Relations between Air Quality and *Ploiarium alternifolium* Characteristics on Lichen Diversity in Thung Khai Garden

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Abstract

The purposes of research were to study air quality, temperature, relative humidity (RH) in *P. alternifolium* garden, to study *P. alternifolium* characteristics, bark texture, stem size, number of aerating root and to study the lichens diversity on *P. alternifolium*. Procedures were proceeded according to the Globe protocols. From the results, Area around small *P. alternifolium* had temperature from 23.2-23.6°C averaged at 23.4 ± 0.2°C and RH from 69-77%RH averaged at 73 ± 3%RH. They had rough stem, stem size from 14-27 cm averaged at 20 ± 6 cm, aerating root from 3-5 roots averaged at 4 ± 1 roots and they were discovered crustose type, 2 family, Graphidaceae Chrysotrichaceae, 2 genus, Ocellularia Chrysothrix, 2 species, *Ocellularia* sp.1 *C. candellaris*. *Ocellularia* sp.1 was discovered the most at 73%RA. Diversity and evenness index of lichens was equal to 1.63 and 2.35, respectively. Area around large *P. alternifolium* had temperature from 23.1-25.3°C averaged at 23.9 ± 0.9°C and RH from 79-99%RH averaged at 87 ± 9%RH. They had rough stem, stem size from 32-39 cm averaged at 36 ± 3 cm, aerating root from 5-12 roots averaged at 8 ± 3 roots and they were discovered crustose type, 4 family, Graphidaceae Arthoniaceae Chrysotrichaceae Physciaceae, 6 genus, Graphis Ocellularia Cryptothecia Chrysothrix Sarcographa Amandinea, 2 species, *Graphis* sp.1 *Ocellularia* sp.1 *Cryptothecia* sp.1 *C. candellaris S. labyrinthica A. extunata Cryptothecia* sp.2. *Ocellularia* sp.1 was discovered the most at 50%RA. Diversity and evenness index of lichens was equal to 16.83 and 8.65, respectively. So, the results show that the relations between air quality and botanical characteristics of *P. alternifolium* effected on lichen diversity. The air quality, it was higher temperate, humid and the botanical characteristics of *P. alternifolium*, they had the larger stem size and more aerating root relate to higher diversity of lichens.

Introduction

Lichens are mutually symbiotic systems consisting of fungal and algal symbionts.

formation of lichens is not a random but it is from the environmental, ecological evolutionary factors and then it brings to the specificity and selectivity. These factors do the lichens have the high diversity and they can live in many ecosystems and environments.

it can use just a species for identification the environmental conditions (Nimis *et al.*, 2002). Residence characteristics are a factor for lichen growth such as bark and size of the stem. Lichen can use for producing the medicines, dyes, perfumes and beverages.

Introduction

They can be found on *P. alternifolium*. *P. alternifolium* is a shrub, found in the southern Thailand, growing in inpeat swamp, melaleuca and rain forest. *P. alternifolium* can also be found in Thung Khai Botanic Garden Trang, Thailand.

lichens are biological resources that have not been explored and studied rigorously because they are not well-known in Thailand.

The researchers have an idea to study the relations between air quality such as temperature and relative humidity in *P. alternifolium* garden and the botanical characteristics of *P. alternifolium* such as bark texture, size of the plant stem and number of aerating root on lichen diversity in Thung Khai Botanic Garden Trang, Thailand.

Research Question

Do the air quality and botanical characteristics of *P. alternifolium* effect on lichen diversity in *P. alternifolium* garden?

Research Objectives

1. To study the air quality such as air temperature and relative humidity in *P. alternifolium* garden.
2. To study the botanical characteristics of *P. alternifolium* such as bark texture, size of the plant stem and number of aerating root.
3. To study lichen diversity in *P. alternifolium* garden.

Research Hypothesis

The air quality and botanical characteristics of *P. alternifolium* could show the different lichen diversity.

Materials and Equipments

1. CU Smart Lens 20x
2. Camera
3. Research record keeping book
4. GPS
5. Digital thermometer
6. Digital hygrometer

Study Site

Study Site	Geographic coordinates	
	Latitude (°N)	Longitude (°E)
Thung Khai Botanic Garden Trang, Thailand	7.46839	99.63834

Research Method

Measure temperature

Measure relative humidity

Research Method

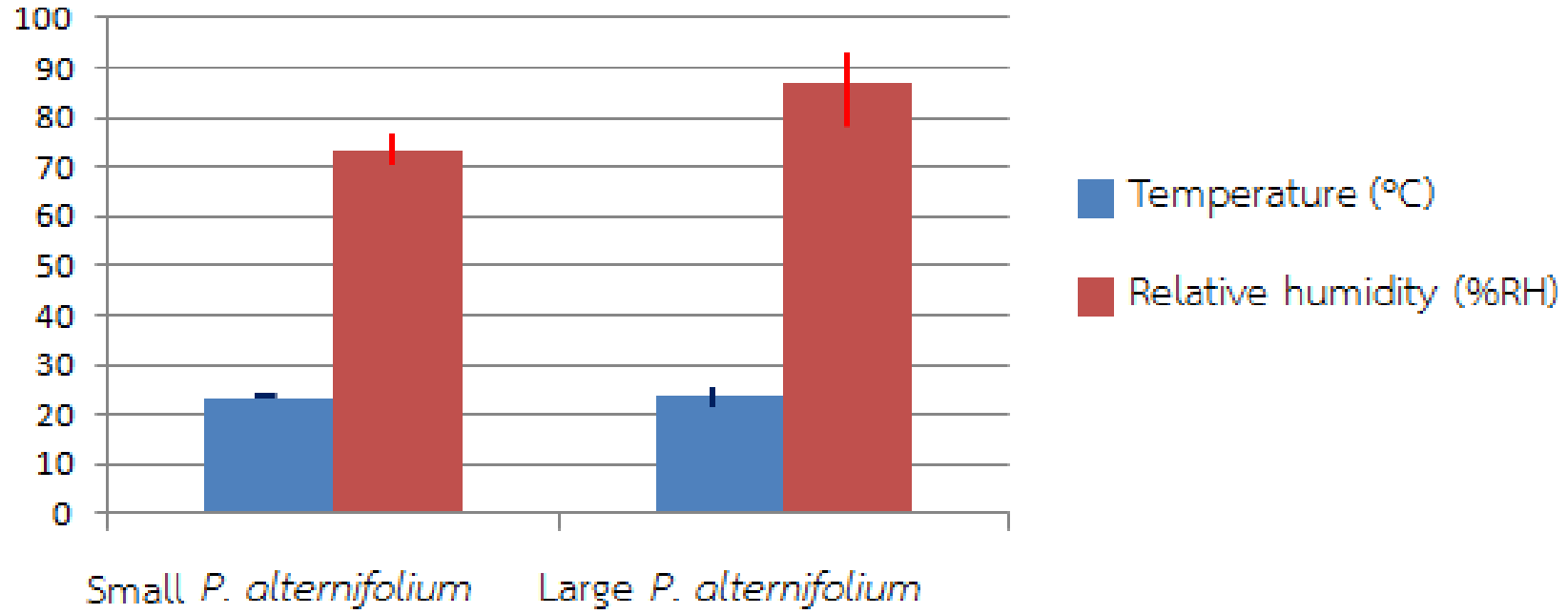
- Observe bark texture
- Measure size of *P. alternifolium*
- Count the number of the aerating root of *P. alternifolium*

Research Method

- Observe the lichens
- Observe physical characteristics of the lichens
- Count the number of the lichen
- Compare the physical characteristics with the Lichen Identification Guide book

Result and Discussion

Part 1 Air quality



Graph 1 shows the temperature and relative humidity around the small and large *P. alternifolium*

Result and Discussion

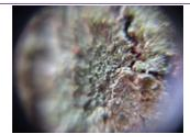
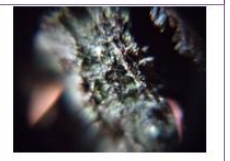
Part 2 Botanical characteristics of *P. alternifolium*

n	Bark texture		Size of stem(cm)		Aerating roots	
Size of stem	Small	Large	Small	Large	Small	Large
1	Rough	Rough	14	39	3	8
2	Rough	Rough	26	38	4	5
3	Rough	Rough	17	36	3	8
4	Rough	Rough	16	32	4	12
5	Rough	Rough	27	35	5	5
Mean ± S.D.	Rough	Rough	20 ± 6	36 ± 3	4 ± 1	8 ± 3

Table 1 shows the bark texture, size of the stem and aerating roots of the small and large *P. alternifolium*

Result and Discussion

Part 3 Species of the lichen on *P. alternifolium*

n	Species		Photo	
Size of stem	Small	Large	Small	Large
1	Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1	Crustose Family: Graphidaceae Genus: Graphis Species: *Graphis* sp.1		
		Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1		
2	Crustose Family: Chrysotrichaceae Genus: Chrysothrix Species: *C. candellaris*	Crustose Family: Arthoniaceae Genus: Cryptothecia Species: *Cryptothecia* sp.1		
	Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1	Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1		
		Crustose Family: Chrysotrichaceae Genus: Chrysothrix Species: *C. candellaris*		

Result and Discussion

4	Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1	Crustose Family: Arthoniaceae Genus: Cryptothecia Species: *Cryptothecia* sp.1		
	Crustose Family: Chrysotrichaceae Genus: Chrysothrix Species: *C. candellaris*	Crustose Family: Chrysotrichaceae Genus: Chrysothrix Species: *C. candellaris*		
		Crustose Family: Physciaceae Genus: Amandinea Species: *A. extunata*		
		Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1		

Result and Discussion

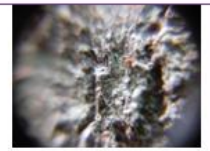
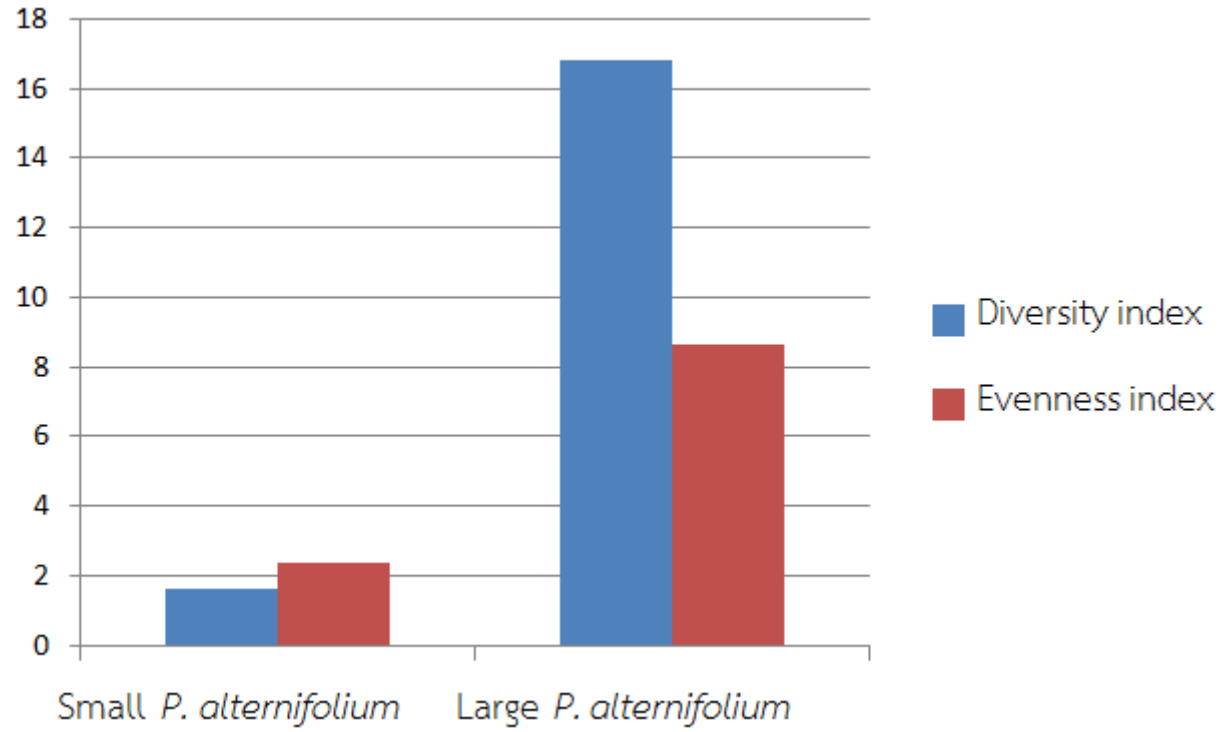
5	Crustose Family: Chrysotrichaceae Genus: Chrysothrix Species: *C. candellaris*	Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1		
	Crustose Family: Graphidaceae Genus: Ocellularia Species: *Ocellularia* sp.1	Crustose Family: Arthoniaceae Genus: Cryptothecia Species: *Cryptothecia* sp.1		
		Crustose Family: Arthoniaceae Genus: Cryptothecia Species: *Cryptothecia* sp.2		
		Crustose Family: Chrysotrichaceae Genus: Chrysothrix Species: *C. candellaris*		

Table 2 shows the lichen's species and their photo on the small and large *P. alternifolium*

Result and Discussion



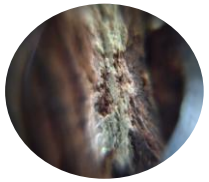
Graph 2 shows the diversity and evenness index of lichen on the small and large *P. alternifolium*

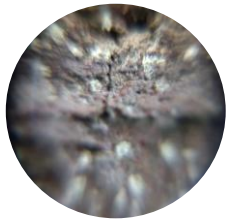
Conclusions

From the results, the relations between air quality and botanical characteristics of *P. alternifolium* effected on lichen diversity. The air quality, it was higher temperate and humid and the botanical characteristics of *P. alternifolium*, they had the larger size of the stem and more aerating root relate to higher diversity of lichens.

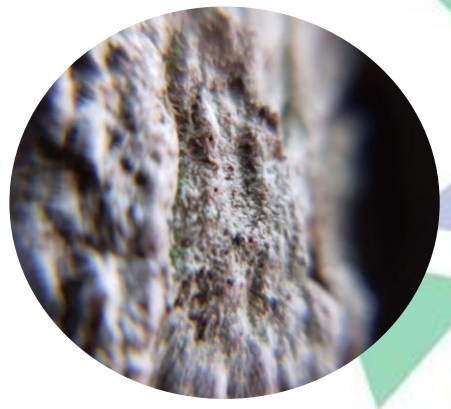
Recommendations

1. Study more about the percentage of gases in the air for the relating on lichen diversity.
2. Study more about chemical property of bark that relate with lichen diversity.
3. Study more plant that relate with lichen diversity.





Lichens on *Ploiarium alternifolium*



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