

ความหลากหลายทางชีวภาพของไลเคนวงศ์กราฟิดาซิดี ณ เขตรักษาพันธุ์สัตว์ป่าภูหลวง จังหวัดเลย  
**BIODIVERSITY OF THE LICHEN FAMILY GRAPHIDACEAE AT PHU LUANG WILDLIFE SANCTUARY, LOEI PROVINCE.**

วสันต์ เพ็งสูงเนิน<sup>1</sup>, พชร มงคลสุข<sup>1</sup>, ขจรศักดิ์ วงศ์ชีวะรัตน์, วินนาถ บัวเรือง<sup>1</sup> และ ชัยณรงค์ คูคดัม<sup>2</sup>

Vasun Poengsungnoen<sup>1</sup>, Pachara Mongkolsuk<sup>1</sup>, Kajohnsak Vongshewarat<sup>1</sup>, Kawinnat Buaruang<sup>1</sup> and Chainarong Doodurm<sup>2</sup>

<sup>1</sup>Lichen Research Unit, Department of Biology, Faculty of Science, Ramkhamhaeng University E-mail: vasun\_poeng@hotmail.com, Tel. (02) 3108410 # 132, Fax: 02 3108416

<sup>2</sup>Phu Luang Wildlife Sanctuary, Loei Province

**บทคัดย่อ:** ตัวอย่างไลเคนวงศ์กราฟิดาซิดี (Graphidaceae) ที่รวบรวมได้จำนวน 297 ตัวอย่าง ในเขตรักษาพันธุ์สัตว์ป่าภูหลวง จังหวัดเลย ระหว่างเดือนมิถุนายน 2551 ถึง พฤษภาคม 2552 จากหินและพรรณไม้ใน 7 ชนิดป่า ได้แก่ ป่าไม้พุ่ม ป่าสนเขา ป่าเต็งรัง ป่าดิบแล้ง ป่าดิบเขา ป่าเบญจพรรณ และป่าดิบชื้น จัดจำแนกตามหลักอนุกรมวิธานได้ 76 ชนิด 14 สกุล ได้แก่ *Carbacanthographis*, *Diorygma*, *Dyplolabia*, *Fissurina*, *Glyphis*, *Graphis*, *Hemithecium*, *Phaeographis*, *Platygramme*, *Platythecium*, *Sarcographa*, *Sarcographina*, *Thalloloma* และ *Thecaria* พบไลเคน 24 ชนิด ที่ไม่เคยมีรายงานในประเทศไทยมาก่อน และ 31 ชนิดคาดว่าเป็นชนิดใหม่ของโลก สกุลและชนิดที่พบได้เสมอคือ *Dyplolabia afzelii* และ *Sarcographa labyrinthica* และป่าไม้พุ่มเป็นป่าที่พบความหนาแน่นของไลเคนมากที่สุด

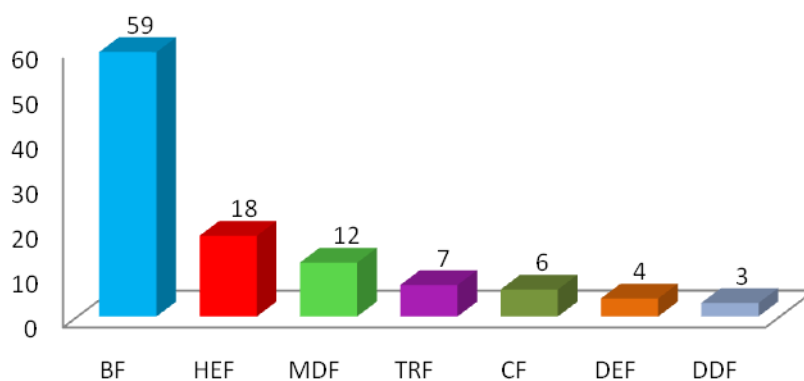
**Abstract:** The collecting samples of lichen family Graphidaceae 297 specimens from Phu Luang Wildlife Sanctuary Loei Province during June 2008 – May 2009 on rocks and plants from 7 forest types, bush forest, coniferous forest, dry dipterocarp forest, dry evergreen forest, hill evergreen forest, mixed deciduous forest and tropical rain forest, were identified in to 76 species 14 genera such as *Carbacanthographis*, *Diorygma*, *Dyplolabia*, *Glyphis*, *Graphis*, *Fissurina*, *Hemithecium*, *Phaeographis*, *Platygramme*, *Platythecium*, *Sarcographa*, *Sarcographina*, *Thalloloma* and *Thecaria*. Twenty-four species were described as a new record of Thailand and thirty-one species were expected to be new species of the world. *Dyplolabia afzelii*, and *Sarcographa labyrinthica* are common species. The high density of lichen taxa are in bush forest.

**Introduction:** Phu Luang Wildlife Sanctuary is situated in the North-East of Thailand, where consists of area about 897 square kilometers. There are 7 forest types with different temperatures and elevations which favor for diversity of animals and plants, ferns, mosses, liverworts and lichens. The Graphidaceae is crustose lichens, which occurred as symbiosis between fungi in ascomycota and green algae, *Trentepohlia*. They produce lirellate apothecia with usually containing parallel paraphyses and clavate asci, shot to long or radiate and varied color. This family is the largest group of the microlichen contains 918 species world wide (Kerk *et al.* 2001) which widely distribution mainly in tropical and

subtropical region. The purposes of this investigation are to survey, collect and identify graphidaceous tropical lichen samples from seven forest types.

**Methodology:** A total of 297 specimens of the Graphidaceae were prepared for herbarium preservation. Taxonomic identification performed prior to herbarium storage included examination of the lichen morphology and anatomical features under light microscope and stereomicroscopes. Taxa were determined according to Lücking *et. al.* (2009), Archer (2006), Kalb *et. al.* (2004), Staiger (2002) and Awasthi (1991). Chemistry of the thalli and lichen products were characterized by spot test and thin layer chromatography (TLC) according to White & Jame (1985).

**Results, Discussion and Conclusion:** The biodiversity and distribution of lichen family Graphidaceae explored at Phu Luang Wildlife Sanctuary during June 2008 – May 2009. They consisted of 14 genera 76 species from 297 specimens of seven forest type. Seven genera and twenty four species were new record of Thailand. Seven genera and thirty-one taxa were expecting to be new species of the world (Table 1). The great density of lichen taxa found in genus *Graphis* 28 species and in genus *Phaeographis* 19 species of bush forest, hill evergreen forest, mixed deciduous forest, coniferous forest and dry evergreen forest. The highest diversity was found in bush forest 59 species. Because of the high elevation 1400-1600 meters above sea level, light intensity and different kind of plant are suitable for lichens growth. The lesser diversity was found in hill evergreen forest and mixed deciduous forest 18 and 12 species. The lower diversity was in tropical rain forest, coniferous forest, dry evergreen forest and dry dipterocarp forest of 7, 6, 4 and 3 species respectively (Fig. 1). The common taxa, *Dyplolabia afzelii* and *Sarcographa labyrintheca* (Fig. 2). were almost found in seven forest types.



**Fig. 1** Number of graphidaceous lichen taxa that found in bush forest (BF), coniferous forest (CF), dry dipterocarp forest (DDF), dry evergreen forest (DEF), hill evergreen forest (HEF), mixed deciduous forest (MDF) and tropical rain forest (TRF) at Phu Luang Wildlife Sanctuary.

**Table 1** Number of specimens and lichens species in each forest type at Phu Luang Wildlife Sanctuary

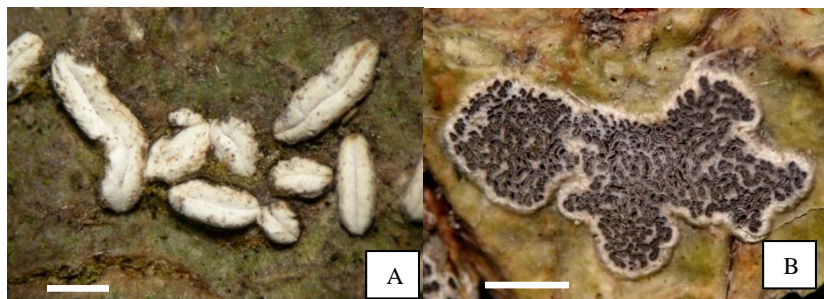
Species	Forest type (number of specimens)							Total
	BF	HEF	MDF	CF	TRF	DEF	DDF	
<i>Carbacanthographis candida</i>	+10	+2	-	+2	-	-	-	14
<i>Carbacanthographis marcescens</i> *	+1	+1	-	-	-	-	-	2
<i>Diorygma epiglaucum</i> *	+1	-	-	-	-	-	-	1
<i>Diorygma monophorum</i> *	+17	-	-	-	-	-	-	17
<i>Diorygma reniforme</i>	+6	-	-	-	-	-	-	6
<i>Diorygma</i> PL. 1**	-	-	-	+1	-	-	-	1
<i>Dyplolabia afzelii</i>	+4	+5	+1	-	+3	+3	+3	19
<i>Fissurina cingalina</i> *	+3	-	-	-	-	-	-	3
<i>Fissurina</i> PL. 1**	+1	-	-	-	-	-	-	1
<i>Fissurina</i> PL. 2**	+3	-	-	-	-	-	-	3
<i>Fissurina</i> PL. 3**	-	-	-	+1	-	-	-	1
<i>Glyphis cicatricosa</i>	-	+2	-	-	-	-	-	2
<i>Graphis acharii</i> *	-	-	+1	-	-	-	-	1
<i>Graphis albissima</i> *	-	-	+2	-	-	-	-	2
<i>Graphis anfractuosa</i> *	+2	-	-	-	-	-	-	2
<i>Graphis emersa</i>	+3	-	-	-	-	-	-	3
<i>Graphis dendrogramma</i> *	-	-	-	-	-	+2	-	2
<i>Graphis desquamescens</i> *	-	-	-	-	-	+1	-	1
<i>Graphis flavens</i> *	+1	-	-	-	-	-	-	1
<i>Graphis insulana</i> *	-	+3	-	-	-	-	-	3
<i>Graphis leucoparypha</i> *	+1	-	-	-	-	-	-	1
<i>Graphis librata</i> *	-	+2	-	-	-	-	-	2
<i>Graphis oxyclada</i> *	-	-	+1	-	-	-	-	1
<i>Graphis pavoniana</i>	-	-	-	+1	-	-	-	1
<i>Graphis proserpens</i> *	-	-	+1	-	-	-	-	1
<i>Graphis rimulosa</i>	+1	+1	-	-	-	-	-	2
<i>Graphis rockii</i> *	+1	-	-	-	-	-	-	1
<i>Graphis rustica</i> *	+14	-	-	-	-	-	-	14
<i>Graphis stenotera</i> *	+2	-	-	-	-	-	-	2
<i>Graphis streblocarpa</i> *	+2	+1	+1	-	-	-	+1	5
<i>Graphis striatula</i>	+1	-	-	-	-	-	-	1
<i>Graphis verminosa</i> *	+5	-	-	-	-	-	-	5
<i>Graphis</i> PL. 1**	+5	-	-	-	-	-	-	5
<i>Graphis</i> PL. 2**	+1	-	-	-	-	-	-	1
<i>Graphis</i> PL. 3**	+1	-	-	-	-	-	-	1
<i>Graphis</i> PL. 4**	+7	+2	-	-	-	-	-	9
<i>Graphis</i> PL. 5**	+1	-	-	-	-	-	-	1
<i>Graphis</i> PL. 6**	+1	-	-	-	-	-	-	1
<i>Graphis</i> PL. 7**	+2	-	-	-	-	-	-	2
<i>Graphis</i> PL. 8**	+1	-	-	-	-	-	-	1
<i>Hemithecium chlorocarpoides</i>	+1	+2	-	+4	-	-	-	7
<i>Hemithecium chrysenderon</i>	+4	-	+1	-	+1	-	+2	8
<i>Hemithecium implicatum</i> *	-	-	+2	-	-	-	-	2
<i>Hemithecium</i> PL. 1**	+2	-	-	-	-	-	-	2
<i>Phaeographis brasiliensis</i>	+6	+1	-	-	-	-	-	7
<i>Phaeographis dendritica</i>	+3	-	-	-	-	-	-	3
<i>Phaeographis dendroides</i>	+2	-	-	-	-	-	-	2
<i>Phaeographis intricans</i>	+13	-	-	-	-	-	-	13
<i>Phaeographis leightonii</i> *	+2	-	-	-	-	-	-	2
<i>Phaeographis platycarpa</i> *	+11	-	-	-	-	-	-	11
<i>Phaeographis</i> PL. 1**	+1	-	-	-	-	-	-	1
<i>Phaeographis</i> PL. 2**	+4	-	-	-	-	-	-	4
<i>Phaeographis</i> PL. 3**	+1	-	-	-	-	-	-	1
<i>Phaeographis</i> PL. 4**	+3	-	-	-	-	-	-	3
<i>Phaeographis</i> PL. 5**	+1	-	-	-	-	-	-	1

**Table 1** Number of specimens and lichens species in each forest type at Phu Luang Wildlife Sanctuary (continued).

Species	Forest type (number of specimens)							Total
	BF	HEF	MDF	CF	TRF	DEF	DDF	
<i>Phaeographis</i> PL. 6**	+4	-	-	-	-	-	-	4
<i>Phaeographis</i> PL. 7**	+15	-	-	-	-	-	-	15
<i>Phaeographis</i> PL. 8**	+2	-	-	-	-	-	-	2
<i>Phaeographis</i> PL. 9**	+4	-	-	-	-	-	-	4
<i>Phaeographis</i> PL. 10**	+1	-	-	-	-	-	-	1
<i>Phaeographis</i> PL. 11**	+1	-	-	-	-	-	-	1
<i>Phaeographis</i> PL. 12**	+3	-	-	-	-	-	-	3
<i>Phaeographis</i> PL. 13**	+2	-	-	-	-	-	-	2
<i>Platygramme caesiopruinosa</i>	-	+1	-	-	+1	-	-	2
<i>Platygramme pudica</i>	+3	+1	-	-	+2	-	-	6
<i>Platythecium</i> PL. 1**	-	+1	-	-	-	-	-	1
<i>Platythecium</i> PL. 2**	+1	-	-	-	-	-	-	1
<i>Sarcographa labyrinthica</i>	+9	-	+3	-	+2	+2	-	16
<i>Sarcographa verrucosa</i>	+4	+1	-	-	+1	-	-	6
<i>Sarcographina glyphiza</i>	-	+5	+1	-	-	-	-	6
<i>Thalloloma cf. janeirensis</i> *	+1	-	-	-	-	-	-	1
<i>Thalloloma</i> PL. 1**	+1	-	-	-	-	-	-	1
<i>Thalloloma</i> PL. 2**	+1	-	-	-	-	-	-	1
<i>Thalloloma</i> PL. 3**	+2	-	-	-	-	-	-	2
<i>Thecaria montagnei</i>	-	+1	+1	+4	+1	-	-	7
<i>Thecaria quassaecola</i>	+2	+2	+2	-	-	-	-	6
<b>Total</b>	<b>208</b>	<b>34</b>	<b>17</b>	<b>13</b>	<b>12</b>	<b>8</b>	<b>6</b>	<b>297</b>

\* = species were described as a new record of Thailand.

\*\* = species were expected to be new species of the world.



**Fig. 2** The common species., (A) *Dyplolabia afzelii* and (B) *Sarcographa labyrinthica* general found in nearly all of forest types. scale = 1 mm

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**Keywords:** Graphidaceae, common species, biodiversity, new record