

ความแปรผันของกลุ่มไลเคนบนเปลือกของต้นก่อเดียวในป่าดิบเขาต่ำ ณ อุทยานแห่งชาติเขาใหญ่

VARIATION OF LICHEN COMMUNITIES ON BARKS OF *CASTANOPSIS ACUMINATISSIMA* IN THE LOWER MONTANE RAIN FOREST AT KHAO YAI NATIONAL PARK

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บทคัดย่อ: เขาเขียวเป็นภูเขาหนึ่งที่ตั้งอยู่ในอุทยานแห่งชาติเขาใหญ่ มีสภาพเป็น ป่าดิบเขาต่ำ มีอากาศเย็น และความชื้นค่อนข้างสูง มีไลเคนเติบโตหลายชนิด มีความเป็นไปได้สูงที่สิ่งมีชีวิตในระบบนิเวศนี้จะได้รับผลกระทบจากการเปลี่ยนแปลงภูมิอากาศ การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อสำรวจความสัมพันธ์ของชุมชนพืชไลเคนที่ชอบเปลือกไม้ที่เป็นกรดของต้นก่อเดียว ที่เติบโตอยู่ในป่าดิบเขาต่ำ ณ อุทยานแห่งชาติเขาใหญ่ โดยทำการเลือกต้นก่อเดียว ที่มีความสูงตั้งแต่ 15-25 เมตร จำนวน 5 ต้น วางควadrat ขนาด 60x20 ตารางเซนติเมตร ทางทิศตะวันออกของลำต้น วัดขอบเขตของแทลลัสที่อยู่ในควadrat และเก็บตัวอย่างไลเคนมาทำการศึกษาทางอนุกรมวิธานในห้องปฏิบัติการ ณ มหาวิทยาลัยรามคำแหง ส่วนการวัดสภาพความเป็นกรด-ด่างของเปลือกไม้ ทำโดยการเก็บตัวอย่างเปลือกไม้จากต้น ต้นละ 10 ตัวอย่าง ซึ่งพบว่ามีไลเคน 42ชนิด จาก 115 ตัวอย่าง ส่วน pH มีค่า 3.3-3.6 (ค่าเฉลี่ย 3.5) ไลเคนที่มีการแพร่กระจายสูงได้แก่ *Thelotrema colobicum*, *Dimerella* sp.1, *Phyllopsora soralifera* โดยมีความถี่ในการพบร้อยละ 7.8, 6.9 และ 6.9 ตามลำดับ ต้นที่ 1 และ 2 มีค่า pH 3.4 เท่ากัน มีไลเคนที่เหมือนกัน 8 ชนิด คิดเป็นร้อยละ 30.7 และพื้นที่ครอบคลุมที่เป็นไลเคนชนิดเดียวกันร้อยละ 32.7 ในต้นที่ 3 และ 4 มีค่า pH 3.3 และ 3.6 ไม่พบไลเคนที่เหมือนกัน แสดงว่าความแตกต่างของ pH เพียงเล็กน้อยอาจส่งผลต่อชุมชนพืชของไลเคน หรืออาจเกิดจากปัจจัยอื่นที่อยู่ นอกเหนือการศึกษาครั้งนี้ ซึ่งจะต้องทำการศึกษาต่อไป

Abstract: Khao Kheow one of the mountain peaks at Khao Yai National Park is a Lower montane rain forest. Has cold weather and high humidity. Several lichens inhabited in this forest. This type of ecosystem is vulnerable to climate change which possible extinction of some floras and faunas. The objective of this study was to find the variations of lichen communities on acid bark by using *Castanopsis acuminatissima* as host plant, the study was performed by selected five trees of the host plant, and placed quadrants size 60x20 cm² on the East facing sides of the tree trunks at the level of about 15-25 m above the ground. Covers of lichen were estimated by drawing outline of thalli on the transparent overlaying sheets. Lichen samples were collected and identified.

Determination of the bark pH was performed by collecting ten bark samples per tree for measurement at the laboratory of Ramkhamhaeng University (RU). Forty two species were identified from a total of 115 thalli grew in the five quadrants. Bark pH ranged from 3.3-3.6 (average 3.5). The three highest frequencies of occurrences were recorded from *Thelotrema colobicum*, *Dimerella* sp.1 and *Phyllopsora soralifera* accounting for 7.8, 6.9 and 6.9 percent respectively. Tree No.1 and 2 had the same pH of 3.4, by which eight lichens of the same species were identified. These lichens had 8 thalli cover similarity 30.7% and percent cover 32.7%. Tree No.3 and 4 had pH values of 3.3 and 3.6, of which lichens of the same taxa was not observed. This study reveals that slight variation of bark acidity seems to exert strong influence on corticolous lichen communities. However, other environmental factors which are beyond the scope of this study are important and need further study.

Introduction: Ecological communities of lichens are group of taxa that gather under similar environmental condition, which include both climate and substrate. Changes in these conditions affect lichen assemblage. Mountain ecosystem is threatened by increasing temperature as the consequences of global warming. Some flora and fauna in this type of ecosystem are vulnerable to climate change and are at risk of extinction (IPCC 2007). More than two hundred species of lichens are reported from the lower montane rain forest at Khao yai National Park (Lichen Research RU. 2004). However, the relationship of lichen communities on the host is not known. The objective of this study was to find variation of lichen communities on bark of *C. acuminatissima* which is one of the dominant trees at the lower montane rain forest of Khao Yai National Park. It is hypothesize that lichen communities on bark of *C. acuminatissima* are different because the substrate factor, pH, which were dominated by microclimatic factor of the site.

Methodology

Study area: Khao Kheow at Khao Yai National Park is located about 14° 22' 7.28" N and longitude 101° 24' 0.15" E, at altitude about 1200 meters. The average mean annual air temperature is 19.4-21.6 °C.

Host plant: Five trees of *C. acuminatissima* with average height of about 15-30 m. were selected. Tree No. 1 and 2 were in the same vicinity, which were about 6 m. far from road. Tree No. 3 was about 15 m. from road, whereas No. 4 and 5 were about 30 m. far from the parking lot of Pha Dieo Dai.

Bark pH: Ten samples from each tree at the area close to the quadrates were collected for measuring of bark pH. The standard solution of 0.25M KCl, pH 8.1 was sprayed on bark sample, and measurement of the pH were performed by using flat electrode of DENVER INSTRUMENT.

Lichen samplings: A quadrant of 60x20 cm² was placed on bark of each host tree on the east facing of the trunk. Outlines of all thalli presented in the quadrants were drawn,

and areas were determined by using AxioVision LE Rel. 4.1. All lichens were then collected for taxonomic identification at RU laboratory.

Ecological analysis: Similarity and cover of lichens between two trees were calculated and compared according to method of Jaccard and Sorensen (1980) as follow:

Formula of similarity:

A= total number of species in stand A

B= total number of species in stand B

C= total number of species in both stand A and stand B

Formula of cover percent

MA= total % cover of species in stand A

MB= total % cover of species in stand B

MC= total % cover of species in both stand A and stand B,
using the lower % cover figure for each species.

$$\frac{C}{A+B-C} \times 100$$

$$\frac{2 MC}{MA+MB} \times 100$$

Lichen diversity of status: Status of lichen on *C. acuminatissima* were categorized onto five classes, which were extremely rare, very rare, rare, common and very common.

Results, Discussion and Conclusion

Bark pH and distribution of epiphytic lichen communities: The results that indicated bark of *C. acuminatissima* in the LMF were acid, which the pH ranged from 3.3-3.6 (average 3.5). The highest number of lichen taxa, 22 species, was recorded from Tree No.1, which had pH 3.4. However, tree No. 2, which had the same acidity as tree No.1 hosted only 14 species. Tree No. 4 and 5 which had the same values of pH 3.6 supported 7 and 11 species respectively. Crustose were the dominant form of lichens found, of which *Thelotrema colobicum* was the most abundant. This species grew on wide ranges of barks pH from 3.3-3.6 (Table 1).

Other lichen found in this studies were *Anthacothecium* sp.1, *A.* sp.2, *Astrothelium eustomum*, *Bacidia* sp.1, *Cladonia* sp.1, *Cryptothecia* sp., *Dimerella* sp.2, *D.* sp.3, *D.* sp.4, *Glyphis* sp.1, *Graphina vestita*, *Graphis duplicate*, *G. rimulosa*, *G.* sp.1, *G. subassimilis*, *G.* unidentified.6, *Hypotrachyna chlorobarbatica*, *Lecanora* sp.1, *Lepraria* sp.1, *L.* sp.2, *Leproloma* sp.1, *L.* sp.2, *Myriotrema* unidentified 1, *Ocellularia arecae*, *O. monosporoides*, *O.* unidentified. 2, *Parmotrema elacinulatum*, *Parmelinopsis expallida*, *Phaeographis exaltata*, *Phaeographina* sp.2, *Thelotrema subhiatum*, Unknown crustose.

Table 1. List of top ten lichen species on *Castanopsis acuminatissima* in lower montane rain forest, bark pH level and distribution

Tree	1	2	3	4	5		
pH	3.4	3.4	3.3	3.6	3.6		
Lichen species	Thallus					Total	Average (% cover)
<i>Amandina</i> sp.1	3	-	-	2	-	5	4.3
<i>Arthopyrenia</i> sp.1	-	1	4	-	-	5	4.3
<i>Bacidia</i> sp.2	-	-	-	-	4	4	3.5
<i>Dimerella</i> sp.1	1	4	-	2	1	8	7
<i>Graphis supracola</i>	1	2	4	-	-	7	6.1
<i>Laurera meristosporiodes</i>	2	-	1	-	1	4	3.5
<i>Ocellularia meiosperma</i>	3	1	1	-	-	5	4.3
<i>Pertusaria</i> sp.1	6	-	-	-	-	6	5.2
<i>Thelothema colobicum</i>	1	-	6	-	2	9	7.8
<i>Phyllopsora soralifera</i>	6	2	-	-	-	8	7
Others	16	10	17	8	13	64	
Total species	22	14	10	7	11		
Total thallus	39	20	23	12	21	115	

Ecological analysis: The highest similarity of species composition was noted from tree No.1 and 2 composing of 30.7% resemble. These two trees had the same pH values of 3.4. Tree No. 3 and 4, having pH 3,3 and 3.6, had completely different in lichen taxa. However, tree No. 4 and 5, which had similar pH as the previous pair 3.6, had 10 % of similarity of species. These result indicated that bark pH is one of the factors that influence lichen communities (Table 2 and 3). However other environmental factors such as microclimate, which was influenced by light gaps of the canopies play an important role in forming the communities of lichens.

Table.2 Similarity percent of lichen

Tree	1	2	3	4	5
1	-	30.7	14.2	7.4	13.7
2		-	20.0	5.0	8.6
3			-	0	10.5
4				-	5.8
5					-

Table. 3 Cover percent of lichen

Tree	1	2	3	4	5
1	-	32.7	16.1	11.7	13.7
2		-	22.2	11.7	9.7
3			-	0	14.2
4				-	6.4
5					-

Status of lichens on *C. acuminatissima* were listed in Table. 4. It revealed that seventeen taxa or 40.5% of species were represent by only one thallus in the sampling process, and they were categorized as extremely rare. Fourteen species were very rare as two thalli were found, seven species were rare as 4-5 thalli were recorded and two species were common (6-7) thalli were found) and three species were very common, which represented by as many as 8-9 thalli (Table 4).

Table. 4 Status of lichen on *Castanopsis acuminatissima* in lower montane rain forest

Extremely rare (ER) 1 thallus		
<i>Anthacothecium</i> sp.2	<i>Astrothelium eustomum</i>	<i>Cladonia</i> sp.1
<i>Cryptothecia</i> sp.	<i>Graphina vestita</i>	<i>Graphis duplicate</i>
<i>Graphis</i> sp.1	<i>Graphis subassimilis</i>	<i>Hypotrachyna chlorobarbatica</i>
<i>Leproloma</i> sp.1	<i>Ocellularia monosporoides</i>	<i>Parmolinopsis expallida</i>
<i>Parmotrema elacinulatum</i>	<i>Phaeographis exaltata</i>	<i>Phaeographina</i> sp.2
<i>Thelotrema subhiatum</i>	Unknown crustose	
Very rare (VR) 2-3 thallus		
<i>Anthacothecium</i> sp.1	<i>Bacidia</i> sp.1	<i>Dimerella</i> sp.2
<i>Dimerella</i> sp.3	<i>Dimerella</i> sp.4	<i>Glyphis</i> sp.1
<i>Graphis rimulosa</i>	<i>Graphis</i> unidentified.6	<i>Lepraria</i> sp.1
<i>Lepraria</i> sp.2	<i>Leproloma</i> sp.2	<i>Myriotrema</i> unidentifide 1
<i>Ocellularia arecae</i>	<i>Ocellularia</i> unidentified. 2	
Rare (R) 4-5 thallus		
<i>Amandina</i> sp.1	<i>Arthopyrenia</i> sp.1	<i>Bacidia</i> sp.2
<i>Dimerella</i> sp.3	<i>Laurera meristosporiodes</i>	<i>Lecanora</i> sp.1
<i>Ocellularia meosperma</i>		
Common (C) 6-7 thallus		
<i>Graphis supracola</i>	<i>Pertusaria</i> sp.1	
Very common (VC) 8-9 thallus		
<i>Dimerella</i> sp.1	<i>Phyllopsora soralifera</i>	<i>Thelotrema colobicum</i>

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