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Medical ethnobotany and utilization of medicinal plants in the Don Pu Ta Forest Thai Yoi Ethnic Groups, Sakon Nakhon Province, Thailand

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Abstract. *Saensouk S, Saensouk P, Ragsasilp A, Senakun C, Daovisan H, Setyawan AD, Niamngon T, Niamngon P, Appamaraka S. 2024. Medical ethnobotany and utilization of medicinal plants in the Don Pu Ta Forest Thai Yoi Ethnic Groups, Sakon Nakhon Province, Thailand. Biodiversitas 25: 3014-3031.* The Thai Yoi Ethnic Group has access to Don Pu Ta Forest, a valuable resource rich in medicinal plants that are essential to the community. Local doctors in Don Pu Ta Forest have traditionally used these medicinal plants to care for the health of the community. This study aimed to examine the plant species and the use of medicinal plants in Don Pu Ta Forest, located in Pak Thop Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, Thailand. The study was conducted from 2023 to 2024 by interviewing villagers and surveying the biodiversity of medicinal plants. The plots were created to collect data on plant species, which were then examined and analyzed using various indices. The results of the study identified 36 families, 54 genera, and 61 species of medicinal plants. These species were further categorized into 30 families and 50 species of tall trees, 20 families and 25 species of saplings, and 14 families and 18 species of understory plants. Among these, tall trees had the highest diversity score, measuring 3.88, followed by saplings with a diversity value of 2.87, and understory plants with a diversity index of 2.46. The Evenness Index (E) was 0.88, and the highest Importance Value Index (IVI) recorded was 27.66. Specifically, *Lagerstroemia calyculata* Kurz had the highest IVI at 27.66, followed by *Elaeocarpus lanceifolius* Roxb. at 22.30, and *Anisoptera costata* Korth. at 20.20. The ICF analysis revealed that a total of 61 herbs were used to treat 28 groups of symptoms. The herbal treatment for relieving symptoms of flatulence, bloating, and cramps had the highest ICF value at 0.96, while the lowest ICF value was 0.70. Seven plants used to treat similar symptoms showed the highest fidelity level (%FL) value of 100%. This research is vital for the effective use of herbal plants in Don Pu Ta Forest and for conserving plant genetics to ensure long-term sustainability.

Keywords: Don Pu Ta Forest, ethnobotany, medicinal plants, Thai Yoi Ethnic Group

INTRODUCTION

Thailand is a country characterized by a diverse ethnic population. The majority of ethnic groups reside in rural regions (Phumthum and Balslev 2018). Throughout history, human existence has depended on natural resources for essential needs such as sustenance, nourishment, medicinal purposes, clothing, and shelter. Knowledge of the beneficial properties of plants has been acquired through practical experience in utilizing various plants, with these benefits passed down over many generations, eventually evolving into cultural practices within each tribe. Each generation may make alterations or changes in response to its usage, as stated by Pholhiamhan et al. (2018). The Thai Yoi Ethnic Group is one of the seven ethnic groups residing in Sakon Nakhon Province, located in the northeastern region of Thailand. Their original domicile was in province of Guizhou and Guangxi Zhuang Autonomous Regions, China. Subsequently, they migrated and established residence in the city of Phuwa. Phuwadon Sa-ang is located near the cities of Mahachai Kong Kaeo and Hom Thao in Khammouane Province, Lao People's Democratic Republic. Additionally, part of the population relocated by crossing the Mekong River to settle near water reservoirs in Sakon Nakhon Province. They sustain their lives through agricultural and fishing activities. Furthermore, the Bung Pa Tham Forest is a vital resource for sustenance, refuge, and medicinal purposes. A particularly notable local custom of the Thai

Yoi Ethnic Group is the practice of floating a steamboat at the conclusion of Buddhist Lent (Incherdchai 2024).

Don Pu Ta Forest is a community conservation area, sometimes referred to as a "life bank," typically found in rural towns in northeastern Thailand. Kongkittisan (2006) indicates that it serves as a significant reservoir of diverse and abundant life forms. The forest is considered sacred, and the sacred elements within it provide protection for the town, ensuring its safety. Consequently, the Pu Ta Shrine was constructed within the forest for religious devotion, and specific regulations and restrictions were established, including the prohibition of gathering forest resources, felling trees, and hunting. Local medical practitioners are allowed to use medicinal plants to treat individuals within the community. As a result, Don Pu Ta Forest has become a significant ecological asset at the local level. Upon reviewing the papers and research concerning the use of medicinal plants in Don Pu Ta Forest by various ethnic groups, it was found that only a minimal amount of information is available (Appamaraka et al. 2023). This scarcity can be attributed to the strict restrictions and regulations that prevent external parties from conducting studies and utilizing these plants.

Due to the absence of a study on the variety of food and therapeutic plants in Don Pu Ta Forest, there is a significant lack of information in this area. Therefore, it is crucial to conduct a comprehensive survey and analysis that covers all aspects of these plants. The findings from such an investigation would create a valuable repository of knowledge, enhancing our understanding of the expertise and wisdom possessed by indigenous medical practitioners who use medicinal plants in the Don Pu Ta Forest for healthcare purposes. Moreover, this study would provide a foundation for developing strategies to conserve these plants, ensuring their long-term survival in Don Pu Ta Forest.

MATERIALS AND METHODS

Study area

The study was conducted in the Don Pu Ta Forest, located in Phak Tob Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, Thailand, which is inhabited by the Yoi Ethnic Group, specifically in Villages No. 7 and 16 (Figure 1), located in Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province. The village is situated at an elevation of approximately 172 meters above sea level, with an estimated population of around 697. The primary agricultural activities in the area include cultivating rice and indigenous vegetables, as well as producing eucalyptus. The region experiences three distinct seasons: summer typically spans from March to May, the rainy season occurs between May and October, and the winter season lasts from October to February.

Data collection

Botanical survey

A botanical survey was conducted in Phak Tob Village between January 2023 and December 2024. The survey covered forested regions, residential zones, and various other sites. Within the settlement, the survey also involved verifying botanical data, including the scientific nomenclature, indigenous plant names, sources, and potential benefits or risks. The collected plants were sampled, dried, accurately identified, and then submitted as voucher specimens to the Herbarium at Mahasarakham University in Maha Sarakham, Thailand.

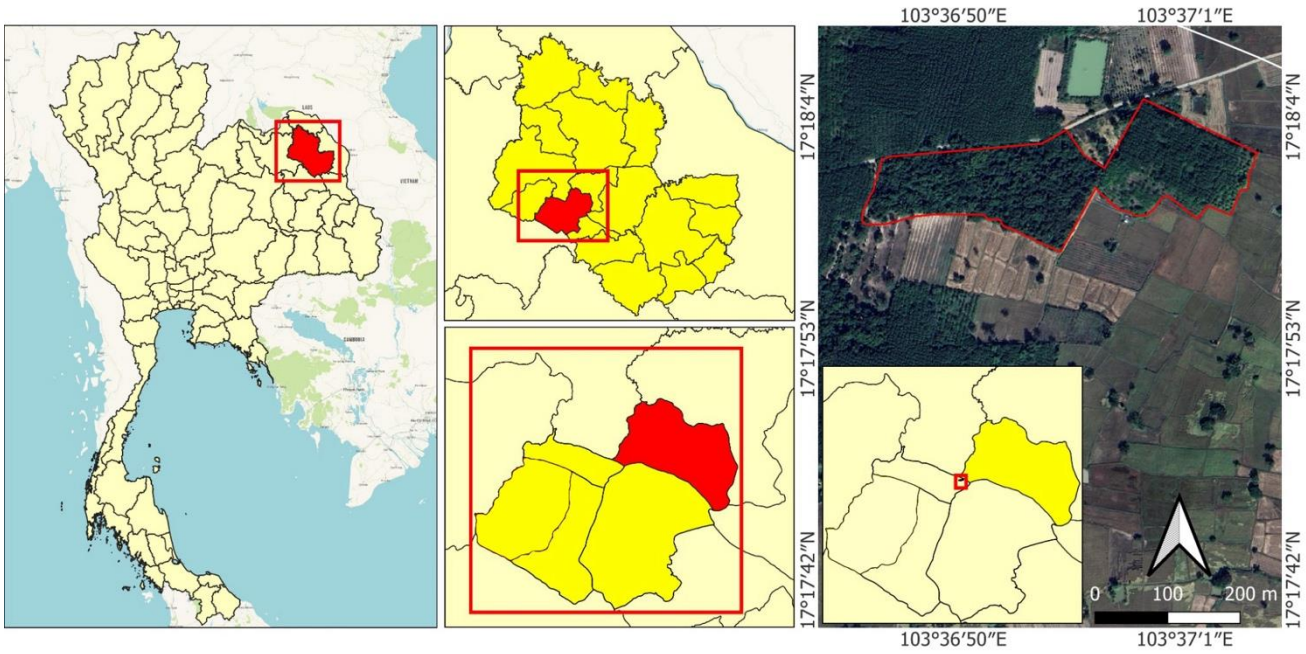

Figure 1. Map of study area in Don Pu Ta Forest, Phak Tob Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, Thailand

Plant species classification was based on available taxonomic information, specifically referencing the Flora of Thailand, including works by Mokkamul et al. (2013), Low et al. (2014), Thongpukdee et al. (2014), Van Welzen et al. (2014), Bongcheewin et al. (2015), Esser and Saw (2015), Paton et al. (2016), Saensouk et al. (2016; 2018; 2021a,b,c,d; 2022a,b), Ye and Xia (2016), Leeratiwong et al. (2017), Chen et al. (2018), Rather et al. (2018), Boonma and Saensouk (2019), Choopan et al. (2019), Saensouk and Saensouk (2019a,b, 2020a,b,c; 2021a,b; 2023), Boonma et al. (2020a,b, 2021, 2023), Rokade et al. (2020), Chantaranothai (2021), Johnson et al. (2021), Kumar et al. (2021), Lim et al. (2021), Orlandini et al. (2021), Satthaphorn et al. (2021), Bongcheewin et al. (2022), Chantaranothai et al. (2022), Ngernsaengsaruay et al. (2022), Rakarcha et al. (2022), Singh (2022), Tagane et al. (2022), Tarmizi et al. (2022), Zhang et al. (2022), Inta et al. (2023), POWO (2024), and Saensouk et al. (2024).

Ethnobotanical study

Data collection on traditional knowledge was carried out by gathering information on the community's understanding and use of medicinal plants to treat various ailments. Semi-structured interviews were conducted with a selected group of participants, allowing for in-depth conversations on the subject. The information collected included details on the local nomenclature of plants, the specific parts used, their attributes in usage, and their therapeutic qualities.

For biodiversity data collection, the Quadrat Method was employed in Don Pu Ta Forest to assess the diversity of medicinal plants. Eleven study plots were arranged following methodologies outlined by Smitinand (2014) and Saisor et al. (2021). Perennial plants were surveyed in 5×5 meter plots, where data on plants with a circumference of 30 centimeters or more and a height of at least 1.30 meters were recorded. This included information on the plants' circumference, names, and the number of trees. Sapling plants, with circumferences less than 30 centimeters and heights below 1.30 meters, were surveyed in 10×10 meter plots, with similar data recorded. Finally, seedling plants, not exceeding 1.30 meters in height, were documented within 1×1 meter plots, where their names were noted.

Local medicinal practitioners played a significant role in the survey, following the principles outlined in the Code of Ethics of the International Society of Ethnobiology (ISE 2006). These practitioners contributed their knowledge in documenting the biodiversity and medicinal properties of the plants. Information on local names, documented uses, and images of the plants were collected, along with plant parts for further analysis. Additional research was then conducted using taxonomic references and relevant literature, such as the work by Smitinand (2014).

Data analysis

Plant information is classified by family group, including scientific name, native name, and plant utilization. Quantitative data were analyzed using the following ethnobotanical indices:

Analysis of species diversity

Ecological importance. The species diversity data collected from each plot were used to calculate the Important Value Index (IVI), indicating each plant species' ecological significance. The calculations include the following parameters: Frequency (F), Dominance (Do), Density (D), Relative Density (RD), Relative Frequency (RF), and Relative Dominance (RDo) (Krebs 1999; Rahman et al. 2017).

RD = (number of individuals of species i/total number of individuals) x 100

RF = (frequency of species i/sum frequencies of all species) x 100

RDo = (total basal area for species i/total basal area of all species) x 100

Basal area = $\sum\pi (d/2)^2$; d = DBH, π =3.14

IVI = Relative density + Relative frequency + Relative dominance

Species diversity. The species diversity data collected from each plot were analyzed to assess species diversity using the appropriate formulas.

Diversity Index (H')

$H' = -\sum i=1S(pi \cdot \ln(pi))$

$$H' = -\sum_{i=1}^{s} (Pi)(InPi)$$

Where:

H' : Species Diversity Index value

Pi : Proportion between the number of tree species to the total number of trees

S : Total number of species

Evenness. Evenness measures the distribution of each species within a community. If the distribution is even, with similar numbers of each species, the evenness index will be high. Conversely, if the distribution varies significantly among species, the evenness index value will decrease.

Evenness Index (E)

$$E = \frac{H'}{\ln (S)}$$

Where:

E : Equitability, has a value from 0-1

H' : Diversity Index

S : Total number of plant species

Analysis of the utilization of species

Informant Consensus Factor (ICF). The Informant Consensus Factor (ICF) is used to test the homogeneity of knowledge about medicinal plants.

$$ICF = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where:

N_{ur} : Number of use-reports for a particular use category

N_t : Number of taxa used for a particular use category by all informants

A lower ICF value (close to 0) indicates disagreement among informants regarding the use of a plant for a specific ailment category. A higher ICF value (approaching 1) suggests that a small number of plants are commonly used by informants for treating a particular ailment category (Friedman et al. 1986).

Fidelity Level (%FL). Since many medicinal plant species may be used within the same use category, it is valuable to identify the most preferred species for treating a particular ailment, which can be assessed using the Fidelity Level (%FL).

$$\%FL = \frac{Np}{N} \times 100$$

Where:

N_p : Represents the number of reported utilizations of the plant for a specific syndrome

N : Total number of reports of utilization of that plant across all syndromes (Friedman et al. 1986).

RESULTS AND DISCUSSION

Species diversity of medicinal plants in the Don Pu Ta Forest Area

The traditional botanical study of the Don Pu Ta Forest, associated with the Thai Yoi Ethnic Group, yielded notable results. Phak Tob Village, located in Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, is home to a total of 36 families, 54 genera, and 61 species of plants. The Fabaceae family is the most widespread, consisting of 6 species (Table 1). This is consistent with the previous study by Pholhiamhan et al. (2018), which examined the ethnobotany of the Phu Thai ethnic group in Nakhon Phanom Province, Thailand. They found 329 plant species from 89 families used in the daily lives of the Phu Thai people, with the Fabaceae family being the most numerous (42 species), followed by Zingiberaceae (20 species) and Poaceae (15 species). Junsongduang et al. (2021) studied medicinal plants used by Tai Lao healers in Roi Et, Thailand, and found 146 species of medicinal plants across 127 genera and 60 plant families. The most common family was Fabaceae (12 species), followed by Poaceae (9 species) and Zingiberaceae (8 species). Saisor et al. (2021) conducted an ethnobotanical study of plants in Khok Nhong Phok Forest, Kosum Phisai District, Northeastern Thailand, and identified 101 plant species from 51 families used in various fields. Of these, 69 species were used for medicinal purposes. Niamngon et al. (2023) found that the Isaan Laos ethnic group in Sadam Sri Village utilized a total of 291 species from 229 genera and 88 families for various purposes, with the highest number in the Fabaceae family (32 species). Similarly, Niamngon et al. (2024) studied the Lao Isan ethnic group in Pho Chai District, Roi Et Province, and found 317 species across 247 genera and 89 families used in daily life. The most numerous plants were from the Fabaceae family (34 species), followed by Zingiberaceae (15 species). From these studies, it is evident that the Fabaceae family is the most commonly used plant family. This trend is consistent with the findings of this study, likely because the Fabaceae family shows significant diversity in various regions, leading to its extensive use in different applications.

Phenology

The period of blossoming and fruit-bearing is categorized into three distinct seasons: summer, rainy, and winter. From February to May, 5 species are in flower and 1 species is bearing fruit. During the rainy season, which spans from June to September, 21 species are in bloom and 18 species are bearing fruit. In the winter months from October to January, there are 5 species in flower and 7 species producing fruit. A total of 10 species exhibits cyclic blooming patterns over the summer and rainy seasons, resulting in the production of 24 distinct fruit varieties. Similarly, in both the rainy and winter seasons, there is one species that undergoes cyclic flowering, whereas three species produce fruit. Additionally, 12 species undergo cyclic blooming patterns in both the winter and summer seasons, of which 3 species bear fruit. Furthermore, there are two species currently experiencing continuous flowering, while two other species are bearing fruit and have not been located. At present, there are 5 species in flower, with 1 more species expected (Table 2, Figure 2).

Plant part used

The plant components most frequently utilized for medicinal purposes include 37 species of aerial stems, 29 species of roots, and 8 species of barks (Table 2, Figure 3). A study by Pholhiamhan et al. (2018) reported on the use of plant parts for various benefits by the Phu Thai ethnic group in Nakhon Phanom Province, finding that 82 plant species were used, with the majority being leaf parts. This study is similar to that of Junsongduang et al. (2021), which reported the use of plant parts by Tai Lao doctors in Roi Et Province, where 64 plant species were found, with the majority being stem parts.

Table 1. Plant family used by Don Pu Ta Forest of the Thai Yoi Ethnic Group, Phak Tob Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, Thailand

Family	Number of species
Fabaceae	6
Annonaceae	5
Capparaceae, Vitaceae	3
Apocynaceae, Bignoniaceae, Celastraceae, Combretaceae, Dipterocarpaceae, Fagaceae, Hypericaceae, Malvaceae, Moraceae, Myrtaceae, Rhamnaceae, Rubiaceae, Sapindaceae	2
Anacardiaceae, Burseraceae, Chrysobalanaceae, Connaraceae, Dilleniaceae, Elaeocarpaceae, Euphorbiaceae, Irvingiaceae, Lythraceae, Magnoliaceae, Melastomataceae, Meliaceae, Phyllanthaceae, Poaceae, Santalaceae, Thymelaeaceae, Zingiberaceae	1

Table 2. List of plant species with ethnobotanical uses by Don Pu Ta Forest of the Thai Yoi Ethnic Group, Phak Tob Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, Thailand

Family	Scientific name	Thai name	Phenology (month)		Part used	Collector no.
			Flowering periods	Fruiting periods		
Anacardiaceae	*Mangifera laurina* Blume	มะม่วงพรวน (Ma Muang Pruan)	11-1	1-4	AE	Sombat 001
Annonaceae	*Anaxagorea luzonensis* A.Gray	กำลังวัวเถลิง (Gum Lang Wua Thaloeng)	Not seen	Not seen	AE	Sombat 002
	Goniothalamus laoticus (Finet & Gagnep.) Bân	ข้าวหลามดง (Kaow Lahm Dong)	4-7	7-9	RO, AE	Sombat 003
	Polyalthia evecta (Pierre) Finet & Gagnep.	นมน้อย (Nom Noi)	6-8	8-10	RO	Sombat 004
	Uvaria micrantha (A.DC.) Hook.f.& Thomson	น้ำเต้าน้อย (Nam Tao Noi)	4-6	6-8	RO	Sombat 005
	U. ovata subsp. *ovata*	นมควาย (Nom Kwai)	5-6	6-8	AE	Sombat 006
Apocynaceae	*Cryptolepis buchananii* R.Br. ex Roem. & Schult.	เถาเอ็นอ่อน (Thao En On)	3-4	4-5	AE	Sombat 007
	Amphineurion marginatum (Roxb.) D.J.Middleton	โมกเครือ (Mok Kruea)	3-4	4-5	RO	Sombat 008
Bignoniaceae	*Stereospermum fimbriatum* (Wall. ex G.Don) A.DC.	แคฝอย (Kae Foy)	1-3	3-5	AE, BA, FL	Sombat 009
	Oroxylum indicum (L.) Kurz	เพกา (Phae Ga)	3-7	7-10	BA	Sombat 010
Burseraceae	*Canarium subulatum* Guillaumin	มะกอกเกลื้อน (Ma Gork Gluean)	1-5	5-7	GU	Sombat 011
Capparaceae	*Capparis radula* Gagnep.	เครือคางควาย (Kruea Karng Kwai)	2-3	3-4	AE	Sombat 012
	C. micracantha DC.	ชิงชี่ (Ching Chi)	2-4	4-6	RO	Sombat 013
	C. sepiaria L.	งัวซัง (Ngua Sang)	1-5	5-8	AE	Sombat 014
Celastraceae	*Siphonodon celastrineus* Griff.	มะดูก (Ma Dook)	5-6	6-8	RO, AE	Sombat 015
	Salacia chinensis L.	กำแพงเจ็ดชั้น (Gum Phaeng Jet Chan)	1-3	Not seen	RO, AE	Sombat 016
Chrysobalanaceae	*Parinari anamensis* Hance	พอก (Pok)	1-4	4-7	AE	Sombat 017
Combretaceae	*Getonia floribunda* Roxb.	ติ่งตั่ง (Ting Tang)	2-3	3-5	AE	Sombat 018
	G. aff. *floribunda* Roxb.	ฮวงชุ่ม (Huang Chum)	2-3	Not seen	AE	Sombat 019
Connaraceae	*Ellipanthus tomentosus* Kurz	คำรอก (Kham Rok)	1-3	Not seen	AE	Sombat 020
Dilleniaceae	*Dillenia ovata* Wall. ex Hook.fil. & Thomson	ส้านใบเล็ก (Saan Bai Lek)	6-7	7-9	RO, FR	Sombat 021
Dipterocarpaceae	*Anisoptera costata* Korth.	กระบาก (Kra Bark)	11-3	3-5	AE	Sombat 022
	Dipterocarpus obtusifolius Teijsm. ex Miq.	ยางเหียง (Yang Heang)	11-2	2-6	RO, GU	Sombat 023
Elaeocarpaceae	*Elaeocarpus lanceifolius* Roxb.	พีพ่าย (Pee Pai)	6-9	9-11	AE, BA	Sombat 024
Euphorbiaceae	*Suregada multiflora* (A.Juss.) Baill.	ขันทองพยาบาท (Khan Thong Phayabat)	3-5	5-7	RO, AE	Sombat 025
Euphorbiaceae	*Croton persimilis* Müll.Arg.	เปล้า (Plao)	2-6	6-8	RO, LE	Sombat 026
Fabaceae	*Samanea saman* (Jacq.) Merr.	จามจุรี (Jamjuree)	1-12	1-12	RO	Sombat 027
	Xylia xylocarpa (Roxb.) W.Theob.	แดง (Daeng)	2-4	4-9	AE	Sombat 028
	Dialium cochinchinense Pierre	เขลง (Kleng)	6-9	9-12	RO, AE	Sombat 029
	Pterocarpus macrocarpus Kurz	ประดู่ (Pra Doo)	3-4	4-6	AE, GU	Sombat 030
	Sindora siamensis Teijsm. ex Miq.	มะค่าแต้ (Ma Kah Tae)	3-6	6-9	AE, BA	Sombat 031
	Peltophorum dasyrhachis (Miq.) Kurz	อะราง (A-Raang)	2-5	5-9	AE, BA	Sombat 032
Fagaceae	*Castanopsis piriformis* Hickel & A.Camus	ก่อหิน (Gor Hin)	9-12	1-6	AE	Sombat 033
	Albizia lebbekoides (DC.) Benth.	คาง (Kaang)	3-4	4-7	AE	Sombat 034
Hypericaceae	*Cratoxylum formosum* (Jack) Benth. & Hook.fil. ex Dyer	ติ้วขาว (Tiw Khaow)	1-5	5-7	RO, LE	Sombat 035
	C. cochinchinense (Lour.) Blume	ติ้วขน (Tiw Kon)	1-5	5-7	RO	Sombat 036
Irvingiaceae	*Irvingia malayana* Oliv. ex A.W.Benn.	กระบก (Kra Bok)	1-3	3-4	FR	Sombat 037
Lythraceae	*Lagerstroemia floribunda* Jack	ตะแบก (Ta Baek)	3-5	5-7	BA	Sombat 038
Magnoliaceae	*Magnolia champaca* (L.) Baill. ex Pierre	จำปาดง (Jum Pa Dong)	1-12	1-12	RO, AE	Sombat 039
Malvaceae	*Microcos tomentosa* Sm.	พลับพลา (Plab Plar)	5-6	6-8	RO, AE	Sombat 040
	Bombax ceiba L.	งิ้วป่า (Ngew Pa)	1-2	2-4	BA	Sombat 041
Melastomataceae	*Osbeckia stellata* Buch.-Ham. ex D.Don	เอนอ้า (En Ah)	11-12	1-2	RO	Sombat 042
Meliaceae	*Azadirachta indica* A.Juss.	สะเดา (Sa Dao)	12-3	3-5	RO, LE	Sombat 043
Moraceae	*Streblus asper* Lour.	ข่อย (Khoi)	1-2	2-4	AE	Sombat 044
	Ficus hispida L.fil.	มะเดื่อปล้อง (Ma Duea Plong)	2-4	4-6	RO, AE, BA	Sombat 045
Myrtaceae	*Syzygium antisepticum* (Blume) Merr. & L.M.Perry	เม็ก (Mek)	2-4	4-6	RO	Sombat 046
	Syzygium cumini (L.) Skeels	หว้า (Wah)	3-5	5-7	RO, AE	Sombat 047
Phyllanthaceae	*Aporosa ficifolia* Baill.	เหมือดขน (Muead Kon)	1-3	3-5	RO, AE	Sombat 048
Poaceae	*Centotheca lappacea* (L.) Desv.	หญ้ารีแพร์ (Ya Repair)	Not seen	Not seen	WH	Sombat 049
Rhamnaceae	*Ziziphus oenopolia* (L.) Mill.	เล็บแมว (Leb Maew)	3-5	5-8	RO	Sombat 050
	Z. cambodiana Pierre	ตะครอง (Ta Krong)	3-4	Not seen	RO, AE	Sombat 051

Rubiaceae	*Dioecrescis erythroclada* (Kurz) Tirveng.	มะคังแดง (Ma Kang Daeng)	3-5	5-7	AE	Sombat 052
	Ridsdalea wittii (Craib) J.T.Pereira	หม้อ (Mhor)	12-2	2-4	AE	Sombat 053
Santalaceae	*Scleropyrum pentandrum* (Dennst.) Mabb.	นมวัว (Nom Wua)	3-6	6-7	RO, AE	Sombat 054
Sapindaceae	*Schleichera oleosa* (Lour.) Oken	ตะคร้อ (Ta Kroh)	3-4	4-7	AE	Sombat 055
	Lepisanthes rubiginosa (Roxb.) Leenh.	มะหวด (Ma Huat)	2-3	3-5	AE	Sombat 056
Thymelaeaceae	*Enkleia malaccensis* Griff.	ปอเต่าไห้ (Por Tao Hai)	1-2	2-4	RO	Sombat 057
Vitaceae	*Leea indica* (Burm.fil.) Merr.	กะตังใบ (Ka Tang Bai)	5-7	7-9	RO	Sombat 058
	Parthenocissus quinquefolia (L.) Planch.	เถาคัน (Thao Khan)	5-7	7-8	AE	Sombat 059
	Ampelocissus martini Planch.	ส้มกุ้ง (Som Goong)	4-6	6-8	AE	Sombat 060
Zingiberaceae	*Alpinia galanga* (L.) Willd.	ข่า (Kha)	5-6	6-7	RH, WH	Sombat 061

Part used: RO: Root; RH: Rhizome; AE: Aerial stem; BA: Barks; LE: Leaf; FL: Flower; FR: Fruit; GU: Gum; WH: Whole parts

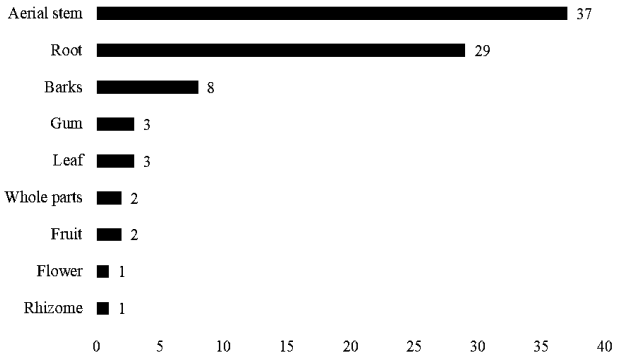

Figure 3. Number of plant part used in Don Pu Ta Forest, Phak Tob Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, Thailand

In the report by Niamngon et al. (2023), it was found that among the Lao Isan ethnic group in Kalasin Province, 140 plant species were used, with the majority being leaf parts, followed by 129 species of stem parts. Similarly, the study by Niamngon et al. (2024) found that among the Lao Isan ethnic group in Roi Et Province, 121 plant species were used, with the majority being leaf parts, followed by 104 species of stem parts. While these studies indicate a trend towards the use of specific plant parts, differences in findings may be due to variations in the focus of each study. Ethnobotanical research is multifaceted, which can lead to diverse findings.

Index value of importance of tree

The purpose of the study was to survey 30 families and 50 species of large evergreen medicinal plants in the Don Pu Ta Forest of the Thai Yoi Ethnic Group, using a specifically designed set of sample plots. The study revealed that *Lagerstroemia floribunda* Jack had the highest index value of 33.01, followed by *Elaeocarpus lanceifolius* Roxb. with a value of 21.45, and *Anisoptera costata* Korth. with a value of 21.37. The tree species with the lowest significance index values were *Xylia xylocarpa* (Roxb.) W.Theob. and *Dialium cochinchinense* Pierre, both with a value of 1.19 (see Table 3).

Index value of importance of sapling

A survey was conducted in the Don Pu Ta Forest of the Thai Yoi Ethnic Group to assess the presence of young trees in the sample plots. The survey identified a total of 20 families and 25 species of plants. The plant with the highest index value was *Goniothalamus laoticus* (Finet & Gagnep.) Bân, with a value of 46.24. It was followed by *Streblus asper* Lour. with a value of 35.62 and *Lepisanthes rubiginosa* (Roxb.) Leenh. with a value of 20.33. The plant with the lowest index value among the young trees was *D. cochinchinense* Pierre, with a value of 4.54 (see Table 4).

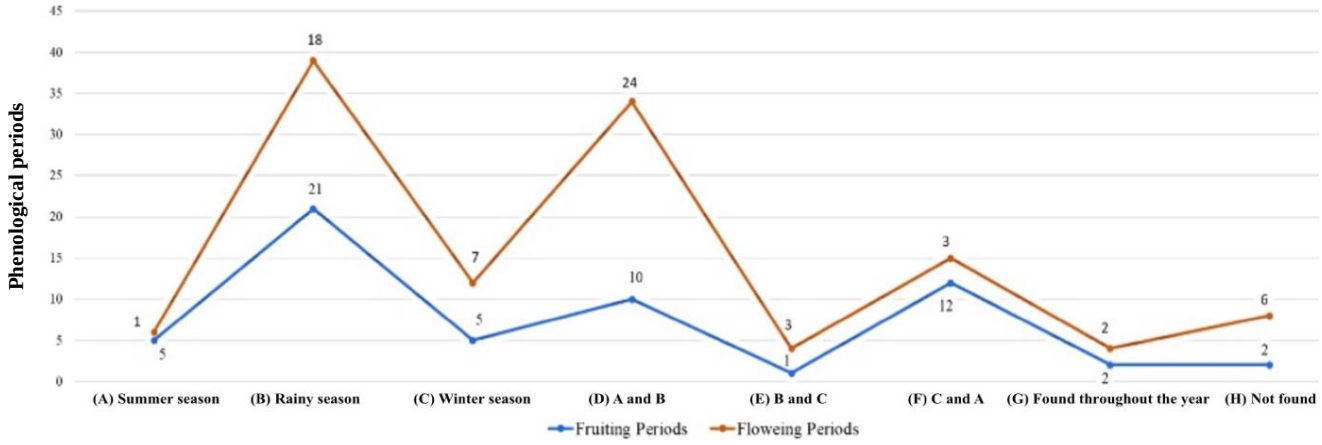

Figure 2. The phenology of plants in Don Pu Ta Forest, Phak Tob Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, Thailand

Table 3. The Importance Value Index (IVI) of tree species in the Don Pu Ta Forest, Thailand, associated with the Thai Yoi Ethnic Group, sorted from highest to lowest value

Scientific name	RD (%)	RF (%)	Rdo (%)	IVI
Lagerstroemia floribunda Jack	9.92	6.98	16.11	33.01
Elaeocarpus lanceifolius Roxb.	7.25	5.43	8.77	21.45
Anisoptera costata Korth.	4.2	5.43	11.74	21.37
Parinari anamensis Hance	5.73	5.43	7.48	18.64
Capparis radula Gagnep.	9.54	6.2	2.33	18.07
Syzygium antisepticum (Blume) Merr. & L.M.Perry	5.73	3.88	6.86	16.46
Pterocarpus macrocarpus Kurz	4.2	4.65	5.79	14.64
Streblus asper Lour.	5.34	3.88	4.56	13.78
Microcos tomentosa Sm.	6.11	3.88	2.37	12.35
Cryptolepis buchananii R.Br. ex Roem. & Schult.	4.58	3.1	1.65	9.33
Ridsdalea wittii (Craib) J.T.Pereira	2.29	1.55	3.74	7.58
Sindora siamensis Teijsm. ex Miq.	0.76	1.55	4.91	7.23
Dillenia ovata Wall. ex Hook.fil. & Thomson	3.05	2.33	1.82	7.19
Dipterocarpus obtusifolius Teijsm. ex Miq.	1.91	2.33	2.62	6.86
Syzygium cumini (L.) Skeels	1.91	2.33	2.41	6.64
Irvingia malayana Oliv. ex A.W.Benn.	0.38	0.78	4.41	5.57
Schleichera oleosa (Lour.) Oken	1.91	2.33	1.16	5.39
Castanopsis piriformis Hickel & A.Camus	1.15	1.55	2.19	4.88
Parthenocissus quinquefolia (L.) Planch.	1.53	2.33	0.33	4.18
Goniothalamus laoticus (Finet & Gagnep.) Bân	1.53	2.33	0.21	4.06
Uvaria ovata subsp. *ovata*	1.91	1.55	0.51	3.97
Samanea saman (Jacq.) Merr.	1.15	2.33	0.22	3.69
Cratoxylum formosum (Jack) Benth. & Hook.fil. ex Dyer	1.53	1.55	0.61	3.68
Albizia lebbekoides (DC.) Benth.	1.15	1.55	0.84	3.53
Bombax ceiba L.	1.15	1.55	0.58	3.28
Peltophorum dasyrhachis (Miq.) Kurz	1.53	0.78	0.97	3.27
Capparis micracantha DC.	0.76	1.55	0.34	2.66
Croton persimilis Müll.Arg.	0.76	1.55	0.18	2.49
Canarium subulatum Guillaumin	0.76	0.78	0.89	2.42
Lepisanthes rubiginosa (Roxb.) Leenh.	0.76	1.55	0.1	2.42
Aporosa ficifolia Baill.	0.76	1.55	0.06	2.37
Suregada multiflora (A.Juss.) Baill.	0.76	1.55	0.03	2.35
Ficus hispida L.fil.	1.15	0.78	0.3	2.22
Ziziphus cambodiana Pierre	0.76	0.78	0.51	2.05
Ampelocissus martini Planch.	0.38	0.78	0.78	1.93
Siphonodon celastrineus Griff.	0.38	0.78	0.53	1.68
Azadirachta indica A.Juss.	0.38	0.78	0.16	1.31
Ziziphus oenopolia (L.) Mill.	0.38	0.78	0.14	1.3
Oroxylum indicum (L.) Kurz	0.38	0.78	0.13	1.29
Cratoxylum cochinchinense (Lour.) Blume	0.38	0.78	0.11	1.27
Stereospermum fimbriatum (Wall. ex G.Don) A.DC.	0.38	0.78	0.11	1.26
Dioecrescis erythroclada (Kurz) Tirveng.	0.38	0.78	0.11	1.26
Mangifera laurina Blume	0.38	0.78	0.08	1.23
Magnolia champaca (L.) Baill. ex Pierre	0.38	0.78	0.05	1.21
Amphineurion marginatum (Roxb.) D.J.Middleton	0.38	0.78	0.06	1.21
Salacia chinensis L.	0.38	0.78	0.05	1.21
Ellipanthus tomentosus Kurz	0.38	0.78	0.04	1.2
Capparis sepiaria L.	0.38	0.78	0.04	1.2
Xylia xylocarpa (Roxb.) W.Theob.	0.38	0.78	0.03	1.19
Dialium cochinchinense Pierre	0.38	0.78	0.03	1.19

Index value of importance of understory

In the Don Pu Ta Forest of the Thai Yoi Ethnic Group, sample plots were established to study the ground vegetation. This vegetation includes 14 families and 18 species, comprising fruits, herbaceous plants, vines, and creepers. The ground understory species with the highest relative frequency was *E. lanceifolius* Roxb., with a value of 18.92. It was followed by *Uvaria ovata* subsp. *ovata*, with a value of 17.57, and *Parinari anamensis* Hance, with a value of 12.16. The ground vegetation with the highest relative density included *Polyalthia evecta* (Pierre) Finet & Gagnep., *U. ovata* subsp. *ovata*, *P. anamensis* Hance, and *Centotheca lappacea* (L.) Desv., with respective values of 9.09 (Table 5).

Diversity Index (H') and Evenness Index (E)

The Diversity Index (H') and Evenness Index (E) revealed the presence of 61 species of medicinal plants in Don Pu Ta Forest. These species were categorized into three groups: giant trees, seedling trees, and understory trees. Specifically, there were 30 families of giant trees, comprising 50 species; 20 families of seedling trees,

comprising 25 species; and 14 families of understory trees, comprising 18 species. The study found that giant trees exhibited the highest diversity index value of 3.88, while sapling trees and understory trees had diversity index values of 2.87 and 2.46, respectively. The overall evenness index value for the species was determined to be 0.88 (see Table 6).

The study results indicated that the tree diversity index in Don Pu Ta Forest, home to the Tai Yoi ethnic group in Sakon Nakhon Province, was higher compared to the sapling and understory layers. This finding is consistent with Klinhom (2014), who surveyed plant and animal species in Don Pu Ta Forest in Maha Sarakham Province. Klinhom's study found that the forest primarily consisted of large trees, outnumbering seedlings and small trees. These trees are distributed throughout the forest, providing ample shade.

Don Pu Ta Forest is considered a site of significant cultural and conservation value for the Isan villagers, with a specific management model. Located in Pak Thop Village, Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, the forest features numerous large trees that serve as crucial habitats and wildlife sanctuaries. Strict regulations on logging, harvesting, and hunting have contributed to the forest's high biodiversity, reflected in a uniformity index of 0.88, indicating a balanced distribution of tree species. The forest is preserved as a dry evergreen forest and conservation area, free from encroachment, which helps maintain its fertility and promotes a thriving ecosystem. These factors are vital for the survival of diverse plant and animal species in the forest.

The benefits of Don Pu Ta Forest's conditions can be attributed to the topography and settlement of the Tai Yoi community in Sakon Nakhon Province. This area is a naturally fertile deciduous and dry evergreen forest, rich in plants and herbs. Additionally, the community's traditions and beliefs, deeply rooted in their ancestral heritage, play a crucial role. The villagers chose a forest area near their home to establish Don Pu Ta Forest and built a shrine for Pu Ta as a symbol for future generations to honor their ancestors. Annually, before the rice planting season, the villagers perform a ceremony to dedicate to their grandparents, demonstrating respect, faith, and belief in the spirits of their ancestors who protect the community, ensure its happiness and peace, and ward off potential dangers. The villagers also pass down sacred stories about the spirits of their ancestors residing in Don Pu Ta Forest to their children. The community's commitment to conserving the forest and avoiding encroachment or destruction has made Don Pu Ta Forest more fertile compared to other general areas (Ketthet 1999).

Table 4. The index value of the importance of sapling in the Don Pu Ta Forest, Thailand, of the Thai Yoi Ethnic Group

Scientific name	RD (%)	RF (%)	Rdo (%)	IVI
Goniothalamus laoticus (Finet & Gagnep.) Bân	17.24	13.16	15.84	46.24
Streblus asper Lour.	15.52	7.89	12.2	35.62
Lepisanthes rubiginosa (Roxb.) Leenh.	8.62	7.89	3.82	20.33
Capparis micracantha DC.	5.17	2.63	8.96	16.76
Microcos tomentosa Sm.	5.17	7.89	2.52	15.59
Getonia floribunda Roxb.	3.45	2.63	8.71	14.79
Cratoxylum formosum (Jack) Benth. & Hook.fil. ex Dyer	3.45	5.26	5.86	14.57
Ziziphus oenopolia (L.) Mill.	3.45	5.26	3.93	12.64
Syzygium cumini (L.) Skeels	5.17	2.63	4.22	12.02
Scleropyrum pentandrum (Dennst.) Mabb.	3.45	5.26	3.06	11.77
Elaeocarpus lanceifolius Roxb.	1.72	2.63	4.06	8.41
Aporosa ficifolia Baill.	1.72	2.63	3.5	7.85
Leea indica (Burm.fil.) Merr.	3.45	2.63	1.67	7.75
G. aff. floribunda Roxb.	1.72	2.63	3.22	7.75
Croton persimilis Müll.Arg.	1.72	2.63	3.39	7.75
Syzygium antisepticum (Blume) Merr. & L.M.Perry	1.72	2.63	3.13	7.49
Salacia chinensis L.	1.72	2.63	2.98	7.34
Anisoptera costata Korth.	3.45	2.63	1.08	7.16
Uvaria ovata subsp. *ovata*	1.72	2.63	2.5	6.86
Cratoxylum cochinchinense (Lour.) Blume	1.72	2.63	2.15	6.51
Anaxagorea luzonensis A.Gray	1.72	2.63	1.68	6.03
Pterocarpus macrocarpus Kurz	1.72	2.63	1.32	5.68
Parinari anamensis Hance	1.72	2.63	1.32	5.68
Osbeckia stellata Buch.-Ham. ex D.Don	1.72	2.63	1.2	5.55
Castanopsis piriformis Hickel & A.Camus	1.72	2.63	0.72	5.08
Dialium cochinchinense Pierre	1.72	2.63	0.19	4.54

Table 5. The index value of the importance of seedling in the Don Pu Ta Forest of the Thai Yoi Ethnic Group

Scientific name	RF (%)	RD (%)
Polyalthia evecta (Pierre) Finet & Gagnep.	10.81	9.09
Uvaria ovata subsp. *ovata*	17.57	9.09
Parinari anamensis Hance	12.16	9.09
Centotheca lappacea (L.) Desv.	4.05	9.09
Anaxagorea luzonensis A.Gray	8.11	4.55
Uvaria micrantha (A.DC.) Hook.f. & Thomson	4.05	4.55
Capparis micracantha DC.	2.7	4.55
Elaeocarpus lanceifolius Roxb.	18.92	4.55
Suregada multiflora (A.Juss.) Baill.	2.7	4.55
Croton persimilis Müll.Arg.	1.35	4.55
Samanea saman (Jacq.) Merr.	1.35	4.55
Dialium cochinchinense Pierre	1.35	4.55
Irvingia malayana Oliv. ex A.W.Benn.	1.35	4.55
Microcos tomentosa Sm.	6.76	4.55
Osbeckia stellata Buch.-Ham. ex D.Don	1.35	4.55
Syzygium antisepticum (Blume) Merr. & L.M.Perry	2.7	4.55
Enkleia malaccensis Griff.	1.35	4.55
Alpinia galanga (L.) Willd.	1.35	4.55

Table 6. Diversity of medicinal plants in the Don Pu Ta Forest, Thailand, of the Thai Yoi Ethnic Group

Ethnic group	Tree	Sapling	Understory	Total H'	Evenness Index (E)
Thai Yoi	3.88	2.87	2.46	3.62	0.88

Table 7. Relative Frequency (RF), Relative Density (RD), Relative Dominance (RDo) and Importance Value Index (IVI) of medicinal plants in ethnic groups

Scientific name	RD	RF	RDo	IVI
Lagerstroemia calyculata Kurz	6.60	4.76	16.30	27.66
Elaeocarpus lanceifolius Roxb.	8.63	4.76	8.90	22.30
Anisoptera costata Korth.	3.55	4.76	11.89	22.20
Parinari anamensis Hance	6.35	5.29	7.58	19.22
Alpinia galanga (L.) Willd.	0.25	0.53	0.00	0.78
Samanea saman (Jacq.) Merr.	0.25	0.53	0.00	0.78
Enkleia malaccensis Griff.	0.25	0.53	0.00	0.78

Important Value Index (IVI)

All the medicinal plants found in the Don Pu Ta Forest are associated with the Thai Yoi Ethnic Group. The plant species with the highest significance index scores are *Lagerstroemia calyculata* Kurz, *Elaeocarpus hygrophilus* Kurz, *A. costata* Korth., and *P. anamensis* Hance, with importance index values of 27.66, 22.30, 22.20, and 19.22, respectively. Conversely, the plant species *Alpinia galanga* (L.) Willd., *Samanea saman* (Jacq.) Merr., and *Enkleia malaccensis* Griff. have the lowest importance index value of 0.78 (Table 7).

This study is the first to report these findings in this area. Khamyong et al. (2018) studied tree species composition and height-diameter allometry across three forest types in northern Thailand. Their research revealed a total of 201 tree species in 68 families. The dry evergreen forest had the highest tree species richness, with 137 species in 51 families, followed by the mixed deciduous forest (71 species in 31 families) and the dry dipterocarp forest (85 species in 43 families). The top five dominant tree species in each forest type, based on the highest IVI values, were *Lagerstroemia duperreana* Pierre ex Gagnep. (12.07%), followed by *Pterocarpus macrocarpus* Kurz (8.03%) and *Tectona grandis* L.f. (6.67%).

In the study by Thammanu et al. (2021) on above-ground carbon stock and REDD+ opportunities in community-managed forests in northern Thailand, 3,769 trees were surveyed in the Mae Chiang Rai Lum community forest, covering 129 species and 43 plant families. The plants with the highest IVI in the deciduous forest were *Shorea obtusa* Wall. (15.18%), followed by *S. siamensis* (Kurz) Miq. (11.63%) and *X. xylocarpa* (Roxb.) W.Theob. (8.20%). These differences may be attributed to variations in the study area, topography, and climate, which result in differing data on plant density and prominence.

Informant Consensus Factor (ICF)

The Informant Consensus Factor (ICF) analysis revealed that 61 medicinal plants were used in the treatment of 28 disease syndromes, with a predominant usage of medicinal plants as therapeutic agents. The disease syndromes with the highest number of plants used for their treatment were as follows: body aches and pains involved 18 different plant species, followed by fever and headaches associated with urticaria syndrome, which involved 14 plant species. Finally, the treatment of coughs, sore throats, and the expulsion of phlegm involved 13 plant species. The ICF for informants' knowledge of medicinal plants used to treat diseases was highest (ICF = 0.96) for the treatment of bloating and colic, indicating a strong level of agreement among the informants. Conversely, neutralizing exhibited the lowest level of agreement, with an ICF of 0.70 (Table 8).

In a study by Kumar et al. (2015) analyzing the ICF index, it was found that the diabetes and parasitic disease groups had an ICF value of 0.92, while the lowest ICF of 0.692 was observed in three disease groups: circulatory system diseases, eye problems, and urinary system issues. According to the study by Pholhiamhan et al. (2018), 53 disease syndromes were reported, with 52 used to treat more than one disease, while the remaining 18 were used to treat only one disease. The majority of plants were used for treating gastrointestinal disorders (51 species), followed by infections or outbreaks (27 species) and injuries (20 species). The highest ICF values were recorded for injuries (ICF = 0.968), indicating a high level of agreement among the informants regarding medicinal plants used in these categories, while the lowest ICF value was for nervous system disorders (ICF = 0.909).

The study by Saisor et al. (2021) analyzed the ICF index and found that dizziness syndrome had the highest ICF value of 0.958, indicating widespread acceptance of medicinal plants for this treatment among informants. Meanwhile, musculoskeletal syndrome had the lowest ICF of 0.692, suggesting that the medicinal plants used for this syndrome were less accepted by the informants. This may be due to the low use of plants for this syndrome and the variation in plant use among different respondents.

Fidelity Level (%FL)

Fidelity level (%FI) of used syndrome categories of the Thai Yoi Ethnic Group includes (Table 9).

Treatment of body aches and pains

A total of 18 plant species are used to alleviate bodily discomfort and soreness. Among these, *D. cochinchinense* Pierre has the highest Fidelity Level (%FL) value at 50.0%. The roots and pith of this plant are boiled and consumed as a drink. *Capparis radula* Gagnep. follows with a %FL value of 47.4%, where a portion of the vine is boiled and consumed as a beverage. *Cryptolepis buchananii* R.Br. ex Roem. & Schult. ranks third with a %FL value of 42.9%; it is used by boiling vine pieces to relieve body ailments.

Cure fever and headache

Fourteen plant species were used to treat fever and relieve headaches. The plant with the highest Fidelity Level (%FL) value is *Leea indica* (Burm.fil.) Merr., with a %FL value of 52.9%. The leaves of this plant are boiled and consumed as a drink. *Peltophorum dasyrhachis* (Miq.) Kurz follows with a %FL value of 45.5%, where the core part of the plant is boiled and consumed. In third place is *Albizia lebbekoides* (DC.) Benth., with a %FL value of 34.8%. The essence of this plant is boiled and consumed to cure fever and relieve headaches.

Cure cough, sore throat, expel phlegm

Thirteen plant species are utilized for the treatment of coughs, sore throats, and phlegm. The plant with the highest Fidelity Level (%FL) is *Mangifera laurina* Blume, with a %FL value of 50.0%. The leaves of this plant are boiled and consumed as a drink. The next species in terms of %FL value is *Syzygium antisepticum* Merr. & L.M.Perry, which has a %FL value of 45.5%. The leaves are boiled and consumed as a beverage. *Schleichera oleosa* (Lour.) Oken ranks third, with a %FL value of 36.0%. The fresh fruit of this plant is employed to treat coughs, sore throats, and to expel phlegm.

Treat hemorrhoids

A total of 11 distinct species of herbs have been used to treat hemorrhoids. The plant with the highest Fidelity Level (%FL) is *Irvingia malayana* Oliv. ex A.W.Benn., with a %FL value of 60.0%. The leaves of this plant are commonly boiled and consumed. The *A. costata* Korth. follows closely, with a %FL value of 53.3%; its leaves are typically ground and applied topically. In third place, both *Canarium subulatum* Guillaumin and *Castanopsis piriformis* Hickel & A.Camus have a %FL value of 50.0%. The bark, pith, and decocted blossoms of these plants are used in the treatment of hemorrhoids.

Relieve bloating, bloating, and colic

To alleviate bloating, distension, and colic, a total of ten plant species were employed. *Ziziphus cambodiana* Pierre had the highest Fidelity Level (%FL) value of 100.0%, with its roots being utilized. The core is boiled and consumed. Following this, *Dipterocarpus obtusifolius* Teijsm. ex Miq. had a %FL value of 80.0%, with its roots simmered and ingested. In third place, *Ziziphus oenopolia* (L.) Mill. had a %FL value of 60.6%. The roots were boiled and taken orally to alleviate symptoms of bloating, distension, and colic.

Treat rashes, itching, eczema, and other skin diseases

A total of ten plant species are used for treating rashes, eczema, and other skin ailments. The *P. anamensis* Hance has the highest Fidelity Level (%FL) value of 81.5%. The roots are utilized, and crushed young leaves are applied to the affected areas of the skin. Following this, *Siphonodon celastrineus* Griff. has a %FL value of 50.0%. Its pulverized root components are applied to the skin. In third place, *I. malayana* Oliv. ex A.W.Benn. has a %FL value of 47.6%. The leaves are used to prepare a boiled essence, which is then applied to treat rashes, eczema, and other skin disorders.

Nourish strength

There are 10 species of plants used to treat coughs, sore throats, and phlegm. The plant with the highest %FL value is *M. laurina* Blume, with a %FL value of 50.0%. This plant is used to make a drink. The second highest %FL value is for *S. antisepticum* (Blume) Merr. & L.M. Perry, with a %FL value of 45.5%. The leaves of this plant are used to make a drink. In third place is *S. oleosa* (Lour.) Oken, with a %FL value of 36.0%. The fresh fruit of this plant is used to treat coughs, sore throats, and to expel phlegm.

Helps the uterus to enter the cradle

There are 10 plant species used to treat coughs, sore throats, and phlegm. The plant with the highest %FL value is *M. laurina* Blume, which has a %FL value of 50.0% and is used for boiling and drinking. It is followed by *S. antisepticum* (Blume) Merr. & L.M. Perry, with a %FL value of 45.5%. The leaves of this plant are used for drinking. In third place is *S. oleosa* (Lour.) Oken, with a %FL value of 36.0%. The fresh fruit of this plant is used to cure coughs, sore throats, and to expel phlegm.

Table 8. Informant Consensus Factor (ICF) of used syndrome categories of the Thai Yoi Ethnic Group, Thailand

Syndrome category	No. of use-report (Nur)	No. of species (Nt)	ICF
Relieve bloating, and colic	213	10	0.96
Treats toothache, tartar, and bleeding gums	57	4	0.95
Treat urethritis, helps to urinate	89	6	0.94
Treat oral wounds	35	3	0.94
Treats rashes, itching, eczema, and other skin diseases	135	10	0.93
Cure cough, sore throat, expel phlegm	169	13	0.93
Nourish strength	127	10	0.93
Treat bruises	35	4	0.91
Relieve menstrual pain	23	3	0.91
Treat jaundice disease	12	2	0.91
Treat liver disease	41	5	0.90
Laxatives treat constipation	66	8	0.89
Treat diabetes, blood pressure	47	6	0.89
Treat diarrhea, diarrhea	26	4	0.88
Cure fever, headache	107	14	0.88
Treat malnutrition in children	9	2	0.88
Treat cancer	25	4	0.88
Helps remove toxins from the body	55	8	0.87
Helps nourish milk	39	6	0.87
Treat body aches and pains	130	18	0.87
Helps the uterus to enter the cradle	69	10	0.87
Relieves vomiting	31	5	0.87
Relieves dizziness and nausea	61	9	0.87
Helps nourish the blood	51	8	0.86
Treat fresh wounds, stop bleeding, abscesses, pus, and rotting wounds	49	8	0.85
Treat hemorrhoids	69	11	0.85
Nourish and treat kidney disease	52	10	0.82
Treat hives	6	2	0.80

Table 9. Fidelity level (%FL) of used syndrome categories of the Thai Yoi Ethnic Group, Thailand

Syndrome category	Scientific name	NP	N	%FL
Treat body aches and pains (18 species)	*Dialium cochinchinense* Pierre	4	8	50.0%
	Capparis radula Gagnep.	9	19	47.4%
	Cryptolepis buchananii R.Br. ex Roem. & Schult.	9	21	42.9%
	Anaxagorea luzonensis A.Gray	20	57	35.1%
	Albizia lebbekoides (DC.) Benth.	8	23	34.8%
	Capparis sepiaria L.	2	6	33.3%
	Siphonodon celastrineus Griff.	6	20	30.0%
	Croton persimilis Müll.Arg.	15	50	30.0%
	Salacia chinensis L.	8	34	23.5%
	Xylia xylocarpa (Roxb.) W.Theob.	5	23	21.7%
	Schleichera oleosa (Lour.) Oken	10	50	20.0%
	Parinari anamensis Hance	10	54	18.5%
	Ampelocissus martini Planch.	2	13	15.4%
	Ridsdalea wittii (Craib) J.T.Pereira	9	60	15.0%
	Irvingia malayana Oliv. ex A.W.Benn.	5	42	11.9%
	Dillenia ovata Wall. ex Hook.fil. & Thomson	2	18	11.1%
	Suregada multiflora (A.Juss.) Baill.	4	36	11.1%
	Ellipanthus tomentosus Kurz	2	22	9.1%
Cure fever, headache (14 species)	*Leea indica* (Burm.fil.) Merr.	9	17	52.9%
	Peltophorum dasyrhachis (Miq.) Kurz	10	22	45.5%
	Albizia lebbekoides (DC.) Benth.	8	23	34.8%
	Syzygium antisepticum (Blume) Merr. & L.M.Perry	8	27	29.6%
	Capparis micracantha DC.	12	45	26.7%
	Getonia floribunda Roxb.	2	9	22.2%
	Ridsdalea wittii (Craib) J.T.Pereira	13	60	21.7%
	Suregada multiflora (A.Juss.) Baill.	7	36	19.4%
	Polyalthia evecta (Pierre) Finet & Gagnep.	4	21	19.0%
	Samanea saman (Jacq.) Merr.	5	29	17.2%
	Azadirachta indica A.Juss.	10	58	17.2%
	Magnolia champaca (L.) Baill. ex Pierre	7	43	16.3%
	Lepisanthes rubiginosa (Roxb.) Leenh.	8	58	13.8%
	Oroxylum indicum (L.) Kurz	4	30	13.3%
Cure cough, sore throat, expel phlegm (13 species)	*Mangifera laurina* Blume	16	32	50.0%
	Syzygium antisepticum (Blume) Merr. & L.M.Perry	13	27	48.1%
	Schleichera oleosa (Lour.) Oken	18	50	36.0%
	Cratoxylum formosum (Jack) Benth. & Hook.fil. ex Dyer	20	57	35.1%
	Canarium subulatum Guillaumin	8	23	34.8%
	Cratoxylum cochinchinense (Lour.) Blume	17	50	34.0%
	Ampelocissus martini Planch.	4	13	30.8%
	Azadirachta indica A.Juss.	16	58	27.6%
	Capparis micracantha DC.	12	45	26.7%
	Bombax ceiba L.	18	72	25.0%
	Magnolia champaca (L.) Baill. ex Pierre	10	43	23.3%
	Oroxylum indicum (L.) Kurz	6	30	20.0%
	Ridsdalea wittii (Craib) J.T.Pereira	11	60	18.3%
Treat hemorrhoids (11 species)	*Irvingia malayana* Oliv. ex A.W.Benn.	6	10	60.0%
	Anisoptera costata Korth.	8	15	53.3%
	Canarium subulatum Guillaumin	3	6	50.0%
	Castanopsis piriformis Hickel & A.Camus	9	18	50.0%
	Samanea saman (Jacq.) Merr.	8	18	44.4%
	Anaxagorea luzonensis A.Gray	8	20	40.0%
	Capparis micracantha DC.	9	29	31.0%
	Streblus asper Lour.	6	21	28.6%
	Alpinia galanga (L.) Willd.	8	32	25.0%
	Capparis radula Gagnep.	1	9	11.1%
	Goniothalamus laoticus (Finet & Gagnep.) Bân	3	61	4.9%
Relieve bloating and colic (10 species)	*Ziziphus cambodiana* Pierre	4	4	100.0%
	Dipterocarpus obtusifolius Teijsm. ex Miq.	20	25	80.0%
	Ziziphus oenopolia (L.) Mill.	20	33	60.6%
	Cratoxylum cochinchinense (Lour.) Blume	28	50	56.0%
	Alpinia galanga (L.) Willd.	52	94	55.3%
	Cratoxylum formosum (Jack) Benth. & Hook.fil. ex Dyer	30	57	52.6%
	Lepisanthes rubiginosa (Roxb.) Leenh.	30	58	51.7%
	Syzygium cumini (L.) Skeels	12	49	24.5%
	Ellipanthus tomentosus Kurz	5	22	22.7%
	Bombax ceiba L.	12	72	16.7%

Treats rashes, itching, eczema, and other skin diseases (10 species)	*Parinari anamensis* Hance	44	54	81.5%
	Siphonodon celastrineus Griff.	10	20	50.0%
	Irvingia malayana Oliv. ex A.W.Benn.	20	42	47.6%
	Ficus hispida L.fil.	6	18	33.3%
	Alpinia galanga (L.) Willd.	25	94	26.6%
	Suregada multiflora (A.Juss.) Baill.	8	36	22.2%
	Azadirachta indica A.Juss.	10	58	17.2%
	Oroxylum indicum (L.) Kurz	5	30	16.7%
	Capparis micracantha DC.	6	45	13.3%
	Amphineurion marginatum (Roxb.) D.J.Middleton	1	20	5.0%
Nourish strength (10 species)	*Enkleia malaccensis* Griff.	35	35	100.0%
	Cryptolepis buchananii R.Br. ex Roem. & Schult.	12	21	57.1%
	Anaxagorea luzonensis A.Gray	30	57	52.6%
	Capparis radula Gagnep.	10	19	52.6%
	Dialium cochinchinense Pierre	4	8	50.0%
	Uvaria micrantha (A.DC.) Hook.f. & Thomson	8	18	44.4%
	Osbeckia stellata Buch.-Ham. ex D.Don	17	61	27.9%
	Irvingia malayana Oliv. ex A.W.Benn.	7	42	16.7%
	Goniothalamus laoticus (Finet & Gagnep.) Bân	2	16	12.5%
	Polyalthia evecta (Pierre) Finet & Gagnep.	2	21	9.5%
Helps the uterus to enter the cradle (10 species)	*Stereospermum fimbriatum* (Wall. ex G.Don) DC.	9	18	50.0%
	Centotheca lappacea (L.) Desv.	12	24	50.0%
	Goniothalamus laoticus (Finet & Gagnep.) Bân	7	16	43.8%
	Xylia xylocarpa (Roxb.) W.Theob.	9	23	39.1%
	Scleropyrum pentandrum (Dennst.) Mabb.	5	15	33.3%
	Amphineurion marginatum (Roxb.) D.J.Middleton	6	20	30.0%
	Croton persimilis Müll.Arg.	10	50	20.0%
	Ellipanthus tomentosus Kurz	3	22	13.6%
	Capparis micracantha DC.	5	45	11.1%
	Magnolia champaca (L.) Baill. ex Pierre	3	43	7.0%
Nourish and treat kidney disease (10 species)	*Dioecrescis erythroclada* (Kurz) Tirveng.	18	18	100.0%
	Getonia floribunda Roxb.	3	9	33.3%
	Leea indica (Burm.fil.) Merr.	4	17	23.5%
	Pterocarpus macrocarpus Kurz	3	15	20.0%
	Microcos tomentosa Sm.	3	17	17.6%
	Osbeckia stellata Buch.-Ham. ex D.Don	8	61	13.1%
	Anaxagorea luzonensis A.Gray	7	57	12.3%
	Dillenia ovata Wall. ex Hook.fil. & Thomson	2	18	11.1%
	Polyalthia evecta (Pierre) Finet & Gagnep.	1	21	4.8%
	Bombax ceiba L.	3	72	4.2%
Relieves dizziness and nausea (9 species)	*Anisoptera costata* Korth.	17	17	100.0%
	Peltophorum dasyrhachis (Miq.) Kurz	12	22	54.5%
	Xylia xylocarpa (Roxb.) W.Theob.	9	23	39.1%
	Scleropyrum pentandrum (Dennst.) Mabb.	5	15	33.3%
	Ampelocissus martini Planch.	3	13	23.1%
	Salacia chinensis L.	7	34	20.6%
	Microcos tomentosa Sm.	3	17	17.6%
	Ellipanthus tomentosus Kurz	2	22	9.1%
	Magnolia champaca (L.) Baill. ex Pierre	3	43	7.0%
Laxatives treat constipation (8 species)	*Schleichera oleosa* (Lour.) Oken	22	50	44.0%
	Aporosa ficifolia Baill.	8	23	34.8%
	Microcos tomentosa Sm.	5	17	29.4%
	Salacia chinensis L.	10	34	29.4%
	Polyalthia evecta (Pierre) Finet & Gagnep.	6	21	28.6%
	Magnolia champaca (L.) Baill. ex Pierre	8	43	18.6%
	Ampelocissus martini Planch.	2	13	15.4%
	Azadirachta indica A.Juss.	5	58	8.6%
Helps remove toxins from the body (8 species)	*Ficus hispida* L.fil.	7	18	38.9%
	Streblus asper Lour.	17	57	29.8%
	Samanea saman (Jacq.) Merr.	7	29	24.1%
	Suregada multiflora (A.Juss.) Baill.	6	36	16.7%
	Croton persimilis Müll.Arg.	5	50	10.0%
	Magnolia champaca (L.) Baill. ex Pierre	4	43	9.3%
	Bombax ceiba L.	5	72	6.9%
	Osbeckia stellata Buch.-Ham. ex D.Don	4	61	6.6%
Helps nourish the blood (8 species)	*Castanopsis piriformis* Hickel & A.Camus	3	6	50.0%
	Syzygium cumini (L.) Skeels	17	49	34.7%
	Dillenia ovata Wall. ex Hook.fil. & Thomson	6	18	33.3%
	Getonia floribunda Roxb.	3	9	33.3%

	Ficus hispida L.fil.	5	18	27.8%
	Samanea saman (Jacq.) Merr.	8	29	27.6%
	Leea indica (Burm.fil.) Merr.	4	17	23.5%
	Capparis micracantha DC.	5	45	11.1%
Treat fresh wounds, stop bleeding,	*Parthenocissus quinquefolia* (L.) Planch.	5	5	100.0%
abscesses, pus, and rotting wounds	*Capparis sepiaria* L.	4	6	66.7%
(8 species)	*Ziziphus oenopolia* (L.) Mill.	13	33	39.4%
	Pterocarpus macrocarpus Kurz	4	15	26.7%
	Canarium subulatum Guillaumin	6	23	26.1%
	Osbeckia stellata Buch.-Ham. ex D.Don	11	61	18.0%
	Bombax ceiba L.	5	72	6.9%
	Amphineurion marginatum (Roxb.) D.J.Middleton	1	20	5.0%
Treat urethritis, helps to urinate	*Getonia floribunda* Roxb.	30	30	100.0%
(6 species)	*Aporosa ficifolia* Baill.	15	23	65.2%
	Ridsdalea wittii (Craib) J.T.Pereira	21	60	35.0%
	Ellipanthus tomentosus Kurz	7	22	31.8%
	Amphineurion marginatum (Roxb.) D.J.Middleton	5	20	25.0%
	Bombax ceiba L.	11	72	15.3%
Treat diabetes, blood pressure	*Uvaria ovata* subsp. *ovata*	12	32	37.5%
(6 species)	*Mangifera laurina* Blume	11	32	34.4%
	Albizia lebbekoides (DC.) Benth.	7	23	30.4%
	Siphonodon celastrineus Griff.	4	20	20.0%
	Alpinia galanga (L.) Willd.	10	94	10.6%
	Magnolia champaca (L.) Baill. ex Pierre	3	43	7.0%
Helps nourish milk	*Uvaria micrantha* (A.DC.) Hook.f. & Thomson	10	18	55.6%
(6 species)	*Centotheca lappacea* (L.) Desv.	12	24	50.0%
	Goniothalamus laoticus (Finet & Gagnep.) Bân	7	16	43.8%
	Scleropyrum pentandrum (Dennst.) Mabb.	5	15	33.3%
	Ellipanthus tomentosus Kurz	3	22	13.6%
	Polyalthia evecta (Pierre) Finet & Gagnep.	2	21	9.5%
Treat liver disease	*Elaeocarpus lanceifolius* Roxb.	3	7	42.9%
(5 species)	*Osbeckia stellata* Buch.-Ham. ex D.Don	18	61	29.5%
	Uvaria ovata subsp. *ovata*	8	32	25.0%
	Syzygium antisepticum (Blume) Merr. & L.M.Perry	6	27	22.2%
	Ridsdalea wittii (Craib) J.T.Pereira	6	60	10.0%
Relieves vomiting	*Mangifera laurina* Blume	5	32	15.6%
(5 species)	*Bombax ceiba* L.	10	72	13.9%
	Uvaria ovata subsp. *ovata*	4	32	12.5%
	Azadirachta indica A.Juss.	7	58	12.1%
	Magnolia champaca (L.) Baill. ex Pierre	5	43	11.6%
Treats toothache, tartar, and bleeding	*Lagerstroemia floribunda* Jack	10	10	100.0%
gums	*Streblus asper* Lour.	40	57	70.2%
(4 species)	*Canarium subulatum* Guillaumin	4	23	17.4%
	Suregada multiflora (A.Juss.) Baill.	3	36	8.3%
Treat bruises	*Croton persimilis* Müll.Arg.	20	50	40.0%
(4 species)	*Irvingia malayana* Oliv. ex A.W.Benn.	10	42	23.8%
	Ampelocissus martini Planch.	2	13	15.4%
	Oroxylum indicum (L.) Kurz	3	30	10.0%
Treat diarrhea, diarrhea	*Elaeocarpus lanceifolius* Roxb.	4	7	57.1%
(4 species)	*Microcos tomentosa* Sm.	6	17	35.3%
	Oroxylum indicum (L.) Kurz	8	30	26.7%
	Bombax ceiba L.	8	72	11.1%
Treat cancer	*Azadirachta indica* A.Juss.	10	58	17.2%
(4 species)	*Capparis micracantha* DC.	5	45	11.1%
	Suregada multiflora (A.Juss.) Baill.	3	36	8.3%
	Alpinia galanga (L.) Willd.	7	94	7.4%
Treat oral wounds	*Lepisanthes rubiginosa* (Roxb.) Leenh.	20	58	34.5%
(3 species)	*Canarium subulatum* Guillaumin	5	23	21.7%
	Syzygium cumini (L.) Skeels	10	49	20.4%
Relieve menstrual pain	*Salacia chinensis* L.	9	34	26.5%
(3 species)	*Syzygium cumini* (L.) Skeels	10	49	20.4%
	Oroxylum indicum (L.) Kurz	4	30	13.3%
Treat jaundice disease	*Cratoxylum formosum* (Jack) Benth. & Hook.fil. ex Dyer	7	57	12.3%
(2 species)	*Cratoxylum cochinchinense* (Lour.) Blume	5	50	10.0%
Treat malnutrition in children	*Sindora siamensis* Teijsm. ex Miq.	4	10	40.0%
(2 species)	*Dipterocarpus obtusifolius* Teijsm. ex Miq.	5	25	20.0%
Treat hives	*Suregada multiflora* (A.Juss.) Baill.	5	36	13.9%
(2 species)	*Amphineurion marginatum* (Roxb.) D.J.Middleton	1	20	5.0%

Nourish and treat kidney disease

There are 10 plant species used to treat kidney disease. The plant with the highest %FL value is *M. laurina* Blume, which has a %FL value of 50.0% and is used for boiling and drinking. It is followed by *S. antisepticum* (Blume) Merr. & L.M. Perry, with a %FL value of 45.5%. The leaves of this plant are used for drinking. In third place is *S. oleosa* (Lour.) Oken, with a %FL value of 36.0%. The fresh fruit of this plant is used to treat kidney disease.

Relieves dizziness and nausea

There are nine plant species used to relieve dizziness, nausea, and vomiting. The plant with the highest %FL value is *M. laurina* Blume, which has a %FL value of 50.0% and is used for boiling and drinking. It is followed by *S. antisepticum* (Blume) Merr. & L.M. Perry, with a %FL value of 45.5%. The leaves of this plant are used for drinking. In third place is *S. oleosa* (Lour.) Oken, with a %FL value of 36.0%. The fresh fruit of this plant is used to treat dizziness, nausea, and vomiting.

Laxatives treat constipation

There are eight plant species used as laxatives to treat constipation. The plant with the highest %FL value is *S. oleosa* (Lour.) Oken, with a %FL value of 44.0%. Its fresh fruit is used. Next is *Aporosa ficifolia* Baill, with a %FL value of 34.8%. Its roots are used for boiling and drinking. In third place is *Microcos tomentosa* Sm., with a %FL value of 29.4%. The root part of this plant is used, and the boiled essence is consumed as a laxative to treat constipation.

Helps remove toxins from the body

There are eight plant species used to help remove toxins from the body. The plant with the highest %FL value is *Ficus hispida* L.fil., with a %FL value of 38.9%. Its roots, pith, and boiled bark are used. It is followed by *S. asper* Lour., with a %FL value of 29.8%. The roots are commonly boiled and drunk. In third place is *S. saman* (Jacq.) Merr., with a %FL value of 24.1%. The roots are boiled and consumed to help remove toxins from the body.

Helps nourish the blood

There are 13 plant species used to help nourish the blood. The plant with the highest %FL value is *C. piriformis* Hickel & A. Camus, with a %FL value of 50.0%, and is used for boiling and drinking. It is followed by *Syzygium cumini* (L.) Skeels, with a %FL value of 34.7%. The leaves of this plant are used for drinking. The second most commonly used plants are *Dillenia ovata* Wall. ex Hook.fil. & Thomson and *Getonia floribunda* Roxb., both with a %FL value of 33.3%. The leaves of these plants are used, and the core is boiled to help nourish the blood.

Treat fresh wounds, stop bleeding, abscesses, pus, and rotting wounds

There are eight plant species used to treat fresh wounds, stop bleeding, and address abscesses, pus, and rotting wounds. The plant with the highest %FL value is *Parthenocissus quinquefolia* (L.) Planch., with a %FL value of 100.0%, and is used for boiling and drinking. It is followed by *Capparis sepiaria* L., with a %FL value of 66.7%. The leaves of this plant are used for drinking. In third place is *Z. oenopolia* (L.) Mill., with a %FL value of 39.4%. The roots and young leaves of this plant are crushed and applied as a compress to treat wounds, prevent bleeding, and address abscesses, pus, and rotting wounds.

Treat urethritis, helps to urinate

There are six plant species used to treat urethritis and aid in urination. The *G. floribunda* Roxb, with a %FL value of 100.0%, has the highest value. Its roots are boiled and drunk. Next is *A. ficifolia* Baill, with a %FL value of 65.2%. Its leaves are used for drinking. In third place is *Ridsdalea wittii* (Craib) J.T. Pereira, with a %FL value of 35.0%. The fresh fruit of this plant is used to treat urethritis and aid in urination.

Treat diabetes, blood pressure

There are six plant species used to treat diabetes and high blood pressure. The plant with the highest %FL value is *U. ovata* subsp. *ovata*, with a %FL value of 37.5%, and is used for boiling and drinking. It is followed by *M. laurina* Blume, which has a %FL value of 34.4%. The leaves of this plant are used for drinking. In third place is *A. lebbekoides* (DC.) Benth., with a %FL value of 30.4%. The fresh fruit of this plant is used to treat diabetes and high blood pressure.

Helps nourish milk

There are six plant species used to help nourish milk. *Uvaria micrantha* (A.DC.) Hook.f. & Thomson, with a %FL value of 55.6%, has the highest %FL value. Its roots are boiled and drunk. Next is *C. lappacea* (L.) Desv., with a %FL value of 50.0%. Its leaves are used for drinking. In third place is *G. laoticus* (Finet & Gagnep.) Bân, with a %FL value of 43.8%. The fresh fruit of this plant benefits milk production.

Treat liver disease

Five species of plants are used to treat diabetes and high blood pressure. The *E. lanceifolius* Roxb. has the highest %FL value at 42.9% and is used for making a drink by boiling. This is followed by *Osbeckia stellata* Buch. Ham ex D.Don, which has a %FL value of 29.5%, with its leaves also used for making a drink. In third place is *U. ovata* subsp. *ovata*, with a %FL value of 25.0%. The boiled essence of this plant is used for drinking to treat liver disease.

Relieves vomiting

Five plant species are used to relieve dizziness, nausea, and vomiting. The plant with the highest fluorescence percentage (%FL) is *M. laurina* Blume, with a %FL value of 15.6%. It is used to make a boiled drink. Next is *Bombax ceiba* L., with a %FL value of 13.9%. Its leaves are also used to make a drink. The *U. ovata* subsp. *ovata* ranks third, with a %FL value of 12.5%, and is used in a boiled essence to relieve dizziness, nausea, and vomiting.

Treats toothache, tartar, and bleeding gums

Four plant species are used to treat toothache, tartar, and bleeding gums. The plant with the highest fluorescence percentage (%FL) is *L. floribunda* Jack, with a %FL value of 100.0%. It is followed by *S. asper* Lour, which has a %FL value of 70.2%. The leaves of *S. asper* Lour are used to make a drink. The *C. subulatum* Guillaumin ranks third, with a %FL value of 17.4%, and is utilized for treating toothache, tartar, and bleeding gums.

Treat bruises

Four distinct plant species are used for treating bruises. *Croton persimilis* Müll.Arg. has the highest fluorescence percentage (%FL) among them, with a value of 40.0%. The *I. malayana* Oliv. ex A.W.Benn. has a %FL value of 23.8%, which is lower. The leaves of *C. persimilis* Müll.Arg. are used to make a beverage. *Ampelocissus martini* Planch ranks third, with a %FL value of 15.4%, and is commonly consumed as a boiled essence to alleviate bruises.

Treat diarrhea, diarrhea

Four distinct plant species are used for treating diarrhea. The plant with the highest fluorescence percentage (%FL) is *E. lanceifolius* Roxb., with a %FL value of 37.5%. This plant is commonly used for boiling and drinking. Next is *M. tomentosa* Sm., with a %FL value of 35.3%. Its leaves are used to make a beverage. *Oroxylum indicum* (L.) Kurz ranks third, with a %FL value of 26.7%, and is traditionally consumed as a boiled essence to alleviate diarrhea.

Treat cancer

Three plant species are utilized for the treatment of cancer. The plant with the highest percentage of flavonoid content (%FL) is *Azadirachta indica* A.Juss., which has a %FL value of 17.2%. The roots and leaves of this plant are prepared by boiling and consumed as a beverage. The next plant is *Capparis micracantha* DC., which has a %FL value of 11.1%. The roots of this plant are also prepared by boiling and consumed as a beverage. *Suregada multiflora* (A.Juss.) Baill. has a %FL value of 8.3%, and the roots and stems are prepared by boiling and consumed as a beverage.

Treat oral wounds

Three species of plants are used to treat mouth ulcers. *L. rubiginosa* (Roxb.) Leenh. has the highest percentage, with a %FL value of 34.5%. The next plant, *C. subulatum* Guillaumin, has a %FL value of 21.7% and is used topically, with both the roots and latex applied. The *S. cumini* (L.) Skeels has a %FL value of 20.4%; its roots and stems are boiled and consumed.

Relieve menstrual pain

Three plant species have the capacity to reduce the discomfort associated with menstruation. *Salacia chinensis* L., the plant with the highest flavonoid content (%FL) of 26.3%, is consumed by boiling and drinking its stem. The next plant, *S. cumini* (L.) Skeels, has a %FL value of 20.4%. The roots and stems of this plant are boiled and consumed as a beverage. The *O. indicum* (L.) Kurz, which has a %FL value of 13.3%, is used by boiling the bark and consuming it.

Treat jaundice disease

Two plant species are utilized for the treatment of jaundice. The plant with the highest Fidelity Level (%FL) is *Cratoxylum formosum* (Jack) Benth. & Hook.fil. ex Dyer, with a %FL value of 12.3%. The roots and leaves of this plant are prepared by decoction and consumed. Another species, *Cratoxylum cochinchinense* (Lour.) Blume, has a %FL value of 10.0%. In this case, only the roots are decocted and consumed.

Treat malnutrition in children

Two species are utilized for the treatment of malnutrition in children. The plant with the highest Fidelity Level (%FL) is *Sindora siamensis* Teijsm. ex Miq., with a %FL value of 40.0%. The stem and bark are boiled and consumed as a beverage. The *D. obtusifolius* Teijsm. ex Miq. has a %FL value of 20.0%. The roots and latex are immersed in water for bathing or consumption.

Treat hives

Two species are used for the treatment of hives. The plant with the highest Fidelity Level (%FL) is *S. multiflora* (A.Juss.) Baill., with a %FL value of 13.9%. The roots and stems of this plant are boiled and consumed. Another species, *Amphineurion marginatum* (Roxb.) D.J. Middleton, has a %FL value of 5.0%. The roots of this plant are also boiled and consumed.

While a study by Pholhiamhan et al. (2018) identified 176 species of medicinal plants, *Crinum asiaticum* L. var. *asiaticum* had the highest Fidelity Level (%FL) of 93.62%. This plant is frequently used. *Chromolaena odorata* (L.) R.M. King & H. Rob. follows with an %FL of 85.88%, commonly used as a hemostatic drug for sprained ankles. In the study by Saisor et al. (2021), which focused on 68 types of herbal plants, the Fabaceae family was the most frequently used. Plants in this family had a %FL value of 100%. Notable examples include *Senna siamea* (Lam.) H.S.Irwin & Barneby, which aids in digestive health; *Bauhinia saccocalyx* Pierre, which helps heal injuries; and *X. xylocarpa* (Roxb.) W.Theob., which supports the musculoskeletal system. Niamngon et al. (2023) found 109 medicinal plant species with a 100% %FL for several plants, including *Mangifera indica* L., *Sandoricum koetjape* (Burm.fil.) Merr., *Antidesma puncticulatum* Miq., *S. oleosa* (Lour.) Oken, and *Morus alba* L. These plants are used primarily for their laxative effects to relieve constipation. In another study by Niamngon et al. (2024), 154 species of medicinal plants were identified, with 16 species showing a 100% %FL. These included *Andrographis paniculata* (Burm.f.) Wall. ex Nees, used to treat fever and headaches, and *Solanum violaceum* Ortega, used for coughs, sore throats, and phlegm. Despite these studies being conducted in the northeastern region of Thailand (Isaan region), differences in ethnic groups, languages, local conditions, and periods of data collection result in variations in plant species and their uses. This highlights the diversity in medicinal plant utilization across

different communities.

The indigenous botanical study conducted in Don Pu Ta Forest, a region inhabited by the Thai Yoi Ethnic Group, has produced significant findings. Phak Tob Village, situated in Pla Lo Sub-district, Waritchaphum District, Sakon Nakhon Province, is home to a diverse array of plant species, comprising 36 families, 54 genera, and 61 species. The Fabaceae family is the most represented, with six species identified. Among the various plant parts used for medicinal purposes, the aerial stems of 37 species are the most commonly utilized, followed by the roots of 29 species and the bark of 8 species.

In terms of plant structure, the study identified 30 families and 50 species of large trees, 20 families and 25 species of saplings, and 14 families and 18 species of understory plants. The large trees had the highest diversity index at 3.88, followed by saplings with a diversity index of 2.87, and understory plants with a diversity index of 2.46. The evenness index (E) was calculated at 0.88, while the highest Importance Value Index (IVI) was 27.66. Specifically, *L. calyculata* Kurz had the highest IVI at 27.66, followed by *E. lanceifolius* Roxb. at 22.30, and *A. costata* Korth. at 20.20.

The Informant Consensus Factor (ICF) analysis revealed that 61 medicinal plants were used to treat 28 disease syndromes, with a significant emphasis on their medicinal applications. The syndromes with the highest number of plant species used for treatment included body aches and pains (18 species), followed by fever and headaches related to urticaria (14 species), and coughs, sore throats, and phlegm expulsion (13 species). The ICF for medicinal plant knowledge among informants was found to be 0.96, indicating a high level of agreement, especially in the treatment of bloating, flatulence, and colic. In contrast, the treatment of neutralization had the lowest level of agreement, with an ICF of 0.70.

The Fidelity Level (%FL) for seven plant species used to treat specific disease symptoms was uniformly 100%. These species include *A. costata* Korth., *Dioecrescis erythroclada* (Kurz) Tirveng., *E. malaccensis* Griff., *G. floribunda* Roxb., *L. floribunda* Jack., *P. quinquefolia* (L.) Planch., and *Z. cambodiana* Pierre.

The findings of this study provide a valuable repository of information, shedding light on the indigenous knowledge of medicinal plant use in Don Pu Ta Forest for healthcare. Furthermore, the study serves as a vital resource for the preservation of plant genetics in Don Pu Ta Forest, ensuring the sustainability of this knowledge for future generations.

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