

Ethnobotany of Phu Thai Ethnic Group in Nakhon Phanom Province, Thailand

Rapeeporn PHOLHIAMHAN¹, Surapon SAENSOUK^{1,*} and Piyaporn SAENSOUK²

¹Plant and Invertebrate Taxonomy and Its Applications Unit Group, Walai Rukhavej Botanical Research Institute, Mahasarakham University, Maha Sarakham 44150, Thailand

²Plant and Invertebrate Taxonomy and Its Applications Unit Group, Department of Biology, Faculty of Science, Mahasarakham University, Maha Sarakham 44150, Thailand

(* Corresponding author's e-mail: surapon.s@msu.ac.th)

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Abstract

The present study aimed to study the diversity of plants used by Phu Thai ethnic groups in Nakhon Phanom province, and to find out the correlation between genders, age, and indigenous knowledge of the Phu Thai groups. The data were analyzed by using independent-samples t-test, one way ANOVA, cultural importance index (CI), informant consensus factor (ICF), and fidelity level (FL %). The results showed that there were 329 plant species from 89 families used in the daily life by the Phu Thai. The largest number of plant species were from Fabaceae (42 species, 12.77 %), followed by Zingiberaceae (20 species, 6.07 %), and Poaceae (15 species, 4.56 %). One hundred and ninety nine species were edible and used for consumption, 176 species for medicine, 56 species for cultural purposes, and 79 for other uses. The highest informant consensus factor (ICF) of medicinal plants were calculated for injuries (ICF = 0.961) indicating the highest degree of agreement among the informants knowledge of medicinal plants used to treat disorders in this category. The highest fidelity level (FL %) values were calculated for *Crinum asiaticum* L. var. *asiaticum* (93.62%), showing the conformity of knowledge regarding use of this plant to heal ankle sprains and postpartum women.

The CI values were calculated for *Oryza sativa* L. (CI = 2.74), followed by *Saccharum officinarum* L. (CI = 2.64), and *Cocos nucifera* L. (CI = 2.57), respectively. The most frequently used parts of the plant were leaves (82 species; 21.20 %) followed by fruits (70 species; 17.99 %), and stems (46 species; 11.85 %). Tree was the most common plant habit (77 species; 26.50 %), followed by the herb (72 species; 22.90 %), and climber (34 species; 9.20 %). The plants were gathered from cultivated fields more than from the forest. The ethnobotanical knowledge listed by males and females did not differ significantly ($p > 0.05$). The older informants had significantly more knowledge of medicinal plant uses than younger informants ($p < 0.05$). The Phu Thai ethnic group used *Oryza sativa* L. to make glutinous fermented liquors called "U". It contains a variety of plants such as *Alpinia galangal* (L.) Willd., *Lepisanthes rubiginosa* (Roxb.) Leenh., *Albizia myriophylla* Benth., *Paederia linearis* Hook. f. var. *linearis*, *Saccharum officinarum* L., *Streptocaulon juvenas* (Lour.) Merr., *Oroxylum indicum* (L.) Benth. ex Kurz, *Harrisonia perforata* (Blanco) Merr., and *Tacca leontopetaloides* (L.) Kuntze.

Keywords: Informant consensus factor (ICF), cultural important index (CI), fidelity level (FL %)

Introduction

Ethnobotany is the study of the relationship between plants and people; a field focusing on the study of the indigenous knowledge on how plants are perceived, used, and managed [1,2]. This study focuses on the ethnobotanical knowledge in the Phu Thai ethnic group in Nakhon Phanom Province, northeastern Thailand. The use of plants over time has allowed a better understanding of their properties in virtually all societies. Our knowledge of plants today is the result of the historical legacy of our ancestors, who learned empirically by trial and error, coupled with the new scientific knowledge used today to find new uses for them. Phu Thai is an ethnic group in Nakhon Phanom Province, most of them living in Renu Nakhon District. They immigrated from Muang Ou Tai, located among the southern part of China, the northern parts of Vietnam and Laos, and eventually continued their migration to the southern part of Laos [3]. From the period of Thon Buri until early Ratanakosin (King Rama I - King Rama V), most of the Phu Thai people migrated into the northeastern area of Thailand, especially in 3 provinces: Nakhon Phanom, Kalasin, and Ubon Ratchathani [3]. Since then, the population has slowly increased and spread to other provinces (i.e. Sakon Nakhon, Mukdahan, Amnat Charoen, Yasothon, Roi Et, Udon Thani, and Nong Khai) [3]. They have the identity culture such as Phu Thai language, Phu Thai clothes, Phu Thai dancing, the belief in spirit the same as in Buddhism and the culture of take care of health like Heetsibsong tradition, Yao ritual, the practice of woman after giving birth and baby and the herb using [4]. Their lifestyles are related to learning how to use local plants for existence and then the obtained indigenous knowledge of the Phu Thai will be passed from generation to generation. From the information we would like to know the indigenous knowledge and use plant species in the Phu Thai, and record all useful plants and their uses. However, little indigenous knowledge has been documented such as in Kalasin province Phu Thai people continue to use the benefit from the herbs and it effects the interaction of their lifestyle, beliefs, and rituals. The changes in social norms and development of many technologies in information, communication, medical, and public utilities to respond to human demand has also changed their dependence on plant use. The finding of this research will have important contributions for conservation and environmental education. The ethnobotany of the Phu Thai ethnic group in Nakhon Phanom has never been studied before.

Materials and methods

Study sites

Nakhon Phanom (17° 24' 25" N 104° 46' 51"E) has a long historical background of over a thousand years situated near the great river basin of the Songkhram and the Mekong rivers [5], located in northeastern Thailand. There are 717,501 people in Nakhon Phanom [6] consisting of 7 ethnic groups. The cultural identity of the Phu Thai ethnic group in Renu Nakhon (**Figures 1 and 2**) can be represented by Phu Thai traditional dances, the relationship of U (glutinous fermented liquors), Phu Thai hand-woven cloth, and ancient remains enshrined in vessels such as Phathat Renu (stupa), Ho Pu Tala (the house spirit), and Renu Nakhon city pillar shrine [5]. In addition to cultural diversity, Renu Nakhon also has a variety of biological diversity.

Ethnobotanical data collection

The ethnobotanical study of the Phu Thai ethnic group in Nakhon Phanom province, Thailand was conducted between January 2015 and December 2015. Forty seven informants (22 males and 25 females) were selected. The ages of the informants were from 15 to 83. Semi-structured interviews and field observations were employed to collect data. During the interviews with each informant, information regarding the local names of plants used by the Phu Thai ethnic group, the plant parts used, method of preparations, route of administration, and dosage were gathered. Ethnobotanical data related to habitat and abundance, threat and local marketability of claimed medicinal plants, as well as cultivation practices of the Phu Thai people were also collected. Photographs of plants and freshly collected material were shown to the informants following established methodologies [7,8] and use categories [9]. Specimens for most of the reported plants were collected, dried, properly identified, and vouchers deposited at the

Maharakham University Herbarium, Maharakham, Thailand. Plant identification was based largely on taxonomic literatures in particular the reference *The Flora of Thailand*.

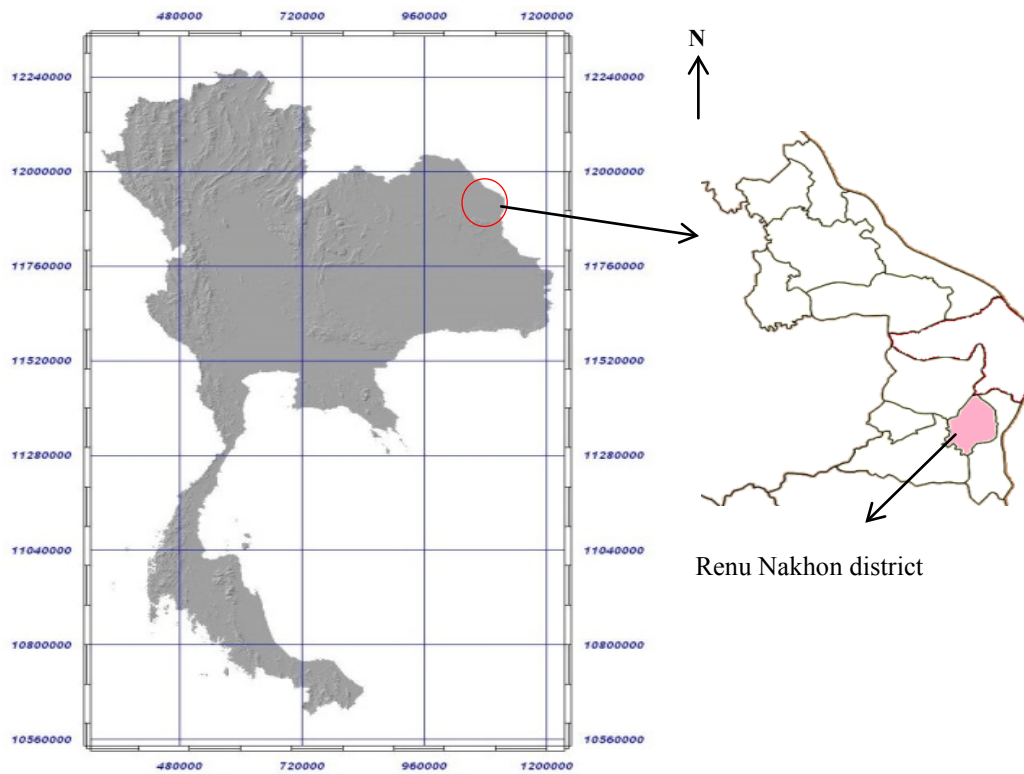


Figure 1 The location of Nakhon Phanom Province and Phu Thai ethnic group location.



Figure 2 Phu Thai ethnic group in Nakhon Phanom Province.

Data was analyzed with the statistical program SPSS, independent-samples t-test, one way ANOVA, cultural importance index (CI), informant consensus factor (ICF), and fidelity level (FL %) as follows:

- Cultural importance index (CI) [10] was used to estimate the significance of each species in ethnobotany studies. This index is widely used in ethnobotanical studies to determine diversity of uses and the consensus of informants. The index is defined as;

$$CI = \frac{\sum_{U=1}^{NC} \sum_{i=1}^N \frac{UR_{ui}}{N}}{N} \quad (1)$$

UR is the total number of use reports for each use category of a given species, N is the total number of informants, and NC is the total number of use categories. Therefore, the CI is the sum of the proportion of informants that mention each of the use categories for a given species.

- Informant consensus factor (ICF).

To test homogeneity of knowledge, the informant consensus factor was used for medicinal plants [11];

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1} \quad (2)$$

N_{ur} refers to the number of use-reports for a particular use category, and N_t refers to the number of taxa used for a particular use category by all informants. A lower ICF value (near 0) indicates the informants' disagreement of using a particular plant to treat a particular ailment category, and a higher ICF value (approaching 1) is indicative of using relatively few plants by the informants in the treatment of a particular ailment category [12].

- Fidelity level (FL %).

Because many plant species of medicinal plant may be used in the same use category, it is interesting to determine the most preferred species used in the treatment of a particular ailment, which can be done with the fidelity level (FL%) [13].

$$FL\% = \frac{N_p}{N} \times 100 \quad (3)$$

N_p is the number of use-reports cited for a given species for a particular use category and N is the total number of use-reports cited for any given species. High FL% (near 100 %) are obtained for plants for which almost all use reports refer to the same way of using a given plant, whereas low FL% are obtained for plants that are used for many different purposes.

Results and discussions

Through collections of plants and interviews with 47 informants, an ethnobotanical study was conducted in order to determine the knowledge and use of plant species among the Phu Thai. The aim of this study was to record all useful plants and their uses.

Diversity of plants

Data information was collected from 47 informants of the Phu Thai ethnic groups in Renu Nakhon district. There were 329 plant species in 89 families that the ethnic group used in their daily live (**Table 1**). The largest number of plant species came from Fabaceae (42 species, 12.77 %), followed by Zingiberaceae (20 species, 6.07 %), and Poaceae (15 species, 4.56 %), respectively (**Table 2**). Abbas [14] also found that the 2 most important families were Asteraceae and Fabaceae with 7 species each, followed by Rosaceae with 6 species in terms of ethnobotanical usage. But in the study by Doğan [15] the usage order of the families was different than our findings. He reported that the highest number of taxa was Asteraceae, followed by Boraginaceae, Apiaceae, Lamiaceae, Caryophyllaceae, respectively.

The studies of plants used by the Phu Thai elsewhere; such as in Kalasin province [3] found that 108 species were used as medicinal plants in this community and the villagers also had their own knowledge about herbs from their own experiences and those of their ancestors. While there were 170 species used among the Phu Thai in Nakhon Phanom Province. The plants species that were used similarly included *Alpinia galanga* (L.) Willd. as a gastroprotective, *Crinum asiaticum* L. var. *asiaticum* used to treat ankle pain.

In addition, the symbol of the Phu Thai ethnic group is “U” (glutinous fermented liquors) and plants which were used for make “U” namely *Alpinia galangal* (L.) Willd., *Lepisanthes rubiginosa* (Roxb.) Leenh., *Albizia myriophylla* Benth., *Paederia linearis* Hook. f. var. *linearis*, *Saccharum officinarum* L., *Streptocaulon juvenas* (Lour.) Merr., *Oroxylum indicum* (L.) Benth. ex Kurz, *Harrisonia perforate* (Blanco) Merr., and *Tacca leontopetaloides* (L.) Kuntze. These plants make “U” taste unique.

Table 1 Families and plants species used in Phu Thai ethic group in Nakhon Phanom Province, Thailand.

Families	Plant species	Phu Thai names	*Part used	**Habit	***Source	****Plant uses
Acanthaceae	<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees (RPH 033)	fa thalai chon	L	H	1	mp
	<i>Asystasia gangetica</i> (L.) T. Anderson subsp. <i>Gangetica</i> (RPH 046)	phak omsap	YL	US	1	fp
	<i>Barleria lupulina</i> Lindl. (RPH 053)	salet phang phon	L	S	1	md
	<i>Justicia gendarussa</i> Burm. f. (RPH 201)	kraduk kai dam	WP	US	1	md
	<i>Rhinacanthus nasutus</i> (L.) Kurz (RPH 289)	thong phan sang	L	S	1	md
	<i>Thunbergia laurifolia</i> Lindl. (RPH 339)	jang chuet	L	C	2	md
Alismataceae	<i>Limnocharis flava</i> Buch. (RPH 215)	phak pai	ST,YL, FL	AqH	2	fp
Amaranthaceae	<i>Achyranthes aspera</i> L. (RPH 007)	ya khoi ngu	RT	H	2	md
	<i>Amaranthus lividus</i> L. (RPH 027)	phak khom	YL, L	H	1	fp
	<i>Amaranthus spinosus</i> Linn. (RPH 028)	phak khom nam	YL, L	H	2	fp
	<i>Celosia argentea</i> L. (RPH 085)	ngon kai	RT	H	2	md
	<i>Gomphrena globosa</i> L. (RPH 176)	sam pi	FL	H	1	cp
Amaryllidaceae	<i>Allium ascalonicum</i> L. (RPH 017)	hom	BL, L	H	1	fp,md,cp
	<i>Allium sativum</i> L. (RPH 018)	katem	BL, L	H	1	fp,md,ou
	<i>Allium tuberosum</i> Rottler ex Spreng. (RPH 019)	phak ban	L	H	1	fp
	<i>Crinum asiaticum</i> L. var. <i>asiaticum</i> (RPH 113)	wan son	L	H	1	md,cp
Anacardiaceae	<i>Buchanania latifolia</i> Roxb. (RPH 065)	ma mong kan	FR	T	2	fp
	<i>Mangifera caloneura</i> Kurz (RPH 221)	ma mong kasor	FR	T	2	md
	<i>Mangifera indica</i> L. (RPH 222)	ma mong	FR,BK,ST	T	1	fp,md,ou
	<i>Spondias pinnata</i> (L. f.) Kurz (RPH 320)	ma kok	FR, YL	T	2	fp
Annonaceae	<i>Annona squamosa</i> L. (RPH 035)	ma keb	FR,L	S/ST	1	fp,md
	<i>Desmos chinensis</i> Lour. (RPH 136)	ker khao kab	RT	C	1	md

Families	Plant species	Phu Thai names	*Part used	**Habit	***Source	****Plant uses
	<i>Goniothalamus laoticus</i> (Finet & Gagnep.) Bân (RPH 177)	khao lam dong	ST	T	2	md
	<i>Monocarpia vaginalis</i> (Burm. f.) C. Presl ex Kunth var. <i>vaginalis</i> (RPH 238)	phak ket	L	AqH	2	fp
Annonaceae	<i>Polyalthia evecta</i> (Pierre) Finet & Gagnep. (RPH 282)	nom noi	RT,FR	S	2	fp,md
	<i>Uvaria rufa</i> Blume (RPH 346)	ma ki pon	FR,RT, ST	C	2	fp,md
Apiaceae	<i>Anethum graveolens</i> L. (RPH 034)	phak si	WP	H	1	fp,md
	<i>Apium graveolens</i> L. (RPH 038)	khuen-chai	WP	H	1	fp
	<i>Centella asiatica</i> (L.) Urban. (RPH 086)	pkak nok	WP,L	H	1	fp,md
	<i>Coriandrum sativum</i> L. (RPH 108)	pkak hom	WP	H	1	fp,cp
	<i>Eryngium foetidum</i> L. (RPH 158)	pkak hom hor	L	H	1	fp
	<i>Trachyspermum roxburghianum</i> (DC.) H. Wolff <i>Coriandrum</i> spp. (RPH 343)	pkak sa ngae	WP	H	1	fp
Apocynaceae	<i>Aganonerion polymorphum</i> Pierre ex Spire (RPH 013)	som lom	YL,RT	C	2	fp,md
	<i>Alstonia scholaris</i> (L.) R. Br. (RPH 026)	tin pet	GU	T	1	ou
	<i>Amphineurion marginatum</i> (Roxb.) D. J. Middleton (RPH 031)	ker sai tan	SH,V,L	C	2	fp,md
	<i>Calotropis gigantea</i> (L.) W. T. Aiton (RPH 072)	hak	FL	S/ST	2	cp
	<i>Cryptolepis dubia</i> (Burm. f.) M. R. Almeida (RPH 117)	ker en on	L,V	C	2	md
	<i>Dischidia nummularia</i> R. Br. (RPH 151)	klet mangkon	L	CrH	2	md
	<i>Dregea volubilis</i> (L. f.) Benth. ex Hook. f. (RPH 153)	ngoan mu	YL	C	2	fp
	<i>Myriopterion extensum</i> (Wight & Arn.) K. Schum. (RPH 247)	cha em	YL,FR	C	2	fp
	<i>Plumeria obtusa</i> L. (RPH 281)	jum pa	FL	ST	1	cp
	<i>Streptocaulon juventas</i> (Lour.) Merr. (RPH 322)	ker hao hon	RT	C	2	ou
	<i>Tabernaemontana pandacaqui</i> Lam. (RPH 329)	put	FL	ST	1	cp
	<i>Telosma cordata</i> (Burm. f.) Merr. (RPH 334)	kha chon	SH,FL	C	1	fp
	<i>Thevetia peruviana</i> (Pers.) K. Schum. (RPH 338)	ka dang nga	FL	ST	1	cp
Araceae	<i>Alocasia macrorrhizos</i> (L.) G. Don (RPH 020)	kradad	WP	H	1	cp
	<i>Arisaema petiolatum</i> Gagnep. (RPH 043)	i rok	ST	H	2	fp
Araceae	<i>Colocasia esculenta</i> Schott (RPH 103)	pher	CR	H	1	fp
	<i>Colocasia gigantea</i> Hook. f. (RPH 104)	tun	PO	H	1	fp
	<i>Lasia spinosa</i> Thw. (RPH 210)	phak nam	YL,RZ	H	2	fp,md
	<i>Wolffia globosa</i> (Roxb.) Hartog & Plas (RPH 349)	pum	WP	AqH	2	fp
Arecaceae	<i>Areca catechu</i> L. (RPH 041)	mak	SD,RT, FR	P	1	md,cp,ou
	<i>Borassus flabellifer</i> L. (RPH 061)	tan	FR	P	2	fp
	<i>Calamus viminalis</i> Willd. (RPH 071)	wai	SH,RT	CP	2	fp,ou
	<i>Cocos nucifera</i> L. (RPH 102)	ma phao	FR,L,PO,CJ, RT,YL,FR	P	1	fp,md,cp,ou
Asteraceae	<i>Acmella oleracea</i> (L.) R. K. Jansen (RPH 008)	phak khrat	WP	H	2	fp
	<i>Blumea balsamifera</i> (L.) DC. (RPH 058)	nat	L, ST	S/ST	2	md,cp
	<i>Blumea napifolia</i> DC. (RPH 059)	phak kat na	L	H	2	fp
	<i>Chromolaena odorata</i> (L.) R. M. King & H. Rob. (RPH 090)	ya farang	L	H	2	md
	<i>Elephantopus scaber</i> L. var. <i>scaber</i> (RPH 156)	ki kai nok kum	RT	H	2	md

Families	Plant species	Phu Thai names	*Part used	**Habit	***Source	****Plant uses
	<i>Gynura procumbens</i> (Lour.) Merr. (RPH 179)	pae tam pueng	L	H	1	md
	<i>Helianthus tuberosus</i> L. (RPH 182)	ta ngen ho	RT	H	1	md
	<i>Lactuca sativa</i> L. (RPH 206)	phak salad	L	H	1	fp
	<i>Tagetes erecta</i> L. (RPH 331)	dao rerng	FL	H	1	cp
Basellaceae	<i>Basella alba</i> L. (RPH 055)	phak pang	YL	HC	1	fp
Bignoniaceae	<i>Dolichandrone columnaris</i> Santisuk(RPH 152)	kae na	FL	T	2	fp
	<i>Millingtonia hortensis</i> L. f. (RPH 231)	pip	RT, ST	T	2	md
	<i>Oroxylum indicum</i> (L.) Benth. ex Kurz (RPH 257)	ma lid mai	BK, FR	ST	2	fp,md,ou
Brassicaceae	<i>Brassica juncea</i> (L.) Czern. (RPH 062)	phak kat khiew	YL, L	H	1	fp
	<i>Brassica oleracea</i> L. Group <i>Capitata</i> (RPH 063)	kalam pli	WP	H	1	fp
Bromeliaceae	<i>Ananas comosus</i> (L.) Merr. (RPH 032)	ma nat	FR,L	H	1	fp,md
Burseraceae	<i>Canarium subulatum</i> Guillaumin (RPH 074)	ma koh	GU,FR,ST	T	2	fp,md,cp,ou
Capparidaceae	<i>Crateva adansonii</i> DC. subsp. <i>trifoliata</i> Jacobs (RPH 109)	phak kum	FL,YL,L, BK	T	1	fp,md,cp,ou
Caricaceae	<i>Carica papaya</i> L. (RPH 079)	ma hung	L,FR	ST	1	fp,md,cp,ou
Celastraceae	<i>Salacia chinensis</i> L. (RPH 294)	ma lum hi dang	RT	ScanS	2	md
Chrysobalanaceae	<i>Parinari anamensis</i> Hance (RPH 265)	phok	BK	T	2	md
Cleomaceae	<i>Cleome gynandra</i> L. (RPH 098)	phak sen	YL,L	H	1	fp
Clusiaceae	<i>Garcinia cowa</i> Roxb. ex Choisy (RPH 168)	som po dee	FR,YL,L,ST, BK	T	2	fp,md,ou
	<i>Garcinia nigrolineata</i> Planch. ex T. Anderson (RPH 169)	sa mong	YL, FR	ST	2	fp
Combretaceae	<i>Combretum quadrangulare</i> Kurz (RPH 106)	kae	BK,L,YL	T	2	md
	<i>Getonia floribunda</i> Roxb. (RPH 171)	ka dang	RT	C	2	md
	<i>Terminalia alata</i> B. Heyne ex Roth (RPH 335)	ser	BK	T	2	md
	<i>Terminalia catappa</i> L. (RPH 336)	hu kwang	BK, FR	T	1	md
	<i>Terminalia chebula</i> Retz. var. <i>chebula</i> (RPH 337)	som mo	BK, FR	T	2	fp,md
Connaraceae	<i>Roureopsis stenopetala</i> (Griff.) G. Schellenb. (RPH 292)	ma kham kher	ST	C	2	md
Convolvulaceae	<i>Argyrea nervosa</i> (Burm. f.) Bojer (RPH 042)	phak rabat	RT,L	C	2	md
	<i>Cuscuta chinensis</i> Lam. (RPH 126)	phak mai	WP	PaHC	2	fp
	<i>Ipomoea aquatica</i> Forssk. (RPH 194)	phak bung	YL	CrH	1	fp
	<i>Ipomoea batatas</i> (L.) Lam. (RPH 195)	men keaw	RT	CrH	1	fp
	<i>Ipomoea cairica</i> (L.) Sweet (RPH 196)	phak bong	L	HC	2	md
Costaceae	<i>Cheilocostus speciosus</i> (J. Koenig) C. D. Specht (RPH 089)	erng	RZ	C	1	md
Cucurbitaceae	<i>Benincasa hispida</i> (Thunb.) Cogn. (RPH 057)	fak	FR	HC	1	fp,cp
	<i>Coccinia grandis</i> (L.) Voigt (RPH 101)	phak tam lueng	YL	HC	1	fp
	<i>Cucumis melo</i> L. (RPH 118)	taeng thai	FR	HC	1	fp,cp
	<i>Cucurbita moschata</i> Duchesne(RPH 119)	ma oop	FR,SH	HC	1	fp,cp
	<i>Lagenaria siceraria</i> (Molina) Standl. (RPH 207)	namtao	YL, FR	HC	1	fp
Cucurbitaceae	<i>Luffa acutangula</i> (L.) Roxb. (RPH 218)	bob	YL, FR	HC	1	fp
	<i>Momordica charantia</i> L. (RPH 236)	ba ra	FR,YL,L	HC	1	fp
	<i>Momordica cochinchinensis</i> (Lour.) Spreng. (RPH 237)	fak khao	YL,FR,L,RT	HC	1	fp,md
	<i>Trichosanthes cucumerina</i> L. (RPH 344)	bob ngu	YL, FR	HC	1	fp
Cyperaceae	<i>Actinoscirpus grossus</i> (L. f.) Goetgh. & D. A.	pheu	ST	H	2	ou

Families	Plant species	Phu Thai names	*Part used	**Habit	***Source	****Plant uses
	Simpson (RPH 009)					
	<i>Cyperus rotundus</i> L. (RPH 131)	ya haeo mu	RT	H	2	md
	<i>Schoenoplectiella mucronata</i> (L.) J. Jung & H. K. Choi (RPH 298)	kok	ST	H	2	ou
Dioscoreaceae	<i>Dioscorea alata</i> L. (RPH 140)	man luet	RT	HC	2	fp
	<i>Dioscorea hispida</i> Dennst. (RPH 141)	kloi	RT	HC	2	fp,md,cp,ou
	<i>Dioscorea pseudotomentosa</i> Prain & Burkill (RPH 142)	man saeng hin	RT	HC	2	fp
	<i>Tacca leontopetaloides</i> (L.) Kuntze (RPH 330)	nom meaw	RT	C	1	ou
Dipterocarpaceae	<i>Dipterocarpus alatus</i> Roxb. ex G. Don (RPH 148)	yangna	BK,ST,GU	T	2	md,ou
	<i>Dipterocarpus obtusifolius</i> Teijsm. ex Miq. (RPH 149)	sat	ST, BK	T	2	md,cp,ou
	<i>Dipterocarpus tuberculatus</i> Roxb. (RPH 150)	kung	L, GU	T	2	ou
	<i>Hopea odorata</i> Roxb. (RPH 189)	khaen	BK	T	2	md
	<i>Shorea obtusa</i> Wall. ex Blume (RPH 307)	chik	BK, ST,GU	T	2	md,ou
	<i>Shorea roxburghii</i> G. Don (RPH 308)	phayom	BK,ST,GU	T	2	md,ou
	<i>Shorea siamensis</i> Miq. (RPH 309)	rung	FL,BK,ST	T	2	md,cp,ou
Ebenaceae	<i>Diospyros filipendula</i> Pierre ex Lecomte (RPH 144)	lam bit dong	YL, FR	T	2	fp
	<i>Diospyros mollis</i> Griff. (RPH 145)	ma kler	ST, FR	T	2	md,ou
	<i>Diospyros Montana</i> Roxb. (RPH 146)	ma kler pa	BK	H	2	md
	<i>Diospyros rhodocalyx</i> Kurz (RPH 147)	tako na	FR	ST	2	md
Elaeocarpaceae	<i>Elaeocarpus hygrophilus</i> Kurz (RPH 155)	ma kok nam	FR	T	2	fp
Euphorbiaceae	<i>Croton argyratus</i> Blume (RPH 116)	plao	L,RT,GU	ST	2	md
Euphorbiaceae	<i>Euphorbia hirta</i> L. (RPH 160)	nam nom ratchasi	RT	H	2	md
	<i>Euphorbia tirucalli</i> L. (RPH 161)	phaya rai bai	SH	S	1	md
	<i>Manihot esculenta</i> Crantz (RPH 223)	man sampalang	RT	S/ST	1	fp
	<i>Ricinus communis</i> L. (RPH 291)	la hung	L,RT	H	1	md
Fabaceae	<i>Acacia catechu</i> (L. f.) Willd. (RPH 002)	si siad	BK,L,FR	T	1	fp,md,cp,ou
	<i>Acacia mangium</i> Willd. (RPH 004)	kra thin the pha	ST	T	1	ou
	<i>Acacia Pennata</i> (L.) Willd.subsp.insuavis Nielsen(RPH 005)	pkak noa	YL	C	1	fp
	<i>Adenanthera pavonina</i> L. (RPH 010)	ma klam ton	RT	T	1	md,ou
	<i>Azelia xylocarpa</i> (Kurz) Craib (RPH 012)	maka mong	ST	T	2	ou
	<i>Albizia myriophylla</i> Benth. (RPH 015)	oi sam sun	RT,ST,BK	C	2	md,ou
	<i>Albizia saman</i> (Jacq.) Merr. (RPH 016)	cham churi	ST	T	2	ou
	<i>Arachis hypogaea</i> L. (RPH 039)	toe	FR,YL	HC	1	fp
	<i>Bauhinia malabarica</i> Roxb. (RPH 056)	som siao	RT,L,YL,BK	T	2	fp,md,ou
	<i>Butea monosperma</i> (Lam.) Taub. (RPH 066)	jan	FL,L	T	2	fp,md
	<i>Butea superba</i> Roxb. (RPH 067)	jan kher	RT,ST	C	2	md
	<i>Caesalpinia mimosoides</i> Lam. (RPH 068)	pkak ka ya	YL	C	2	fp
	<i>Caesalpinia sappan</i> L. (RPH 069)	fang	ST,BK	ST	2	md,ou
	<i>Cajanus cajan</i> (L.) Millsp. (RPH 070)	toe hae	FR,L	S	2	fp,md
	<i>Cassia fistula</i> L. (RPH 081)	khun	ST,FR,FL,L	T	2	md,cp,ou
	<i>Castanopsis piriformis</i> Hickel & A. Camus (RPH 082)	ko hin	RT,FR	T	2	fp,md
	<i>Chamaecrista mimosoides</i> (L.) Greene (RPH 088)	phak krachet nok	YL, L	US	2	fp
	<i>Clitoria ternatea</i> L. (RPH 100)	anchan	FL,RT	C	2	fp,md,ou

Families	Plant species	Phu Thai names	*Part used	**Habit	***Source	****Plant uses
Fabaceae	<i>Crotalaria spectabilis</i> Roth subsp. <i>parvibracteata</i> Niyomdham (RPH 115)	jang chuet	ST	US	1	md
	<i>Dalbergia cochinchinensis</i> Pierre(RPH 132)	phayung	ST	T	1	cp
	<i>Dialium cochinchinense</i> Pierre (RPH 137)	mak keng	FR	T	2	fp
	<i>Erythrina variegata</i> L. (RPH 159)	thong lang lai	L	T	1	md
	<i>Indigofera tinctoria</i> L. (RPH 193)	khram	L	S	1	ou
	<i>Lablab purpureus</i> (L.) Sweet (RPH 205)	thoe paep	FR	C	1	fp
	<i>Leucaena leucocephala</i> (Lam.) de Wit (RPH 214)	kra thin thai	FR,YL,RT, BK, SD	S/ST	1	fp,md
	<i>Lysiphyllum strychnifolium</i> (Craib) A. Schmitz (RPH 219)	ya nang daeng	RT	C	2	md
	<i>Mimosa pudica</i> L. (RPH 232)	maiyarap	WP	S	2	md
	<i>Neptunia oleracea</i> Lour. (RPH 251)	phak krachet	SH	AqH	2	fp
	<i>Pachyrhizus erosus</i> (L.) Urb. (RPH 261)	man kaeo	RT	HC	1	fp
	<i>Pithecellobium dulce</i> (Roxb.) Benth. (RPH 279)	ma kham pae	FR,BK	T	1	fp,md,
	<i>Psophocarpus tetragonolobus</i> (L.) DC. (RPH 285)	thoe phu	FR	HC	1	fp
	<i>Pterocarpus indicus</i> Willd. (RPH 286)	kok du	BK,L,ST	T	1	md,ou
	<i>Senna alata</i> (L.) Roxb. (RPH 301)	sumhet thet	L	S	2	md
	<i>Senna siamea</i> (Lam.) H. S. Irwin & Barneby (RPH 302)	khi lek	YL,ST,BK	T	2	fp,md,ou
	<i>Senna tora</i> (L.) Roxb. (RPH 303)	sumhet thai	L	US	2	md
	<i>Sesbania grandiflora</i> (L.) Poir. (RPH 305)	khae	BK,FL,YL	ST	1	fp,md
	<i>Sesbania javanica</i> Miq. (RPH 306)	sano kin dok	FL	US	1	fp
	<i>Sindora siamensis</i> Teijsm. ex Miq. var. <i>siamensis</i> (RPH 311)	makha tae	SD,ST	T	2	fp,ou
	<i>Tamarindus indica</i> L. (RPH 332)	ma kham	FR,YL,L,ST	T	1	fp,md,ou
	<i>Uraria crinita</i> (L.) Desv. ex DC. (RPH 345)	hang ma chok	RT,L	US	2	md,ou
	<i>Vigna unguiculata</i> (L.) Walp. subsp. <i>unguiculata</i> (RPH 347)	thoe dam	FR	HC	1	fp,cp
<i>Xylia xylocarpa</i> (Roxb.) W. Theob. var. <i>kerrii</i> (Craib & Hutch.) I. C. Nielsen (RPH 350)	daeng	ST,BK,FR	T	2	fp,md,cp,ou	
Gentianaceae	<i>Fagraea fragrans</i> Roxb. (RPH 162)	man pa	ST	T	2	ou
Gnetaceae	<i>Gnetum macrostachyum</i> Hook. f. (RPH 175)	mueai duk	ST	C	2	md
Hypericaceae	<i>Cratoxylum cochinchinense</i> (Lour.) Blume (RPH 110)	tio	ST,SH	T	2	md,ou
	<i>Cratoxylum formosum</i> (Jacq.) Benth. & Hook. f. ex Dyer subsp. <i>pruniflorum</i> (Kurz) Gogelein (RPH 111)	tio som	YL,GU	T	2	fp,md
Irvingiaceae	<i>Irvingia malayana</i> Oliv. ex A. W. Benn. (RPH 197)	krabok	ST,SD, L,FR	T	2	fp,md,ou
Lamiaceae	<i>Clerodendrum paniculatum</i> L. (RPH 099)	man pu	RT,L	S	2	md
	<i>Mentha cordifolia</i> Opiz ex Fresen ex Fresen (RPH 229)	pkak term	L	H	1	fp,md
	<i>Ocimum africanum</i> Lour. (RPH 254)	pkak i tu	L,FL	H	1	fp,md
	<i>Ocimum basilicum</i> L. (RPH 255)	horapha	L,FL	US	1	fp,md
	<i>Ocimum tenuiflorum</i> L. (RPH 256)	kraproa	L	US	1	fp,md
	<i>Perilla frutescens</i> (L.) Britton (RPH 269)	nga khi mon	L	H	1	fp
	<i>Tectona grandis</i> L. f. (RPH 333)	sak	FL,ST,L	T	1	md,ou
	<i>Orthosiphon aristatus</i> (Blume) Miq. (RPH 258)	ya nuat maeo	WP	H	2	md
<i>Plectranthus amboinicus</i> (Lour.) Spreng. (RPH 280)	hu ser	L, SD	H	1	fp,md	

Families	Plant species	Phu Thai names	*Part used	**Habit	***Source	****Plant uses
Lauraceae	<i>Litsea glutinosa</i> (Lour.) C. B. Rob. (RPH 217)	mi	RT,SD,L	T	2	md,ou
	<i>Persea kurzii</i> Kosterm. (RPH 270)	yang bong	GU	T	2	ou
Lecythidaceae	<i>Barringtonia acutangula</i> (L.) Gaertn.(RPH 054)	ka don	L,SH	ST/T	1	fp
	<i>Careya arborea</i> Roxb. (RPH 078)	ka don	FR,YL	T	2	fp
Loganiaceae	<i>Strychnos nux-vomica</i> L. (RPH 323)	tum kha	RT, SD,FR	ST	2	md,cp
	<i>Dendrophthoe pentandra</i> (L.) Miq. (RPH 135)	ka fa ma mong	SH,L	PaS	2	md
Lythraceae	<i>Lagerstroemia floribunda</i> Jack var. <i>floribunda</i> (RPH 208)	ta baek plueak bang	ST	T	2	ou
	<i>Lawsonia inermis</i> L. (RPH 211)	khoa	L	S	1	ou
	<i>Punica granatum</i> L. var. <i>granatum</i> (RPH 287)	ma pi la	L, FR, ST	S	2	fp,md,cp
Malvaceae	<i>Abelmoschus esculentus</i> (L.) Moench (RPH 001)	ka jeb	FR,SD	S	1	fp
	<i>Ceiba pentandra</i> (L.) Gaertn. (RPH 084)	ngio	FR	T	1	ou
	<i>Gossypium herbaceum</i> L. (RPH 178)	fai	SD,FB	S	1	md,cp,ou
	<i>Helicteres isora</i> L. (RPH 185)	po bit	FR	S	2	md
	<i>Hibiscus rosa-sinensis</i> L. (RPH 186)	cha ba	FL	S/ST	1	fp,md,cp,ou
	<i>Hibiscus sabdariffa</i> L. (RPH 187)	ka jeb daeng	FR	H	1	fp
	<i>Microcos tomentosa</i> Sm. (RPH 230)	ma corm	ST,FR	T	2	md
	<i>Sida rhombifolia</i> L. subsp. <i>Rhombifolia</i> (RPH 310)	ya khat	WP	US	2	md
Marantaceae	<i>Maranta arundinacea</i> L. (RPH 224)	sa khu	RT	H	1	fp
	<i>Schumannianthus dichotomus</i> (Roxb.) Gagnep. (RPH 299)	khla	ST	H	2	ou
Marsileaceae	<i>Marsilea crenata</i> C. Presl (RPH 225)	phak wan	WP	AqF	2	fp
Meliaceae	<i>Azadirachta indica</i> A. Juss. (RPH 049)	sadao	YL,FL,BK,R	T	1	fp,md,cp,ou
	<i>Sandoricum koetjape</i> (Burm. f.) Merr. (RPH 295)	ma tong	T,L,FL BK,FR	T	1	fp,md
Memecylaceae	<i>Memecylon edule</i> Roxb. (RPH 228)	mert	L,ST	S/ST	2	fp,md
Menispermaceae	<i>Cissampelos pareira</i> L. var. <i>hirsuta</i> (Buch. ex DC.) Forman (RPH 092)	mor noi	RT,L	C	2	fp,md
	<i>Tiliacora triandra</i> (Colebr.) Diels (RPH 341)	ya nang	L,RT	C	2	fp,md
	<i>Tinospora crispa</i> (L.) Hook. f. & Thomson (RPH 342)	ker kor hor	V	C	2	md
Molluginaceae	<i>Glinus oppositifolius</i> (L.) A. DC. (RPH 173)	ki som	SH, L	H	2	fp
	<i>Mollugo pentaphylla</i> L. (RPH 235)	ki kom	SH, L	H	2	fp
Moraceae	<i>Artocarpus heterophyllus</i> Lam. (RPH 044)	ma mi	FR,L,ST	T	1	fp,md,cp,ou
	<i>Artocarpus lacucha</i> Roxb. ex Buch.-Ham. (RPH 045)	ma hat	ST	T	2	ou
	<i>Ficus racemosa</i> L. (RPH 165)	ma der	FR	T	2	fp
Moraceae	<i>Ficus religiosa</i> L. (RPH 166)	pho	GU	T	2	ou
	<i>Morus alba</i> L. (RPH 242)	mon	L,FR	ST	1	fp,md
	<i>Streblus asper</i> (RPH 321)	koi	FR,L	T	2	fp,ou
Moringaceae	<i>Moringa oleifera</i> Lam.(RPH 241)	phak i hum	RT, FR, L, YL	ST	1	fp,md,cp
Mulpighiaceae	<i>Malpighia glabra</i> L. (RPH 220)	choe ri	FR	S	1	fp
Muntingiaceae	<i>Muntingia calabura</i> L. (RPH 243)	ta khop	FR,BK	ST	1	fp,md
Musaceae	<i>Ensete glaucum</i> (Roxb.) Cheesman (RPH 157)	koi yon	FR	H	1	fp
	<i>Musa × paradisiaca</i> L. (RPH 244)	koi	FR,WP,FL	H	1	fp,md,cp,ou
	<i>Musa balbisiana</i> Colla (RPH 245)	koi tani	L,WP,FR,RT	H	1	fp,md,cp,ou

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	<i>Musa ornata</i> Roxb. (RPH 246)	koi bo	RT,FL,FR	H	1	md
Myrtaceae	<i>Psidium guajava</i> L. (RPH 284)	ma si da	FR,BK,L	ST	1	fp,md
	<i>Syzygium antisepticum</i> (Blume) Merr. & L. M. Perry (RPH 326)	kha mek	L,YL	ST/T	2	fp,md
	<i>Syzygium cinereum</i> (Kurz) Chantar. & J. Parn. (RPH 327)	wa	BK,FR	T	2	fp,md
	<i>Syzygium jambos</i> (L.) Alston (RPH 328)	chomphu	FR	S/ST	1	fp
Nelumbonaceae	<i>Nelumbo nucifera</i> Gaertn. (RPH 248)	bo long	FR,RT ,FL, L	AqH	1	fp,cp
Nymphaeaceae	<i>Nymphaea pubescens</i> Willd (RPH 253)	bo sai	PD	AqH	2	fp
Oleaceae	<i>Jasminum anodontum</i> Gagnep. (RPH 199)	sai kai	RT	C	2	md
	<i>Jasminum sambac</i> (L.) Aiton (RPH 200)	ma li	FL,L	C	1	cp
Opiliaceae	<i>Melientha suavis</i> Pierre (RPH 226)	phak wan	YL, L	T	2	fp
Orchidaceae	<i>Cymbidium alofolium</i> (L.) Sw. (RPH 127)	mai ka dam pi	L	EO	2	md
Oxalidaceae	<i>Averrhoa bilimbi</i> L. (RPH 047)	taling pling	FR	ST	1	fp
	<i>Averrhoa carambola</i> L. (RPH 048)	ma ferng	ST,FR	ST	1	fp,md,cp
Pandanaceae	<i>Pandanus amaryllifolius</i> Roxb. (RPH 263)	toei	L	S	1	fp,md,ou
	<i>Pandanus kaida</i> Kurz (RPH 264)	toei	L	S/ST	2	cp
Passifloraceae	<i>Passiflora laurifolia</i> L. (RPH 266)	ma mong	FR	C	2	fp
Pedaliaceae	<i>Sesamum indicum</i> L. (RPH 304)	nga	SD	H	1	fp,md,cp
Phyllanthaceae	<i>Antidesma acidum</i> Retz. (RPH 036)	mao	FR	T	2	fp
	<i>Baccaurea ramiflora</i> Lour.(RPH 050)	ma fai	ST,L,FR	T	1	fp,md,
	<i>Hymenocardia punctata</i> Wall. ex Lindl. (RPH 191)	faep nam	FR	S/T	2	fp
	<i>Phyllanthus acidus</i> (L.) Skeels (RPH 272)	ma yom	BK,FR,YL,L, PO	ST	1	fp,md,cp
	<i>Phyllanthus emblica</i> L. (RPH 273)	ma kham pom	FR,ST	ST/T	2	fp,md,ou
	<i>Phyllanthus virgatus</i> G. Forst. (RPH 274)	ma ter ber	WP	H	2	md
	<i>Sauropus androgynus</i> (L.) Merr. (RPH 296)	phak wan ban	YL,L	S/ST	1	fp
Piperaceae	<i>Piper betle</i> L. (RPH 275)	phu	V,L	WC	1	md,cp
	<i>Piper nigrum</i> L. (RPH 276)	phrik thai	FR	C	1	fp,ou
	<i>Piper retrofractum</i> Vahl (RPH 277)	sa li pi	FR	C	1	fp
	<i>Piper rostratum</i> Roxb. (RPH 278)	kam pu	L	CrH	1	fp,md
Poaceae	<i>Bambusa multiplex</i> (Lour.) Raeusch. ex Schult. f. (RPH 051)	phai sang phrai	SH	B	1	fp,ou
	<i>Bambusa nutans</i> Wall. ex Munro (RPH 052)	phai bong	ST,SH	B	1	fp,cp,ou
	<i>Centotheca lappacea</i> (L.) Desv. (RPH 087)	khon moi mae mai	WP	G	2	md
	<i>Coix lachryma-jobi</i> L. (RPH 319)	dueai	SD	G	1	fp
	<i>Cymbopogon citratus</i> (DC.) Stapf (RPH 128)	ho sikher	L, ST	G	1	fp,md
	<i>Cymbopogon nardus</i> (L.) Rendle (RPH 129)	ho sikher hom	L, ST	G	1	fp,md,cp,ou
	<i>Cynodon dactylon</i> (L.) Pers. (RPH 130)	ya phraek	WP	G	2	cp
	<i>Dendrocalamus asper</i> (Schultes & J. H. Schultes) Backer ex K. Heyne (RPH 133)	phai tong	SH	B	1	fp
	<i>Dendrocalamus strictus</i> (Roxb.) Nees (RPH 134)	phai sang pai	SH,ST	B	2	fp,ou
Poaceae	<i>Gigantochloa albociliata</i> (Munro) Kurz (RPH 172)	phai rai	SH	B	1	fp
	<i>Imperata cylindrica</i> (L.) Raeusch. (RPH 192)	ya kha	L,RT	G	2	md,ou
	<i>Oryza sativa</i> L. (RPH 259)	khao	SD	G	1	fp,cp,ou
	<i>Saccharum officinarum</i> L. (RPH 293)	oi	ST,WP	G	1	fp,md,cp,ou
	<i>Thyrsostachys siamensis</i> Gamble (RPH 340)	phai ruak	SH	B	1	fp

Families	Plant species	Phu Thai names	*Part used	**Habit	***Source	****Plant uses
	<i>Zea mays</i> L. (RPH 227)	ma sa li	FR	G	1	fp
Polygonaceae	<i>Persicaria odorata</i> (Lour.) Soják (RPH 271)	phak phaew	YL,L	H	1	fp
	<i>Homalocladium platycladum</i> (F. Muell.) L. H. Bailey (RPH 188)	wa ja keb	L	S	2	md
Primulaceae	<i>Ardisia pilosa</i> H. R. Fletcher (RPH 040)	man pu	FR	S	1	fp
Rhamnaceae	<i>Colubrina asiatica</i> (L.) Brongn. var. <i>asiatica</i> (RPH 105)	khan song	YL	C	1	fp
	<i>Ziziphus jujuba</i> Mill. (RPH 357)	ma ka tan	BK	ST	2	md
	<i>Ziziphus oenoplia</i> (L.) Mill. var. <i>oenoplia</i> (RPH 358)	lep meaw	FR,RT	C	2	fp,md
Rubiaceae	<i>Canthium berberidifolium</i> Geddes (RPH 075)	ngiang duk	FR	S	2	fp
	<i>Catunaregam tomentosa</i> (Blume ex DC.) Tirveng. (RPH 083)	nam thaeng	FR	S/ST	2	ou
	<i>Gardenia obtusifolia</i> Roxb. ex Hook. f. (RPH 170)	khai nao	ST	S/ST	2	md
	<i>Ixora cambodiana</i> Pit. (RPH 198)	khem	FL	S	1	cp
	<i>Morinda citrifolia</i> L. (RPH 239)	yo ban	FR,L,ST	ST	1	fp,cp,ou
	<i>Morinda corei</i> Buch.-Ham. (RPH 240)	yo pa	L,ST,WP	ST	2	md,ou
	<i>Neolamarckia cadamba</i> (Roxb.) Bosser (RPH 249)	kra tum pai	L	T	2	cp
	<i>Oxyceros horridus</i> Lour. (RPH 260)	khat khao	RT, ST,FL	ScanS	2	md,cp
	<i>Paederia linearis</i> Hook. f. var. <i>linearis</i> (RPH 262)	tot mu tot ma	L,YL,RT,V	C	2	fp,ou
Rutaceae	<i>Aegle marmelos</i> (L.) Corrêa ex Roxb. (RPH 011)	ma tum	FR,YL,RT	T	2	fp,md
Rutaceae	<i>Citrus × aurantifolia</i> (Christm.) Swingle (RPH 094)	manoa	FR,YL,LN, BK, RT	ST	1	fp,md
	<i>Citrus hystrix</i> DC. (RPH 095)	ma krut	L,FR	ST	1	fp,ou
	<i>Citrus ichangensis</i> Swingle (RPH 096)	som lawo	FR	ST	1	fp
	<i>Clausena guillauminii</i> Tanaka (RPH 097)	song fa	RT,L	S	2	md,ou
Salicaceae	<i>Nephelium hypoleucum</i> Kurz (RPH 250)	ma ngeaw	FR	ST	2	fp
	<i>Casearia grewiiifolia</i> Vent. (RPH 080)	pha sam	ST	T	2	md
	<i>Flacourtia indica indica</i> (Burm. f.) Merr. (RPH 167)	ma ken	ST,FR	ST	2	fp,md
Santalaceae	<i>Scleropyrum pentandrum</i> (Dennst.) Mabb. (RPH 300)	nom ngo	ST,RT	T	2	md
Sapindaceae	<i>Dimocarpus longan</i> Lour. var. <i>longan</i> (RPH 139)	lum yai	FR,L	T	1	fp,cp
	<i>Lepisanthes rubiginosa</i> (Roxb.) Leenh. (RPH 213)	ma hoat	FR,RT,L	S/ST	2	fp,md,ou
	<i>Schleichera oleosa</i> (Lour.) Merr. (RPH 297)	ma khor	FR,BK	T	2	fp,ou
Sapotaceae	<i>Chrysophyllum cainito</i> L. (RPH 091)	ma num nom	FR	T	1	fp
	<i>Pouteria campechiana</i> (Kunth) Baehni (RPH 283)	lamut khamen	FR	T	1	fp
Saururaceae	<i>Houttuynia cordata</i> Thunb. (RPH 190)	phak khao thong	L,YL,WP	H	1	fp,md
Scrophulariaceae	<i>Limnophila aromatica</i> (Lam.) Merr. (RPH 216)	phak kha yaeng	L,YL	H	2	fp
Smilacaceae	<i>Smilax glabra</i> Roxb. (RPH 312)	ya ho	RZ	C	2	md
Solanaceae	<i>Capsicum annuum</i> L. (RPH 076)	ma quid	FR	US	1	fp,cp,ou
	<i>Harrisonia perforate</i> (Blanco) Merr. (RPH 180)	kun ta	L, RT	ScanS	2	ou
	<i>Nicotiana tabacum</i> L. (RPH 252)	ya sen	L	H	1	cp,ou
	<i>Solanum anguivi</i> Lam. (RPH 313)	ma hang	FR,RT	S	1	fp,md
	<i>Solanum incanum</i> L. (RPH 314)	ma kher	FR,RT	US	1	fp,md
	<i>Solanum lycopersicum</i> L. (RPH 315)	ma kher ker	FR	H	1	fp

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Solanaceae	<i>Solanum melongena</i> L. (RPH 316)	ma kher	FR	US	1	fp,cp	
	<i>Solanum stramonifolium</i> Jacq. (RPH 317)	ma uek	FR	US	1	fp	
	<i>Solanum torvum</i> Sw. (RPH 318)	ma kang	FR	S	1	fp	
Styracaceae	<i>Styrax benzoides</i> Craib (RPH 234)	ha yan	RT	T	1	ou	
Symplocaceae	<i>Symplocos racemosa</i> Roxb. (RPH 235)	mert	L	S/ST	2	fp	
Vitaceae	<i>Cissus hastata</i> Miq. (RPH 093)	kher ob ab	L	C	2	fp	
Xanthorrhoeaceae	<i>Aloe vera</i> (L.) Burm. f. (RPH 021)	wan hang kare	L	H	1	md	
Xyridaceae	<i>Xyris indica</i> L. (RPH 351)	ya khi klak	WP	H	2	md	
Zingiberaceae	<i>Alpinia conchigera</i> Griff. (RPH 022)	kha	RZ, SH	H	1	fp	
	<i>Alpinia galanga</i> (L.) Willd. (RPH 023)	kha	FL, RZ	H	1	fp,md,ou	
	<i>Alpinia siamensis</i> K. Schum. (RPH 024)	kha	RZ, FL	H	1	fp	
	<i>Boesenbergia rotunda</i> (RPH 060)	kha sai	RZ	H	1	fp	
	<i>Curcuma longa</i> L. (RPH 121)	ki min san	RZ	H	1	fp,md	
	<i>Curcuma parviflora</i> Wall. (RPH 123)	kha jew	FL,L	H	2	fp,md	
	<i>Hedychium coronarium</i> (RPH 181)	ma ha hong	RZ,FL	H	1	fp,md	
	<i>Kaempferia galanga</i> L. (RPH 202)	wan moop	SH, RZ	H	2	fp	
	<i>Kaempferia marginata</i> Carey ex Roscoe (RPH 203)	wan moop	SH, RZ	H	2	fp,md	
	<i>Zingiber montanum</i> (J. Koenig) Link ex A. Dietr. (RPH 352)	wan fai	FL,RZ,L	H	1	fp,md,cp	
	<i>Zingiber officinale</i> Roscoe (RPH 353)	khing	RZ	H	1	fp,md	
	<i>Zingiber zerumbet</i> (L.) Roscoe ex Sm. subsp. <i>zerumbet</i> (RPH 355)	krathue	L,RZ	H	1	fp,md	
	<i>Alpinia zerumbet</i> (RPH 025)	kha	RZ	H	1	fp,md	
	<i>Curcuma comosa</i> Roxb. (RPH 120)	wan shak mod look	RZ	H	1	md	
	<i>Curcuma manga</i> Valetton & Zijp (RPH 122)	ki min khao	RZ	H	1	md	
	<i>Curcuma sessilis</i> Gage (RPH 124)	ka jew	RZ,FL	H	1	fp,md	
	<i>Curcuma zedoaria</i> (Christm.) Roscoe (RPH 125)	khi min	RZ	H	1	cp,ou	
	<i>Globba winitii</i> C. H. Wright (RPH 174)	wan sao long	SH,L	H	1	md,cp	
	Zingiberaceae	<i>Kaempferia parviflora</i> Wall. ex Baker (RPH 204)	ka sai dam	RZ	H	1	md,ou
		<i>Zingiber ottensii</i> Valetton (RPH 354)	wan fai jai dam	RZ	H	1	fp,md

*YL= young leaves, L= leaves, WP= whole parts, ST= stem, FL= flowers, RT= roots, BL= bulb, FR= fruits, SH= shoots, V= vines, CR= corm, RZ= rhizome, GU= gum, BK= bark, SD= seeds, PO= petiole, CJ=Coconut juice from seed, PD=peduncle, LN=lemonade, FB=fiber

**H=Herb, T=Tree, ST= Shrubby tree, C= Climber, S= Shrub, S/ST=Shrub/Shrub tree, P= Palm, ScanS= Scandent Shrub, G=Grass, Shrubby ST/T= Tree/tree, US=Undershrub, CrH=Creeping Herb, Herbaceous Climbe = HC, S/T= Shrub/Tree, WC=Woody Climber, AqH = Aqua Herb, B=Bamboo, CP = Climbing Palm, AqF=Aquatic Fern, EF=Epiphytic Fern, EO = Epiphytic Orchid, H/S = Herb/Shrub, H/ST = Herb / Shrubby Tree, PaHC = Parasitic Herbaceous Climber, and PaS= Parasitic Shrub

***1 = cultivation, 2 = from the forest

****fp = food plant, md = medicinalplant, cp = cultural plant, ou = other uses

Table 2 Ten most common plant families used by the Phu Thai ethnic group.

No.	Families	Species	Percentage
1	Fabaceae	42	12.77
2	Zingiberaceae	20	6.08
3	Poaceae	15	4.56
4	Apocynaceae	13	3.95
5	Rubiaceae	9	2.74
6	Asteraceae	9	2.74
7	Cucurbitaceae	9	2.74
8	Lamiaceae	9	2.74
9	Solanaceae	9	2.74
10	Malvaceae	8	2.43

Table 3 Cultural importance index (CI) of the 10 most important plant species in the Phu Thai ethnic groups.

No.	Plant species	Phu Thai names	Plant uses				CI
			food plants	medicinal plants	cultural plants	other uses	
1	<i>Oryza sativa</i> L. (RPH 259)	khao	✓	-	✓	✓	2.74
2	<i>Saccharum officinarum</i> L.(RPH 293)	oi	✓	✓	✓	✓	2.64
3	<i>Cocos nucifera</i> L. (RPH 102)	ma phao	✓	✓	✓	✓	2.57
4	<i>Musa × paradisiaca</i> L. (RPH 244)	koi namwa	✓	✓	✓	✓	2.55
5	<i>Musa balbisiana</i> Colla (RPH 245)	koi tani	✓	✓	✓	✓	2.55
6	<i>Artocarpus heterophyllus</i> Lam. (RPH 044)	ma mi	✓	✓	✓	✓	2.15
7	<i>Phyllanthus acidus</i> (L.) Skeels (RPH 272)	ma yom	✓	✓	✓	-	2.02
8	<i>Nelumbo nucifera</i> Gaertn. (RPH 248)	bo long	✓	-	✓	-	2.00
9	<i>Punica granatum</i> L. var. <i>granatum</i> (RPH 287)	ma pi la	✓	✓	✓	-	1.98
10	<i>Bambusa nutans</i> Wall. ex Munro (RPH 052)	phai bong	✓	-	✓	✓	1.87

Classifying the use-categories in this study followed Cook [9]. Vouchers were collected in the number series of Rapeeporn Phonhiamhan (RPH) and deposited in the Mahasarakham University Herbarium, Mahasarakham, Thailand. **Table 3** shows that the highest cultural important index (CI) was *Oryza sativa* L. (CI = 2.74) followed by *Saccharum officinarum* L. (CI = 2.74), and *Cocos nucifera* L. (CI = 2.57). *Oryza sativa* L. is the staple food of the Thai people, including the Phu Thai ethnic group. In addition, rice is also used in tribal rituals and beliefs, including religious and funeral rites of the tribe. The water used to soak the rice is used for shampoo and especially the Phu Thai use rice to make Chinese yeast cake for glutinous fermented liquors. While *Saccharum officinarum* L., *Cocos nucifera* L., *Musa × paradisiaca* L., and *Musa balbisiana* Colla were used for every category of plant usefulness. These plants, which are important in the lives of the Phu Thai, are indispensable in tribal rituals, such as the annual ceremony for 12 months, Bai Si ceremony, wedding, Yao ceremonies, and funerals. Plants with high CI values might have an interesting dietary constituent and need further research. Also, a plant with a low CI value could be an important plant for a few people [10].

The most common cited usages of plants are still food and medicine. Because villagers are generally migrating to big cities and benefiting from the facilities of modern medicine, the heritage of traditional

ethnobotanical knowledge is decreasing dramatically. Although this relieves some of the pressures on some plant species, documenting and analyzing the indigenous wild plants' ethnobotanical usages through ethnobotanical studies is still important for the conservation of traditional ethnobotanical knowledge. With the changes in lifestyle, more and more pronounced droughts, increasing population, and the associated decline of the importance of plants, it is to be feared that Phu Thai ethnobotanical knowledge might get considerably limited or disappear in the foreseeable future. This is more evident since this knowledge is still mostly taught orally, without a written record.

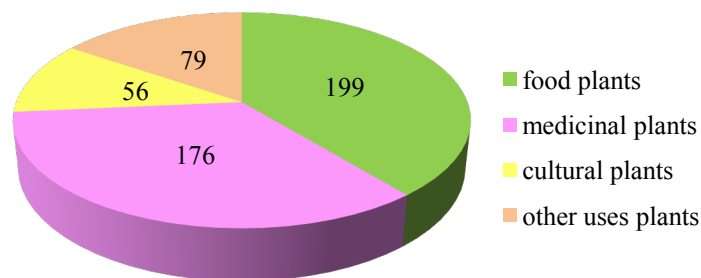


Figure 3 Number of plant species in each category.

The number of plant species in each category in **Figure 3** shows that most plants were used for food (199 species) followed by medicine (176 species), cultural (79 species), and other uses (56 species), respectively.

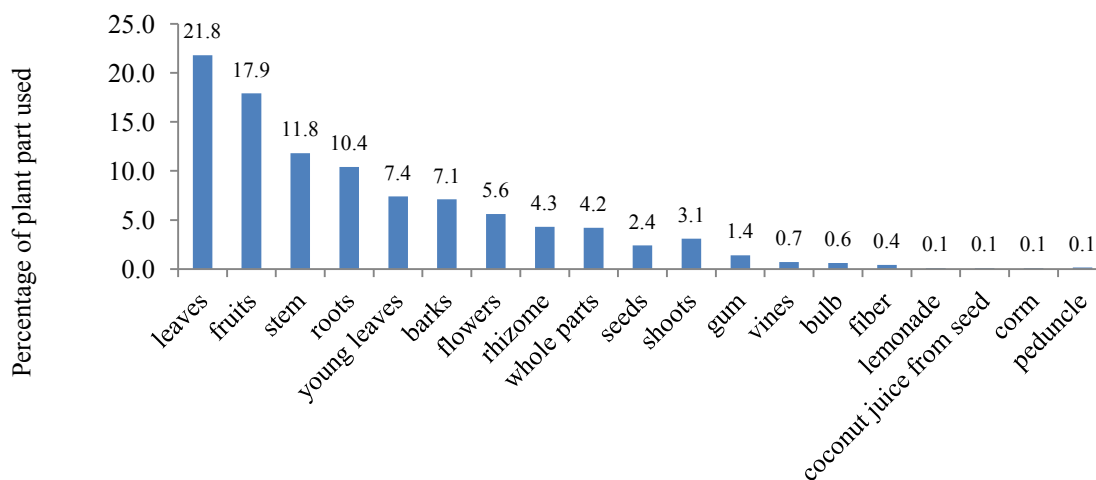


Figure 4 Percentage of plant part used.

The percentage of the plant part used in **Figure 4** shows that leaves, fruits, and stem were the plant parts most used 21.20, 17.99 and 11.85 %, respectively. Leaves were the plant parts that were used the most in the preparation of remedies by the Phu Thai, as compared to other parts. Many studies conducted elsewhere in Thailand show the dominance of the leaf in usage [16-18]. This is because leaves are easy to find in their community, the main photosynthetic organ in plants and are considered to be a key component of the natural pharmacy for the synthesis of many active constituents [19]. Gathering leaves could be promoted as a sustainable practice, since in most cases at least, a number of leaves are left on the parent plant which then allows the plants to carry on their life functions [20].

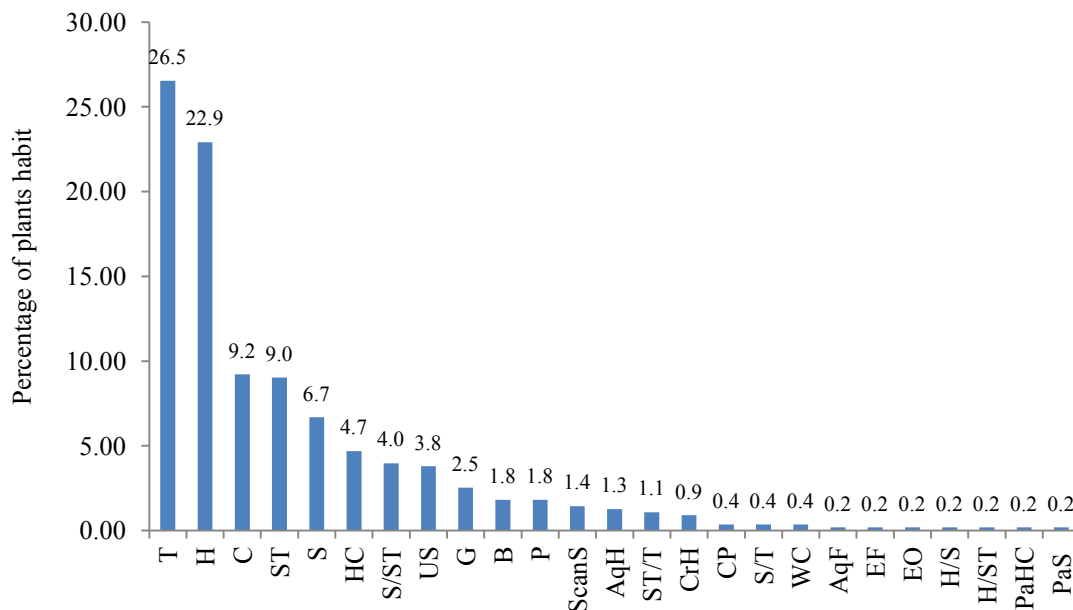


Figure 5 Percentage of plants habit.

This research found that trees (T) were the most common plant habit (26.53 %) such as *Mangifera indica* L., *Tamarindus indica* L., followed by the herb (H) (22.92 %) such as *Eryngium foetidum* L., *Blumea napifolia* DC., and climber (C) 9.21 %) such as *Lablab purpureus* (L.) Sweet, *Tiliacora triandra* (Colebr.) Diels. Trees are very useful and the most used by the Phu Thai. But Hermane [21] found that herbs were generally more widespread in the 3 communities than trees.

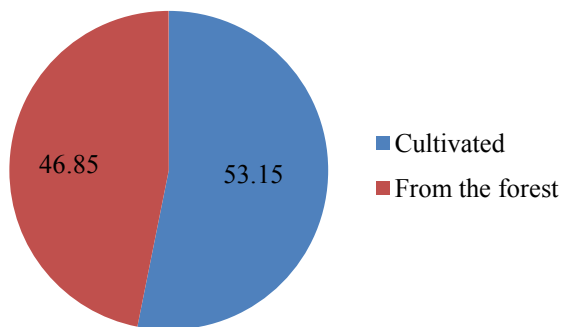


Figure 6 Percentage of plants source.

The percentage of plants source in **Figure 6** shows that most plants were gathered from cultivation (53.15 %) followed by from the forest (46.85 %). In general, most of the women stay at home most of the time, where the main activities are cooking, taking care of the children, tending gardens of edible and ornamental plants, etc., so they are most familiarized with cultivated plants and their uses such as *Ocimum africanum* Lour., *Coriandrum sativum* L. Estrada [22] found that most plants were cultivated.

Comparison of genders, ages, and indigenous knowledge

To determine whether differences exist in the knowledge about the number of species and uses between women and men, and to know if there is a correlation between the age of informants and knowledge of species and their uses.

Table 4 Comparison of genders and indigenous knowledge.

Gender	N	\bar{X}	SD	t	*Sig.
Male	22	0.51	0.22	0.215	0.645
Female	25	0.52	0.24		
Total	47	0.52	0.23		

*The mean difference is significant at the 0.05 level.

Comparison of genders and indigenous knowledge in **Table 4** shows that the indigenous knowledge for males and females were 0.51 and 0.52 respectively and it means that the indigenous knowledge listed by males and females did not differ significantly ($p > 0.05$). Because in the daily life the Phu Thai did the same activity together so they know the same about plants usage. But Edna [18] found that there were significant differences related to the total indigenous knowledge between genders.

Table 5 Comparison of age and indigenous knowledge.

Age	N	\bar{X}	Plant species	SD	F	*Sig.
15 - 30	16	0.29	93	0.04	42.806	0.000
31 - 50	15	0.54	174	0.11		
> 50	16	0.73	236	0.20		
Total	47	0.52	323	0.23		

*The mean difference is significant at the 0.05 level.

The indigenous knowledge related to age was significantly different at the 0.05 level. Informants over 50 have the highest indigenous knowledge (236 species, \bar{X} = 0.73), followed by 31 - 50 (174 species, \bar{X} = 0.54), and the lowest indigenous knowledge is 15 - 30 (93 species, \bar{X} = 0.29), suggesting that older informants had more indigenous knowledge on plants uses than the younger generation.

Informant consensus factor (ICF)

The 53 different ailments reported were grouped into 14 broad categories. One hundred and fifty-two species were used to treat more than one ailment and the remaining 18 species were used to treat only one ailment. Most plant species were used to cure digestive system disorders (51 species), followed by treatment of infections/infestations (27 species), and injuries (20 species). The highest ICF value was recorded for injuries (ICF = 0.968), which indicates the high degree of agreement among the informants' knowledge of medicinal plants that were used to treat ailments in these categories and the lowest ICF value was for nervous system disorders (ICF = 0.909) (Table 6), which indicates the informants' disagreement of using a particular plant to treat a particular ailment category, such as *Blumea balsamifera* (L.) DC. that was used to treat giddiness.

Table 6 Medical categories and informant consensus factor (ICF) of Phu Thai ethnic group.

No.	Medical category	Number of Taxa (Nt)	Number of use reports (Nur)	ICF
1	Injuries	20	587	0.968
2	Puerperium disorders	16	390	0.961
3	Digestive system disorders	51	1,178	0.958
4	Respiratory system disorders	14	234	0.944
5	Treat infections/infestations	27	459	0.943
6	Nutritional disorders	11	164	0.939
7	Endocrine system disorders	6	80	0.937
8	Reproductive System disorders	3	32	0.935
9	Pain	16	230	0.934
10	Parasite	2	15	0.929
11	Blood system disorders	4	42	0.927
12	Skin disorders	10	120	0.924
13	Genitourinary system disorders	11	120	0.916
14	Nervous system disorders	2	12	0.909

Fidelity level values (FL %)

The highest fidelity level values (FL %) were recorded for *Crinum asiaticum* L. var. *asiaticum* (93.62 %), which was used consistently for ankle sprain, *Zingiber officinale* Roscoe (87.23 %), which was used consistently for flatulence, and *Chromolaena odorata*(L.) R. M. King & H. Rob. (85.88 %), which was used consistently as a haemostatic (**Table 7**). Leaves of *Crinum asiaticum* L. var. *asiaticum* contain 6 saturated straight chain hydrocarbons, 2 sterols as well as thirteen fatty acids which have been isolated and identified [23]. Rahmatullah *et al.* [24] found that the plant has multiple ethnomedicinal uses and in various parts of Asia and the South Pacific islands, the plant or plant parts are used for gastrointestinal disorders, skin diseases, fever, earache, boils, tonsillitis, mumps, hernia, rheumatism, urinary troubles, bone fracture, edema, and antidote to poison. All of these medicinal plant species should be studied to determine the efficacy and safety of all locally reported medical uses and also evaluated by phytochemical and pharmacological tests as well as bioactivity essays and toxicity studies. This indicates a strong healing potential of the plants. It is assumed that plants, which are used in a repetitive fashion, are more likely to be biologically active [25].

Table 7 Mostly used medicinal plant species for medical categories based on 10 highest fidelity level of Phu Thai ethnic group.

No	Plants species	Medical category	Np	N	FL %
1	<i>Crinum asiaticum</i> L. var. <i>asiaticum</i> (RPH 113)	injuries	44	47	93.62
2	<i>Zingiber officinale</i> Roscoe(RPH 353)	digestive system disorders	41	47	87.23
3	<i>Chromolaena odorata</i> (L.) R. M. King & H. Rob.(RPH 090)	injuries	73	85	85.88
4	<i>Curcuma longa</i> L. (RPH 121)	digestive system disorders	95	115	82.61
5	<i>Kaempferia parviflora</i> Wall. ex Baker(RPH 204)	digestive system disorders	61	76	80.26
6	<i>Alpinia galanga</i> (L.) Willd. (RPH 023)	digestive system	63	79	79.75
7	<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees (RPH 033)	respiratory system disorders	87	117	74.36
8	<i>Aloe vera</i> (L.) Burm. f. (RPH 021)	injuries	78	105	74.29
9	<i>Barleria lupulina</i> Lindl.(RPH 053)	injuries	134	181	74.03
10	<i>Tiliacora triandra</i> (Colebr.) Diels (RPH 341)	pain	167	234	71.37

Conclusions

This ethnobotanical survey results probably revealed the rich wealth of indigenous knowledge and usage custom of traditional plants associated with rural people of Nakhon Phanom province. There was no written document of traditional knowledge and transmission to the future generation takes place only through oral communication. Traditional plant knowledge and use is still of high importance, and there are no indications that traditional knowledge has declined. With the changes in lifestyle, increasing population and the associated decline of the importance of plants, it is to be feared that the Phu Thai ethnobotanical knowledge might become considerably limited or disappear in the foreseeable future. An illustrated identification guide for the Phu Thai plant use, best produced in the Phu Thai is long overdue. The Phu Thai are however owners of this traditional knowledge and any possible benefit resulting from its use has to be given to their community.

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