Lichen Species at 1.610-1.925 Masl in Inward Hiking Pathway of "Taman Wisata Alam Bukit Kaba" Bengkulu Province

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ABSTRACT

The study about lichen species at height of 1.610-1.925 m asl at inward hiking pathway of Taman Wisata Alam Bukit Kaba has been conducted in February-April 2015 in Taman Wisata Alam Bukit Kaba and Plant Biosistematical Laboratory of Mathematic and Science Faculty of University Bengkulu. The result shown, there were 36 lichen speciesbelonged to16 families (Parmeliaceae, Usneaceae, Graphidaceae, Cladoniaceae, Pertusariaceae, Stereocaulaceae, Lecanoraceae, Arthoniaceae, Peterjameceae, Cendalariaceae, Lecideaceae, Physciaceae, Caliciaceae, Ochrolechiaceae, Bilimbiaceae, and Phlyctidaceae), and 16 genera(*Parmelia, Usnea, Graphis, Cladonia, Pertusaria, Stereocaulon, Lecanora, Cryptothecia, Peterjamesia, Candelaria, Lecidoma, Buellia, Physcia, Ochrolechia, Bilimbia* and *Phlyctis*). Division (Ascomycota), class (Lecanoramycetes), order (Lecanorales). At this site was dominated by crustose lichens.

Key words: descriptive, explorative, identification, lichens

INTRODUCTION

Lichenes is a symbiotic association between a photosynthetic microorganism such as microalgae (as a photobiont) and a fungus such as Ascomycota and Basidiomycota as a micobiont; in which millions of photosynthetic cells are held in a mass of fungal hyphae (Campbell, 2003). From this symbiosis, lichens produce metabolites that is used by people as antibiotic, antifungal, antipyretic, anti-inflammatory, antivirus, etc.(Manojlovic, 2010). Lichens also have been used as a source of parfume industries, food source of Japanese and some other countries as well as food source for many mammals. More over, lichens was also have been successfully used as a polution indicator due to its unique body structures.

Lichens generaly can be found in terestrial ecosystems all over the world; mostly in pole and sub-pole ecosystem. It could be found from inland to highland, from coastal to the mountain, and forest ecosystems, it grow well at surface of stones/rocks, soil, plants bark, even glasses surface (Thomas, 2008).

Based on its substrate, lichens known as *saxicolous (*grow on the rock), *corticolous (*grow on the bark), and *terricolous* (grow on the land). Thallus form of lichens consist of four main forms, those are leaflike lichens (*foliose*), excrusting lichens (*crustose*), scale like lichens (*squamulose*), and shrublike lichens (*fruticose*) (Sharnoff, 2002).

Taman Wisata Alam Bukit Kaba (Kaba Hill Natural Park) with 13.490 hectares in wide is one of Bengkulu conservation area, posseses rich of nature sources and biodiveristies of animals and plants. Taman Wisata Alam Kaba Hill Natural Park located in Rejang Lebong District, Bengkulu Province (BKSDA, 2010).

Altitude as well as otherenvironment factors such astempature, light intensity, and moisture are crucial for lichens growth (Huang and Rai, 2014). The Hue environment of Kaba Hill inward hiking pathway, at the 1.610-1.925 m asl. Is a location that have less trees on it, as well as have no canopy, the sun light reach the forest's ground, occupied by many rocks stones. The particular lichens found at this area was dominated by *crustose lichens*. The hue environment at this site was quite different with that's of those altitude below its height.

Until right now, there is no written-data about lichens species found at this area. Therefore the research about lichen speciesat 1.610-1.925 m asl. height in inward hiking pathway Kaba Hill Nature Park Bengkulu Province has been conducted on February – April 2015.

MATERIALS AND METHODS

Sampling was conducted using explorative method. Every sample that was found in the field was noted its field datas such as the measure of abiotic factors like coordinate point, altitude, temperature, light intensity, and moisture. The samples was photographed and to be made a herbarium for identification need (Obemayer, 2002), and it was identified by some references (Nash, 2008; Lucking, 2009; Nimis, 2009; Rosentreter, 2007), Subsequently, identification processes was conducted by observing the form and color of thallus as well as the substrates of the lichens.

Datas of lichens structures and its habitat was analysed descriptively, and tabulated (Panjaitan, *et al*. 2011)

RESULT AND DISCUSSION

The research result of lichens species found at inward hiking pathway of Kaba Hill Nature Park, Bengkulu Province, it was found 36 specieses that grouped into 16 families and 16 genera. Lichen species, families, genera and its substrates was shown in the Table 1.

Table 1 shown lichen species that was found in Kaba Hill Nature Park at 1.610-1.925 m asl. at inward hiking pathway. It was found 36 species; they grouped into devision of Ascomycota, class Lecanoramycetes, order Lecanorales, 16 families, 16 genera. Lichens that were found possess different thallus types: foliose lichens, crustose lichens, fruticose lichens and squamulose lichens. Lichens which possess foliose thallus are those of genera *Parmelia* and *Physcia*, it has irregular form with thin leaflike thallus, usually big in size with grayish green up surface and chocolate down surface (Sharnoff, 2002). Meanwhile *Graphis*, *Lecanora*, *Cryptothecia*, *Peterjamesia*,

Usnea's thallus is *fruticose* lichen withshrub like thallus and possesses many branches like band, thallus grows upright or hanging out at tree branches (Sharnoff, 2002).

Cladonia's and *Stereocaulon's* thallus are *squamulose,*which has scalelike thallus, overlap each other and often possess fruit body structure as well as the substrat adhere in one side (Sharnoff, 2002).

Several lichens specieses possess different habitat, that is Corticolous, Saxicolous and Terricolous. The genera of *Parmelia, Usnea, Graphis, Pertusaria, Lecanora, Cryptothecia, Peterjamesia, Candelaria, Buellia, physcia,* and *Ochrolechia are corticolous;* theywere found inhabit trees bark. Fenera *Stereocaulon,* and *Bilimbia*are saxicolous; they were found at land surface. Genera of *Cladonia, Lecidoma, Phlytis*, are terricolous; they were found at rock surface.

Lichens found at the heigt of 1.610-1.925 m asl. was dominated by crustose type; those were 20 species which consisted of many families. Based on Fink (1961) *in*Pratiwi (2006), he mentioned thatthallus form, especially crustose, would be found in irregular form as well as several lichens possess thallus form that attend to circle-like but there are any given lichens which also possess irregular thallus. This irregular thallus form that believed can live in verious substrates like wood, decayed-wood, and rock.

From this research, lichens with crustose thallus can be found in various altitude with different temperature, moisture, and light intensity.This is because crustose lichens did not have difficult requirment to live. Based on Purvis (2014), crutose thallus type hasbroad tolerance or can survives in extremes environment, thus this type of lichens possess strong and fast adaptation ability such as in sulphur-poluted area.

Kaba Hill condition at altitude 1.610-1.700 m asl. is full of trees, whereas from 1.700-1.925 m asl. has less trees, and inhabited by fernsand rocks.This condition is considered to be the reason why at 1.610-1.925 m asscan be found much more crustose lichens (Lim, *dkk*., 2007).

The lichens that was found slightly in this research arefruticose thallus type lichens. As it shown at Table 1, fruticose thallus type lichens is only from*Usnea* species. Lichens from fruticose thallus type mostly grow well at bark, so this type of lichens just can be found in woody area which in this research is in altitude 1.610-1.700 m ass. This is why the distribution of this type of lichens is limitted.

From this facts, it is estimated that this is the reason why there are a lot of crutose lichens and just abit from fruticose lichens in altitude 1.610-1.925 m ass.

Table 1. Lichen species found at the height of 1.610-1.925 m aslat inward hiking Pathway of Kaba Hill Natural Park Bengkulu Province

Family	Genus	Species	Substrate
1	**2**	**3**	**4**
Bilimbiaceae	*Bilimbia*	*Bilimbia lobulata* (sommerf) Hafellner	Rock
Caliciaceae	*Buellia*	*Buellia punctata* Hoffm	Decayed wood
Cendalariaceae	*Candelaria*	*Candelaria* sp	Decayed wood
Cladoniaceae	*Cladonia*	*Cladonia subcervicornis* (vain).J Kernst	Land cleft
		Cladonia sp 1	Rock cleft
		Cladonia sp 2	Land surface
		Cladonia sp 3	Land surface
Arthoniaceae	*Cryptothecia*	*Cryptothecia striata* Nyl	Stem
		Cryptothecia sp 2	Thorny stem
		Cryptothecia sp 3	Tree stem
		Cryptothecia sp 4	Broken small branch
Graphidaceae	*Graphis*	*Graphis mexicana* (Hale) Lucking, Lumbsch & Kalb	Tree stem
		Graphis albotecta (Redinger) Staiger	Tree stem
		Graphis astrolirellata (Lucking)	Wood
		Graphis lineola (Ach)	Tree stem
		Graphis furcata (Fee)	Tree stem
1	2	3	4
Lecanoraceae	*Lecanora*	*Lecanora conizaeoides* Cromb	Tree stem
		Lecanora sp 1	Tree stem
Lecideaceae	*Lecidoma*	*Lecidoma demissum* (Rustr) Gotth	Land surface
Ochrolechiaceae	*Ochrolechia*	*Ochrolechia subviridis* (Hoeg) erichsen	Broken small branch
Parmeliaceae	*Parmelia*	*Parmelia perlata* (Dicks.) Stein	Broken small branch
		Parmelia aspera(De Not.) O.Blanco	Broken small branch
		Parmelia squarosa (L).J.St.hill	Broken small branch
		Parmelia carporrhizans (Taylor) Poelt and Vezda	Broken small branch
		Parmelia conspersa(Ehrh.ex.Ach) Ach Hale	Broken small branch
		Parmelia sp 7	Decayed wood
		Parmelia sp 8	Death small branch
		Parmelia sp 9	Tree stem
Peterjamesiaceae	*Peterjamesia*	*Peterjamesia circumscripta* (Taylor) D.Hawksw	Decayed wood
Pertusariaceae	*Pertusaria*	*Pertusaria multipuncta* (Turner) Nyl	Broken small branch
		Pertusaria amara (Tailor) D.Hawksw	Broken small branch
Phlyctidaceae	*Phlyctis*	*Phlyctis* sp	Rock
Physciaceae	*Physcia*	*Physcia stellaris* (L.) Nyl	Broken small branch
Stereocaulaceae	*Stereocaulon*	*Stereocaulon condensatum* (Hoffm)	Crack rock
Usneaceae	*Usnea*	*Usnea cornuta* (Korber)	Broken small branch
		Usnea hirta (L.) F. H. Wigg	Broken small branch

description: 1.Family 2.Genus 4. Species 5. Substrate

CONCLUSION

From the exploration of lichen species at inward hiking pathway of Taman Wisata Alam Bukit Kaba(Kaba Nature Park Hill) at altitude of 1.610-1.925 m asl., it could be concluded :

1. There are found 36 species lichens belonged to Ascomycota division, Lecanoramycetesclass, Lecanoralesorder, and 16 Families : Parmeliaceae, Usneaceae, Graphidaceae, Cladoniaceae, Pertusariaceae, Stereocaulaceae, Lecanoraceae, Arthoniaceae, Peterjameceae, Cendalariaceae, Lecideaceae, Physciaceae, Caliciaceae, Ochrolechiaceae, Bilimbiaceae, and Phlyctidaceae and 16 Genera.
2. The most thallus type found at the altitude of 1.610-1.925 m asl.is crustose and the slightly one is fruticose.

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Lichens species that founded in Taman Wisata Alam Bukit Kaba (Nature Park Kaba Hill) at 1.610-1925m asl)

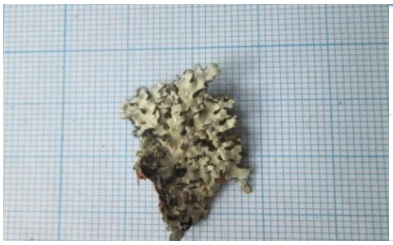

Fig.1. Parmelia squarosa (L).J.St.hill)

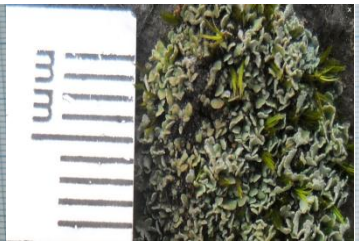

Fig. 2. Cladonia subcervicornis (vain).J Kernst

Fig. 3. Cryptothecia striata Nyl

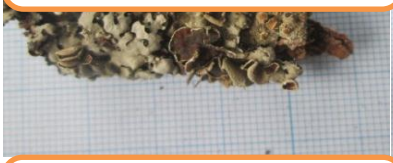

Fig. 4. Parmelia conspersa (Ehrh. Ex. Ach) Hale

Fig. 5. Usneahirta (L.) F. H. Wigg

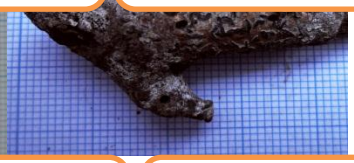

Fig. 6. Graphis lineola (Ach)