UNIVERSITI TEKNOLOGI MARA

AIR POLLUTION ASSESSMENT USING LICHEN BIODIVERSITY INDEX (LBI) IN SHAH ALAM, SELANGOR

NURUL ADIBAH MOKHTAR

MSc

September 2020

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student   :   Nurul Adibah Mokhtar

Student I.D. No.   :   2018856552

Programme   :   Master of Science Applied Biology – AS730

Faculty   :   Applied Sciences

Thesis Title   :   Air Pollution Assessment Using Lichen Biodiversity Index (LBI) in Shah Alam, Selangor

Signature of Student   :   ……………………………………..

Date   :   September 2020

ABSTRACT

Biomonitoring technique was frequently used to monitor air pollution level. Lichens are the commonly used biomonitor since it has the ability to absorb toxic materials into their thallus system. A study was conducted in Shah Alam, Selangor to determine the species composition of lichen, to assess the air pollution status according to Lichen Biodiversity Index (LBI) and to quantify the effect of motor vehicle frequency on the LBI value and species composition of lichens. This study also aimed to identify the most tolerant and the most sensitive lichen species in the study area. A total of 21 sections in central Shah Alam were studied with 52 sampling stations were chosen based on the presence of *Roystonea regia* as the host tree for lichen. Frequency of lichen was collected using quadrat with a dimension of 10 x 50 cm^2 and lichens found within the quadrat were collected for species identification purpose. Frequency of motor vehicles on the traffic road of each sampling station in the study area was counted and recorded to determine the influence of phytotoxic gaseous released by motor vehicles on lichens in the study area. From morphological analysis conducted on the lichen samples, thirteen species of lichen from nine genus and seven family were recorded. Air pollution status of each sampling station was calculated based on LBI to determine the air pollution status in central Shah Alam. Two sections showed high alteration of air, six sections showed moderate alteration of air, eight sections showed low alteration of air but with low naturality, four sections showed moderate naturality of air and one section showed high naturality of air. Section 10, 19 and 21 were omitted due to the absence of the host tree. Section 10 and Section 19 have been developed as a private property area while Section 21 have been developed as cemeteries area. According to the LBI standard, this study area is considered as slightly polluted since 38.10% of the study area showed condition above moderate pollution level (low alteration/low naturality) while only 23.81% of the study area showed condition below moderate pollution level. Regression analysis showed a negative linear relationship between LBI value and frequency of motor vehicles with R^2 = 0.652. Air pollution caused by motor vehicles also negatively affected the species composition of lichen in this study area where there is also a negative linear relationship with R^2 = 0.596. *Pyxine cocoes* was identified as the most tolerant lichen species since it was found in all 21 sections while *Parmotrema praesorediosum* was identified as the most sensitive lichen as it was only found in Section 6 and Section 12 that possessed the highest LBI value. Principal Component Analysis (PCA) was also conducted to determine the correlation of various lichen species and study area. From the analysis, PCA plot indicated that the lichen species were correlated with sections that comprised of mostly moderate and less polluted sampling stations which are Section 1, 6, 7, 8, 9, 16, 17, 18, 20 and 23. The most sensitive lichen species; *Parmotrema praesorediosum* showed a high correlation with Section 6 and 12 while the most tolerant lichen species; *Pyxine cocoes* showed a high correlation with Section 7 and 9. From the result, this study has proven that lichen is very suitable to be used as biomonitoring tool for air pollution and air quality assessment. Therefore, it should be widely used in the future study since it may indicate a direct effect of the pollution towards living organisms.

ACKNOWLEDGEMENT

TABLE OF CONTENTS