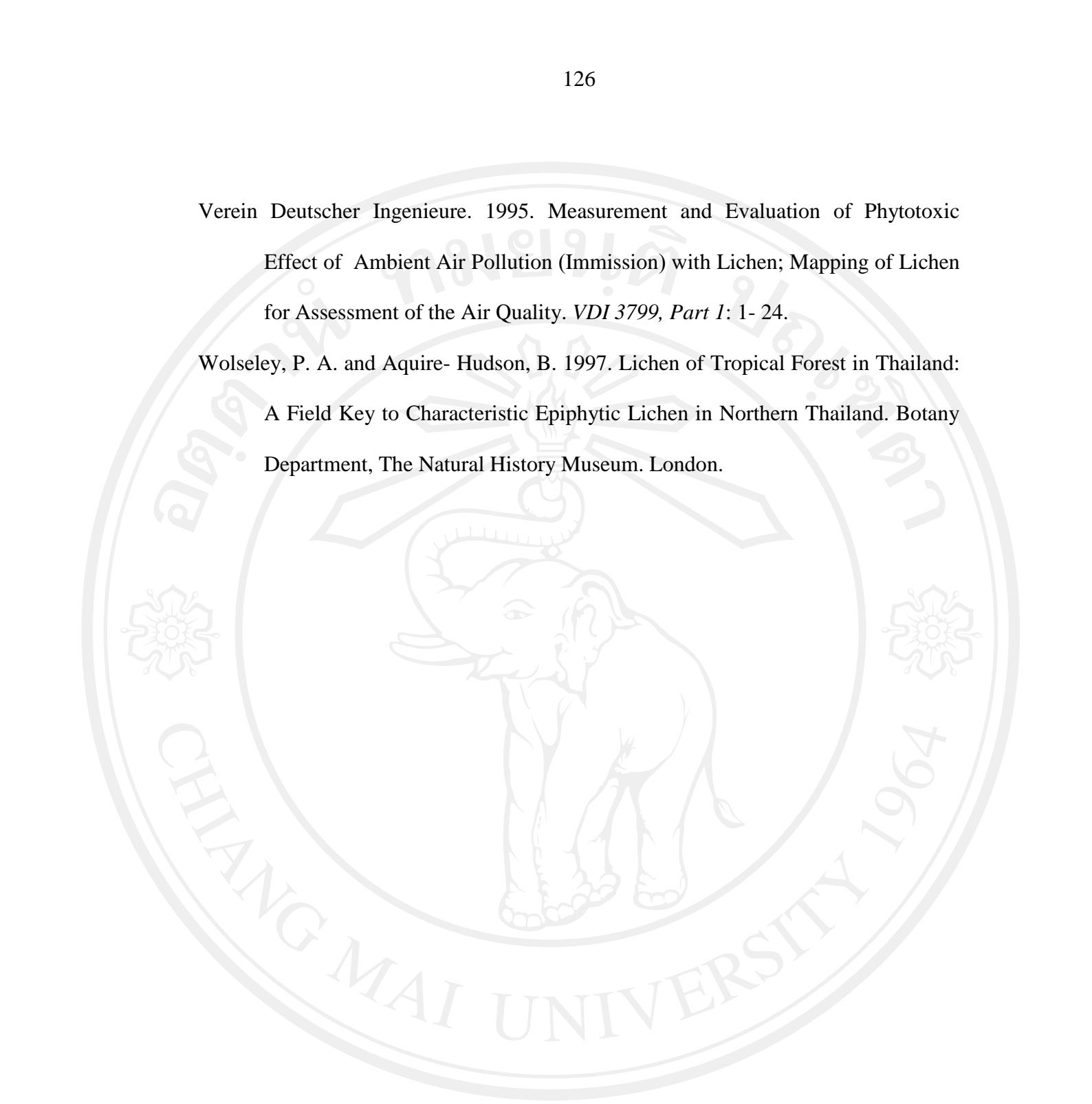
Van Herk, C.M. 2001. Bark pH and susceptible to toxic air pollutions as independent causes of change in epiphytic lichen composition in space and time. *Lichenologist* 33: 419 - 441.

Van Herk, C.M., Aptroot,A. and van Dobben,H.F. 2002. Long-term monitoring in the Netherlands suggests that lichens respond to global warming. *Lichenologist* 34,141 - 154.

Varshney, C.K. and Singh, A.P., 2003. Passive sampler for NO_x Monitoring: A critical review. *The Environmentalist* 23, 127-136.

Verein Deutscher Ingenieure. 1995. Measurement and Evaluation of Phytotoxic Effect of Ambient Air Pollution (Immission) with Lichen; Mapping of Lichen for Assessment of the Air Quality. *VDI 3799, Part 1: 1- 24.*

Wolseley, P. A. and Aquire- Hudson, B. 1997. Lichen of Tropical Forest in Thailand: A Field Key to Characteristic Epiphytic Lichen in Northern Thailand. Botany Department, The Natural History Museum. London.



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright © by Chiang Mai University
All rights reserved