



## Diversity and Conservation of Orchids Along the Ecological Tourism Route of Lum-Nam Nan and Klongtron National Park, Uttaradit

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### Abstract

Taxonomic survey of Thai wild orchids was performed at along the ecological tourism route of Lum-Nam Nan National Park and Klongtron National Park and to conserve orchids by culturing onto a suitable synthetic medium composed of local materials. A survey of orchids along the area of five meters around the ecological tourism route in a distance of about 21 kilometers was made from December 2005 to February 2009. The taxa of orchids found in this National Park were terrestrial, epiphytic and lithophytic orchids. They belonged to 5 subfamilies, 25 genera and 68 species and could be classified into Cyripedioideae 1 genus 1 species, Neottioideae 1 genus 1 species, Orchidoideae 1 genus 2 species, Epidendroideae 11 genera 49 species and Vandoideae 10 genera 15 species. They were grown at 1,100-1,400 meters above mean sea level. The length of stems and the number of shoots of *D. formosum* Roxb.ex Lindl. grown in the formula 3 medium (0.15%(w/v) fertilizer 21-21-21, 0.15% (v/v) vitamin B complex, 7.5% (w/v) Banana puree and adjust pH 5 by 15% (v/v) Pineapple juice). Experiments were statistically significant difference which it was higher than others treatments including Vaccine and Went. The conservation of 7 orchids were performed by bringing three years old grown orchids from seeds culturing back along the ecological tourism route of the National Park by pilot tourists and community organizing in the Park.

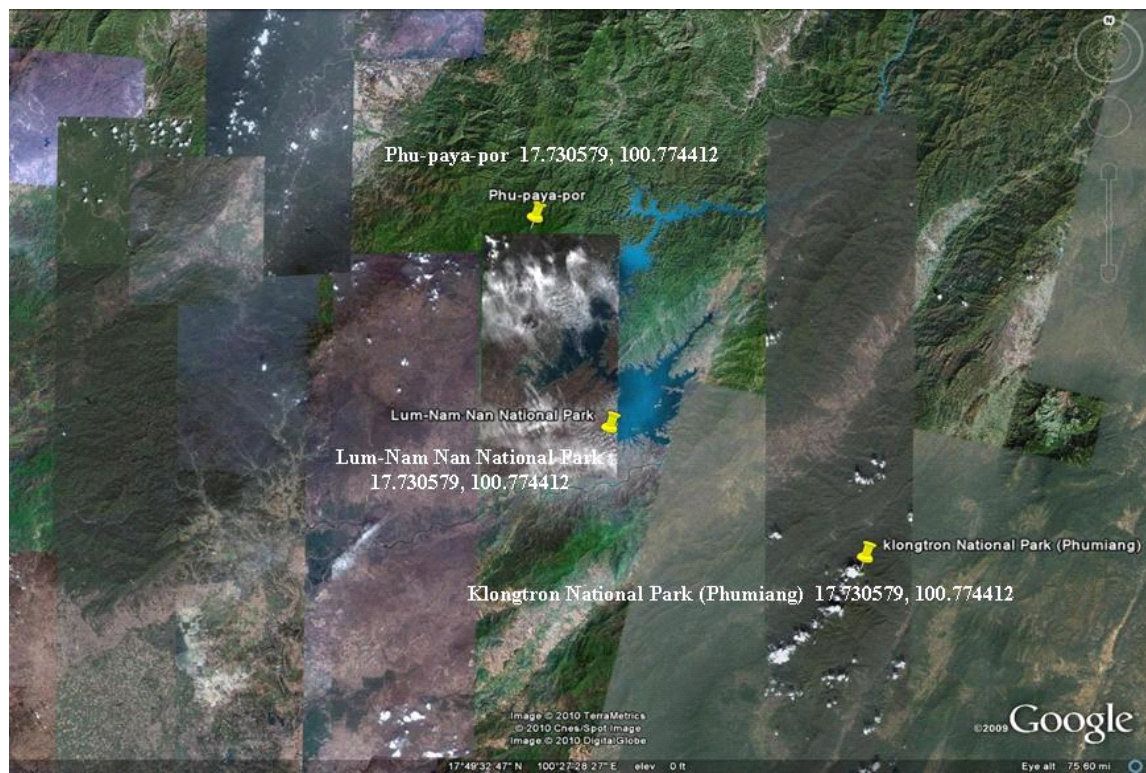
**Keywords:** Diversity/Conservation of Orchids, Lum-Num-Nan, Klong-tron National Park

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### INTRODUCTION

Orchids are the cash flowers producing annual incomes of 2,600 million bath for Thailand (Tammasiri, 2004). Orchids are interesting flowers with various colours, smells and shapes. There were about 35,000 species in the world (Dressler, 1981). According to the orchids survey in 2001 by Thai and Danish taxonomists, there were 1,125 species of wild orchids which belong to 117 genera in Thailand. It found in every province. Northern Thai region comprises 437 species and 385 in the South but only 52 in the central part. A great deal of deforestation causes the lower amount of orchids to the critical point of Thailand (Thaitong, 1999). Lum Nam Nan National Park (Fig.1) was ranked 87<sup>th</sup> in 1999. It consists of a variety of forest types such as deciduous dipterocarp forest, mixed deciduous forest, hill evergreen forest, tropical evergreen forest and savanna forest (Fig.2) thick and sparse forests covering complicated mountainous areas of Muang district of Phrae and Tapla, Nampad of Uttaradit. The height of the mountains ranged 400 - 1,200 meters above mean sea level (AMSL.),

and the heighest one is Phu-Phaya-Por which is the original water source of many waterways in both Phrae and Uttaradit (Lum Nam Nan National Park, 2007). In 2004, Klong Tron National Park was ranked 103<sup>rd</sup>. It is located in Uttaradit containing thick forest with natural outstanding of 1,500 meters AMSL. Cliff of Phu-Mieng (Klong-Tron National Park, 2007). Because these two National Parks are fairly new and from the documentation reviewed so far, there were no reports on the survey and classification of orchids in this area. At present, this park has been opened to the public, and people have used this Park for sightseeing and for making use of forest products. Transaction of wild orchids from National Park is one of the methods that could reduce the number and type of orchid species in the park. Therefore, to conserve orchids was to culture the seeds of orchids found in a suitable synthetic medium using local materials. It is necessary to study the diversity and conservation of orchids performed by bringing three years old orchids from seeds culturing back along the ecological tourism route of the National Park by pilot tourists and community organizing in the Park.



**Figure 1** (a) The map of Lum Nam Nan and Klong Tron National Park  
(b) The position of Phu-paya-por in Lum Nam Nan and Phumiang in Klong - Tron National Park at Uttaradit



Figure 2 Forest Types in National Park at Uttaradit

### Materials and Methods

The methodology to survey the diversity of orchids along the ecological tourism route covering 21 kilometres long and 5 meters wide. The characteristic of the orchids were recorded in details as stems, leaves and flowers. Photographing, number tagging and positioning location by GPS was also recorded. To identify the orchid species, the flowers of orchids found were compared with the photographs of Thai orchids that had been identified (Thaithong, 2003) and the dichotomous key along the subfamily of Dressler, 1981 were used to define the orchids in genera (Seidentaden, 1975 a,b,c., 1976a., 1977a., 1978a,b., 1979).

The method to conserve orchids was to culture the seeds of orchids found in a suitable synthetic medium using local materials. The formula for suitable synthetic medium from local materials was figured out from the ingredients and amount as in 0.15–0.2% (w/v) fertilizer formulas 21–21–21, 0.15–0.2% (v/v) Vitamin B complex, 15% (v/v) Sweet potato juice, 7.5% (w/v) Banana puree (*Musa sapientum* Linn.), 15% (v/v) Coconut juice, 3–3.3% (w/v) Sucrose and 0.65% (w/v) Agar, adjust pH 5 by 15% (v/v) Pineapple juice up totally to 6 formulas by varies concentration of 0.15% and 0.2% (w/v) fertilizer, 0.15% and 0.2% (v/v) Vitamin B complex, and 3% and 3.3% (w/v) Sucrose. The growth

and number of orchid shoots cultured in the suitable synthetic medium were compared with those of the Vaccine and Went medium. The growth and shoot number were measured on the 6<sup>th</sup> week. The growth comparison of each treatment was statistically analyzed using the Duncan's multiple rang test. The conservation of orchids performed by bringing three years old orchids from seeds culturing back along the ecological tourism route of the National Park by pilot tourists and community organizing in the Park.

### Results and Discussion

The orchid diversity along the ecological tourism route consists of terrestrial, epiphytic and lithophytic orchids. They belong to 5 subfamilies, 25 genera and 68 species and could be classified into **Cypripedioideae** 1 genus 1 species., **Neottioideae** 1genus 1 specie., **Orchidoideae** 1 genus 2 species., **Epidendroideae** 12 generas 49 species and **Vandoideae** 10 genera, 15 species (Table 1, Fig.3). The reason that several types of environment in the National Park affected the niche of orchid found which were terrestrial, epiphytic and lithophytic orchid. The terrestrial orchids were found at 627–767 meters above mean sea level. The epiphytic orchids were found at 627–1,564 meters above mean sea level. The lithophytic orchid were found at 1,089 –1,181 meters above mean sea level. Due

to the variety of forest types at National Park, orchids were found in 68 species and each species found was in high numbers.

The reason that orchids around here had a high diversity was because of high moisture levels due to 8 waterfalls in the area and the intensity of light was most suitable for the growth and development of these orchids (Chakrit, 1959). They grew mostly on the cliff at 1,100–1,400 meters above mean sea level (AMSL). (Fig.4)

The shoot numbers and high of orchids on the suitable synthetic medium showed that the height of orchid treatment formula 3 were statistically different higher than (*D. formosum* Roxb.ex Lindl.) the other treatments including Vaccine and Went (Table 2). The reason that medium treatment formulas 3 compared to the growth of other treatments including Vaccine and

Went which was due to the lesser amount of sugar, fertilizer and vitamin B complex. It was assumed that this concentration was suitable for the growth of wild orchids from this area. This result corresponded to the finding of Coffin (Coffin *et al.*, 1976) who said that the sugar concentration was from 20–60 g/l, vitamin B<sub>1</sub>, vitamin B<sub>2</sub> and vitamin B<sub>3</sub>, were in the range from 0.1–5 mg/l and vitamin B<sub>5</sub> was in the range of 0.1–2.5 mg/l. (Trigiano & Gray, 2000)

To conserve the orchid germ lines, orchid pods of *D. primulinum* Lindl., *B. morphologorum* Krzl., *Eulophia spectabilis* (Dennst.) Suresh., *D. draconis* Rchb.f., *C. lactea* Rchb.f., *C. cumingii* Lindl. and *D. formosum* Roxb. ex Lindl., that grew on the formula 3 synthetic medium treatment were brought back along the ecological tourism route of National Park by pilot tourists and community organizing in the Park (Fig. 5).

**Table I** Name list of orchids in National Park.

Orchid	Habitat	Flowering periods
<b>Subfamily : Cypripedioideae</b>	Mixed deciduous forest	The hole year
<i>Paphiopedilum concolor</i> (Lindl.) Pfitzer.		
<b>Subfamily : Neottioideae</b>		
<i>Nervilia crocifermis</i> (Zoll. & Mor.) Seidenf.	Dry evergreen forest	May–June
<b>Subfamily : Orchidoideae</b>		
<i>Habenaria thallandica</i> Seidenf.	Evergreen forest	May–June
<i>H. dentata</i> (Sw.) Schltr.	Evergreen forest	August–October
<b>Subfamily : Epidendroideae</b>		
<i>Bulbophyllum intricatum</i> Seidenf.	Evergreen forest	October–November
<i>B. siamense</i> Rchb. f.	Evergreen forest	November–December
<i>B. morphologorum</i> Krzl.	Dry evergreen forest	January–May
<i>B. wallichii</i> Rchb. f.	Dry evergreen forest	January– February
<i>B. tripaleum</i> Seidenf.	Evergreen forest	October–November
<i>B. blepharites</i> Rchb. f.	Mixed deciduous forest	September–October
<i>B. reclusum</i> Seidenf.	Evergreen forest	September–October
<i>B. khasyanum</i> Griff.	Dry evergreen forest	December
<i>B. bittenerianum</i> Schltr.	Evergreen forest	July– August
<i>B. microtepalum</i> Rchb. f.	Hill evergreen forest	November– January
<i>Coelogyne brachyptera</i> Rchb. f.	Evergreen forest	March–April
<i>C. trinervis</i> Lindl.	Dry evergreen forest	September–November
<i>C. lactea</i> Rchb. f.	Dry dipterocarb forest	February– March
<i>C. cumingii</i> Lindl.	Dry dipterocarb forest	May–June
<i>C. viscosa</i> Rchb. f.	Dry evergreen forest	December–January
<i>C. nitida</i> (Wall.mss.) Lindl.	Hill evergreen forest	May–June
<i>C. fuscescens</i> var. <i>brunnea</i> (Lindl.)	Dipterocarb forest	September–October

Table I (continuous)

Orchid	Habitat	Flowering periods
<i>C. schilleriana</i> Rchb. f.	Evergreen forest	December– March
<i>D. Dendrobium aphyllum</i> (Roxb.) Fischer	Dry evergreen forest	March– April
<i>D. chrysotoxum</i> Lindl.	Dry evergreen forest	March– April
<i>C. devonianum</i> Paxt.	Dry evergreen forest	March– July
<i>D. draconis</i> Rchb. f.	Mixed deciduous forest	March– April
<i>D. finlayanum</i> Par. & Rchb. f.	Dry evergreen forest	January – March
<i>D. infundibulum</i> Lindl.	Dry evergreen forest	June– August
<i>D. lindleyi</i> Steud.	Dry evergreen forest	February– April
<i>D. palpebrae</i> Lindl.	Mixed deciduous and Dry evergreen forest	February–March
<i>D. thysiflorum</i> Rchb. f.	Evergreen forest	January– March
<i>D. delacouril</i> Guill.	Mixed deciduous and Dry evergreen forest	May– June
<i>D. primulinum</i> Lindl.	Mixed deciduous and evergreen forest	March– April
<i>D. cariniferum</i> Rchb. f.	Evergreen forest	March–June
<i>D. puchellum</i> Roxb. ex Lindl.	Mixed deciduous and Dry evergreen forest	February–April
<i>D. ellipsophyllum</i> Tang & Wang	Dry evergreen forest	June– August
<i>Drymoda siamensis</i> Schltr.	Dry evergreen forest	February–March
<i>Eria pannea</i> Lindl.	Dry evergreen forest	February–March
<i>E. amica</i> Rchb. f.	Dry evergreen forest	February
<i>E. bractescens</i> Lindl.	Dry evergreen forest	November
<i>Liparis regnieri</i> Finet.	Evergreen forest	June– August
<i>L. sutepensis</i> Rolfe ex Downie.	Evergreen forest	June– July
<i>Malaxis acuminata</i> D. Don.	Evergreen forest	June– August
<i>M. latifolia</i> J. E. Sn.	Evergreen forest	June– August
<i>Oberonia acaulis</i> Griff.	Evergreen forest	July– September
<i>Phaius tankervilleae</i> Blume.	Evergreen forest	January – March
<i>Pholidota articulata</i> Lindl.	Evergreen forest	March– June
<i>P. recurva</i> Lindl.	Evergreen forest	September – October
<i>P. imbricate</i> Hook.	Evergreen forest	October
<i>Porpax ustulata</i> Rolfe.	Evergreen forest	July– August
<i>P. elwesii</i> (Rchb. f.) Rolfe.	Evergreen forest	September – October
<i>Thunia alba</i> (Lindl.) Rchb. f.	Evergreen forest	May– June

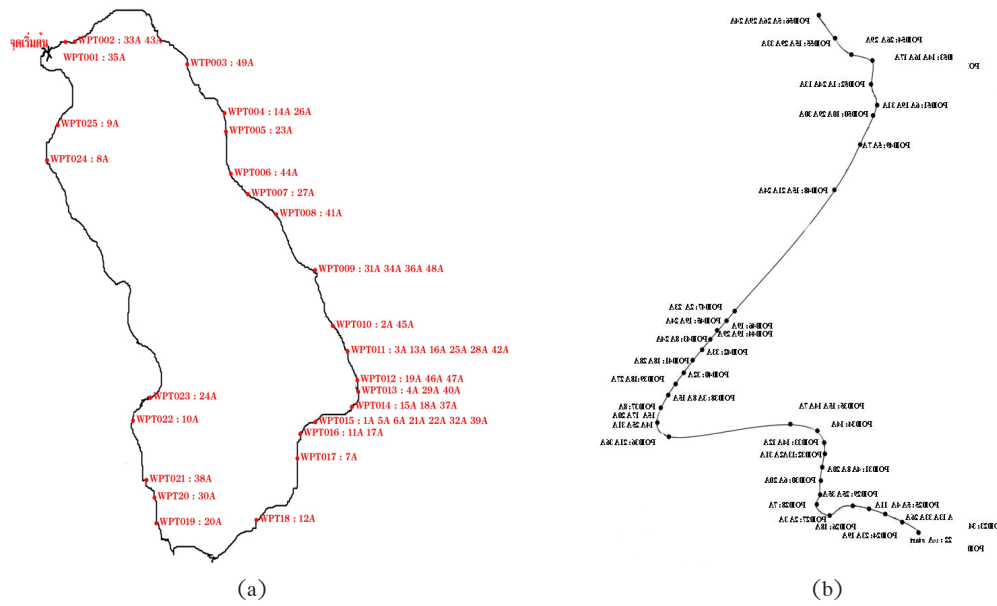
Table I (continuous)

Orchid	Habitat	Flowering periods
<b>Subfamily : Vandoideae</b>		
<i>Aerides falcata</i> Lindl.	Evergreen forest	March – April
<i>A. odorata</i> Lour.	Evergreen forest	March – April
<i>A. multiflora</i> Roxb.	Mixed deciduous and Dry evergreen forest	March – April
<i>A. crassifolia</i> Parish ex Burbidge.	Mixed deciduous and Dry evergreen forest	March – April
<i>Cleisostoma simondii</i> (Gagnep.) Seidenf.	Mixed deciduous and Dry evergreen forest	March – June
<i>Cymbidium bicolor</i> Lindl.	Mixed deciduous forest	March – April
<i>Eulophia spectabilis</i> (Dennst.) Suresh.	Mixed deciduous forest	March – June
<i>E.macrobulbon</i> (Par. & Rchb.f.) Hook.f.	Mixed deciduous forest	February– March
<i>Gastrochilus bigibbus</i> (Rchb.f. ex Hook.f.) Kze.	Dry evergreen forest	February– March
<i>Luisia thailandican.</i> Seidenf.	Mixed deciduous forest	March – April
<i>Ornithochilus difformis</i> (Will. ex Lindl.) Schltr.	Dry evergreen forest	April–July
<i>Rhynchostylis coelestris</i> Rchb. f.	Dry evergreen forest	April–July
<i>R. retusa</i> (L.) Blume.	Dry evergreen forest	April–July
<i>Robiquetia succisa</i> Lindl.	Dry evergreen forest	April–July
<i>Thrixspermum acuminatissimum</i> (Blume) Rchb. f.	Hill evergreen forest	September – October



Figure 3 Some orchids in National Park at Uttaradit.

(a) *Bulbophyllum tripaleum* Seiden f. (b) *Dendrobium senile* Par. & Rchb. f. (c) *Gastrochilus bigibbus* Rchb.f. ex Hook.f. (d) *Drymoda siamensis* Schltr. (e) *Propax ustulata* (Par. & Rchb.f.) Rolfe. (f) *Propax elwesii* (Rchb.f.) Rolfe (g) *Eria bractescens* Lindl.(h) *B. bittenerianum* Schltr. (i) *Rhynchostylis retusa* (L.) Blume (j) *Coelogyne fuscescens* var. *brunnea* (Lindl.) (k) *B. siamense* Rchb.f. and (l) *B. khasyanum* Griff.



**Figure 4** Number tagging and positioning location by GPS  
 (a) Klong-tron and (b) Lum Nam Nan National Park

**Table II** Shoot number and height of some orchids grown in each treatment

Treatment	<i>D. primulinum</i> Lindl.		<i>B. morphologorum</i> F.Kranzl.		<i>Eulophia spectabilis</i> (Dennst.) Suresh.		<i>D. dracoris</i> Rchb.f.	
	shoot	high	shoot	high	shoot	high	shoot	high
1	1.67±0.35	0.48±0.20	2.33±0.25	0.56±0.58	3.17±0.58	0.46±0.09	2.37±0.45	0.45±0.24
2	0.83±0.34	0.42±0.13	3.17±0.50	0.56±0.50	2.80±0.53	0.37±0.07	2.33±0.53	0.53±0.30
3	1.92±0.63	0.23±0.07	3.33±0.48	0.41±0.26	3.67±0.37	0.55±0.08	2.43±0.55	0.51±0.43
4	1.42±0.60	0.50±0.05	2.33±0.45	0.48±0.19	3.42±0.35	0.43±0.05	2.17±0.33	0.43±0.16
5	0.83±0.34	0.25±0.07	2.17±0.23	0.56±0.10	3.42±0.17	0.48±0.06	2.08±0.31	0.51±0.17
VW	0.67±0.18	0.25±0.31	2.00±0.53	0.58±0.43	2.83±0.20	0.44±0.17	1.17±0.26	0.36±0.25

**Table II** (continuous)

Treatment	<i>Cymbidium aloifotium</i> (L.) Sw.		<i>Coelogyne cumingii</i> Lindl.		<i>D. formosum</i> Roxb. ex Lindl.	
	shoot	high	shoot	high	shoot	high
1	2.67±0.62	0.45±0.24	3.17±0.52	0.46±0.52	2.17±0.62	0.63±0.37
2	2.33±0.81	0.53±0.30	2.43±0.28	0.37±0.48	3.33±0.73	0.50±0.29
3	3.83±0.62	0.55±0.43	3.67±0.42	0.55±0.32	4.50±0.68	0.71±0.31 <sup>a</sup>
4	3.67±0.50	0.43±0.16	3.42±0.69	0.43±0.62	3.48±0.48	0.48±0.24
5	3.17±0.18	0.51±0.17	3.52±0.38	0.48±0.75	4.42±0.67	0.48±0.21
VW	2.47±0.55	0.45±0.25	2.47±0.59	0.41±0.68	3.86±0.92	0.48±0.29

Note : <sup>a</sup> = significant at level of 0.05.



**Figure 5** Conservation of orchids was performed by bringing three years old orchids from seeds culturing back along the ecological tourism route of the National Park by pilot tourists and community organizing.

### Conclusion

It has been concluded from this study that the diversity of orchids found in this National Park are terrestrial, epiphytic and lithophytic orchid which belong to 5 subfamilies, 25 genera and 68 species. They were grown at 1,100–1,400 meters above mean sea level. The variety of orchids found were varied according to several types of forest in the National Park. The adapted medium using local ingredients could be used to culture wild orchids. The conservation of 7 orchids were performed by bringing three years old grown orchids from seeds culturing back along the ecological tourism route of the National Park by pilot tourists and community organizing in the Park.

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