H_H0026: BIODIVERSITY OF PELTIGERALIAN LICHEN IN MANGROVE FOREST OF TRAT AND CHANTHABURI PROVINCE

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Abstract: Lichen symbiosis in the Coccocarpiaceae, Collemataceae and Pannariaceae (order Peltigerales), that is the associate between fungal as mycobiont and cyanobacteria as photosynthetic partners. This study was investigated of Peltigeralian lichens throughout boundary area as mangrove forest in Trat and Chanthaburi province. One hundred and thirty-three specimens were identified into four genera and eleven species of *Coccocarpia adnata, C. dissecta, C. erythroxyli, C. pellita, Leptogium azureum, L. crispatellum, L. marginellum, Lepidocollema brisbanensis, L. mariana, L. nigrata* and *Physma byrsaeum*. The highest diversity was found on *Rhizophora apiculata* (35 %), *Excoecaria agallocha* (26%), *Rhizophora mucronata* (13%), *Heritiera littoralis* (12%), *Lumnitzera racemosa* (7%) and lesser on *Ceriops tagal* and *Sonneratia caseolaris* (2%), the lowest diversity was found on *Lumnitzera littorea, Sonneratia ovata* and *Hibiscus tilliaceus* (1%).

Introduction: Symbiosis, lichenization where a fungus utilizes algae or cyanobacteria as source of carbohydrates, is one of the most important ascomycete life strategies[1]. A comparatively small number of ascomycete lichen fungi[2] utilize cyanobacteria as photobionts. From previous study, the biodiversity of cyanolichens, Coccocarpiaceae (6 species), Collemataceae (13 species) and Pannariaceae (5 species) were made in inland as Khao Yai National Park[3], Phuteen Suan Sai National Park[4] and islands as Smarsarn island[5]. The junction area between inland and island as mangrove forest play an important data set for fill the gap of the whole lichen biodiversity in Thailand.

Methodology: The collections were collected from mangrove forest of Trat (Kho Kood and Koh Chang island) and Chanthaburi (Bang Sa Kao Subdistrict) province by pocketknife or hammer and chisel. Occasionally the thalli were sprayed with water to make them soft for easily removal from substrates. The samples include the margins of the thallus and fruiting body, if presented. The collected samples were wrapped by tissue papers and enclosed in paper envelopes, where information of the collection is primarily noted. All specimens were examined for their morphological and anatomical characteristics and chemistry as follow: Macroscopic examination, the morphology of the thallus including lobe size, rhizines, cilia, vegetative propagules (isidia, soredia, phyllidia and pustule), reproductive structure, color and surface texture were examined by using low magnification stereomicroscope. Microscopic examination, the anatomical characters of thallus including reproductive structure, apothecia and pycnidia were free-hand sectioned with the aid of razor blade. Investigation of the fine structures was performed under light microscope. Taxa were determined according to key.[6,7]

Results and Discussion: One hundred and thirty-three specimens were collected from mangrove forest of Trat and Chanthaburi province. The study had identified to 11 species and 4 genera (figure 1 and table 1) were including *Coccocarpia, Leptogium, Lepidocollema* and *Physma*. *Coccocarpia*, thallus foliose, firmly attached to substratum; lobes broadly cuneate, rhizine white at margin and black in the middle of thallus, peripheral all of lower surface[6]. *Leptogium*, foliose with homoiomerous thallus, gelatinous when moist, directly attached to substratum by lower surface[6]. *Lepidocollema*, the thallus was heteromerous, with an amyloid

apical ring structure and a lack of lichen substances in the thallus[7]. *Physma* was characterized by a leathery thallus with a dense upper pseudocortex and thick-walled ascospores with a markedly swollen epispore.[7]

The highest diversity was found on *Rhizophora apiculata* (35 %), *Excoecaria agallocha* (26%), *Rhizophora mucronata* (13%), *Heritiera littoralis* (12%), *Lumnitzera racemosa* (7%) and lesser on *Ceriops tagal* and *Sonneratia caseolaris* (2%), the lowest diversity was found on *Lumnitzera littorea*, *Sonneratia ovata* and *Hibiscus tilliaceus* (1%).

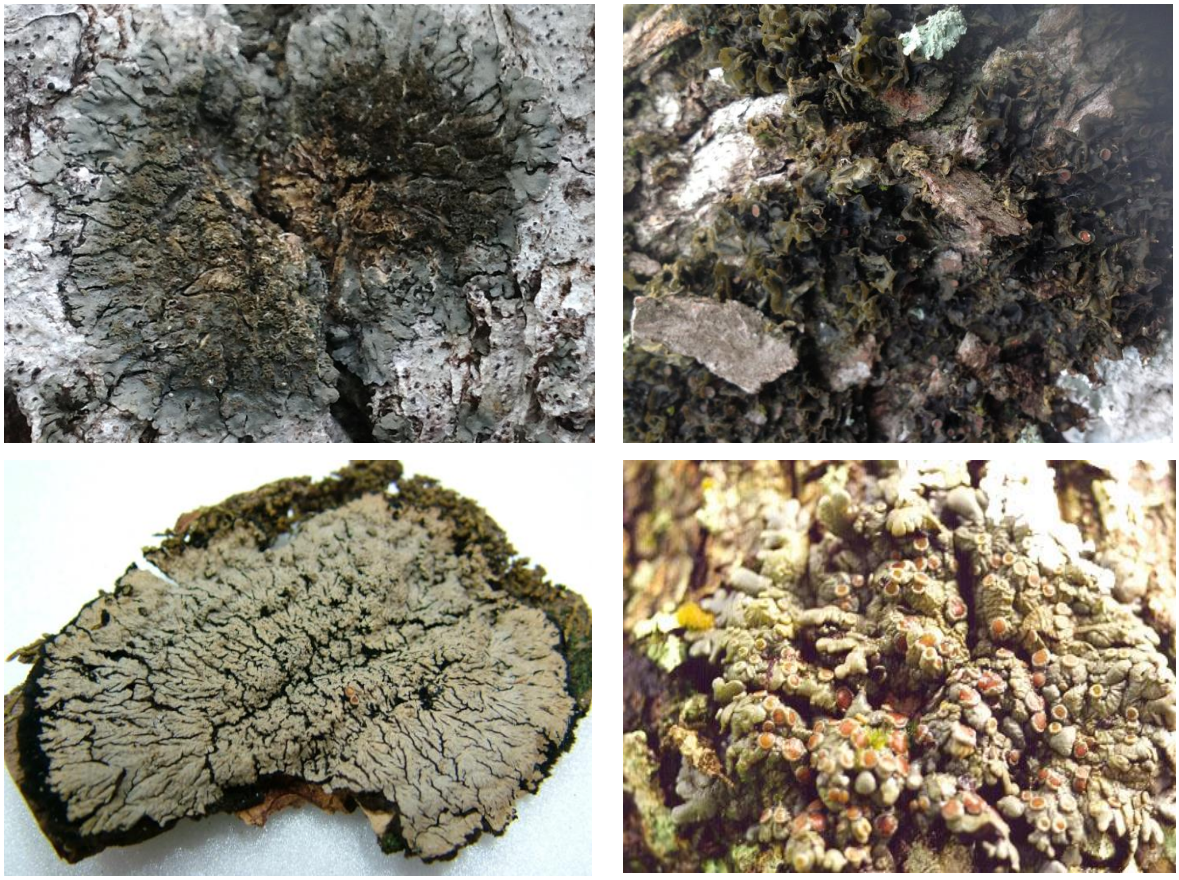

Figure 1. Examples of Peltigeralian lichen, *Coccocarpia* (up, left), *Leptogium* (up, right), *Lepidocollema* (down, left) and *Physma* (down, right).

Conclusion: Field observation of the lichen species belonging to the remote area as mangrove forest of Trat and Chanthaburi province. The biodiversity of Coccocarpiaceae, Collemataceae and Pannariaceae were the basic data in this area, which play an important role in the terrestrial nitrogen cycle of many ecosystems through the fixation of atmospheric nitrogen. They could be the bioindicator of environmental change in the future.

Table 1. Number of Peltigeralian lichen occurred on each plant in mangrove forest.

Lichen	Substrate									
	1	2	3	4	5	6	7	8	9	10
Coccocarpiaceae										
Coccocarpia adnata	11		1		1		1			
Coccocarpia dissecta	8		6	10	1	1	2			1
Coccocarpia erythroxyli	24		5					2	1	
Coccocarpia pellita	3		1		2					
Collemataceae										
Leptogium azureum	1	4								
Leptogium crispatellum		1				1				
Leptogium marginellum	2	4	5	3						
Pannariaceae										
Lepidocollema brisbanensis		1	2		1					
Lepidocollema mariana	4				1					
Lepidocollema nigrata		2			2					
Physma byrsaeum		14		3				1		
Total	53	26	20	16	8	2	3	3	1	1
Grand total	133									

Footnote 1=Rhizophora apiculata, 2=Excoecaria agallocha, 3=Rhizophora mucronata, 4=Heritiera littoralis, 5=Lumnitzera racemosa, 6=Lumnitzera littorea, 7=Ceriops tagal, 8=Sonneratia caseolaris, 9=Sonneratia ovata, 10=Hibiscus tilliaceus

References:

1. Tehler A, Wedin M. Lichen Biology. 2008:336-352.
2. Ahmadjian V. The Lichen Symbiosis 1993.
3. Buaruang N. Biodiversity of Foliose and Fruticose Lichens at Khao Yai National Park. 2002.
4. Wolseley PA, Moncrieff C, Aguirre-Hudson B. Catalogue of lichens of Thailand. Bull Nat Hist Mus Lond (Bot). 2002;32:13-59.
5. Boonpragob K, Buaruang K. Lichen on Samar Sarn Island. 2009.
6. Swinscow TDV, Krog H. Macrolichens of East Africa. 1988.
7. Ekman S, Wedin M, Lindblom L, Jørgensen PM. Lichenologist. 2014;46:627-656.

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