

Uncovering the ethnobotanical importance of community forests in Chai Nat Province, Central Thailand

SUKANDA CHAIYONG^{1,✉}, WITTAYA PONGAMORNKUL², PRATEEP PANYADEE², ANGKHANA INTA^{3,✉✉}

¹Department of Biology, Faculty of Science, Chandrakasem Rajabhat University, Bangkok 10900, Thailand. Tel.: +66-8963-17636, ✉email: sukanda.c@chandra.ac.th

²Queen Sirikit Botanic Garden, the Botanical Garden Organization, 100 Moo 9 Mae Rim, Chiang Mai, Thailand

³Department of Biology, Faculty of Science, Chiang Mai University, 239 Huaykaew Rd, Tumbol Suthep, Amphur Muang, Chiang Mai 50200, Thailand. Tel.: +66-8503-31691, ✉✉email: aungkanainta@hotmail.com

Manuscript received: 13 February 2023. Revision accepted: 7 April 2023.

Abstract. *Chaiyong S, Pongamornkul W, Panyadee P, Inta A. 2023. Uncovering the ethnobotanical importance of community forests in Chai Nat Province, Central Thailand. Biodiversitas 24: 2052-2063.* Ethnobotanical studies are crucial for understanding local communities' traditional knowledge and use of plants and conserving biodiversity. This is the first public ethnobotanical study in the Chai Nat Province. It is an essential contribution to the limited knowledge of the traditional use of plants in this region. Three key informants with high experience in traditional knowledge were selected through a small meeting in the village. Using a semi-structured interview method during the walk-to-the-wood method, we gathered data on 103 plant species belonging to 92 genera and 49 families. The majority of the plant species (57) were used for medicinal purposes, followed by food (38), materials (17), and other small categories. It is worth noting that some plant species were used in more than one category. Our study provides an in-depth understanding of local communities' traditional knowledge and use of plants which is essential for managing and conserving these important resources. This study not only contributes to the field of ethnobotany but also highlights the importance of preserving traditional ecological knowledge for future generations.

Keywords: Biodiversity, local medicinal healthcare, plant conservation, qualitative ethnobotany, traditional knowledge

INTRODUCTION

Ethnobotany, the study of the relationship between humans and plants (Casas et al. 2023), is crucial for understanding how people use, perceive, and manage their local plant resources. Ethnobotanical studies can be broadly classified into qualitative and quantitative (Jha 2021). Quantitative ethnobotany uses statistical techniques to analyze human-plant relationships, describing variables and testing hypotheses. It helps to collect a large amount of data and make cross-cultural comparisons. However, it may not consider traditional ecological knowledge's complexity and cultural context, which can lead to oversimplification. Therefore, quantitative methods cannot substitute the necessity for the qualitative depiction of traditional knowledge. Additionally, collecting and analyzing data using quantitative methods can be labor-intensive, which may limit the scope of some studies. On the other hand, qualitative ethnobotanical studies focus on understanding the cultural and social aspects of human-plant relationships, such as the cultural significance of plants and traditional ecological knowledge, especially if the observation aims to explore the variations in traditional botanical knowledge (de Albuquerque and Hanazaki 2009). This approach is often qualitative in nature and involves methods such as participant observation, interviews, and focus groups. This study method is less resource and labor-intensive, and it is more likely to obtain in-depth ethnobotanical data. Additionally, qualitative

ethnobotanical studies are important for increasing knowledge erosion (Ghanimi et al. 2022; Nguanchoo et al. 2022) as they provide insight into traditional ecological knowledge and its cultural significance. Furthermore, qualitative ethnobotanical studies are crucial in highlighting the unique ethnobotanical knowledge of each ethnic group and village. This knowledge is often specific to a particular community and cannot be generalized. This approach is less resource-intensive and can be used to develop conservation strategies, preserve traditional ecological knowledge, and revitalize indigenous cultures. Additionally, qualitative ethnobotany is crucial for meta-analysis. (Kantasrila et al. 2020; Panyadee et al. 2023; Phumthum and Balslev 2019; Phumthum and Sadgrove 2020; Phumthum et al. 2018). However, qualitative ethnobotanical studies have potential limitations. For example, researcher bias from data collection through interviews and observations and small sample sizes may limit the generalizability of findings.

Thailand, located in Southeast Asia, is known for its diverse geography, including mountains, plateaus, and coastal regions (van Welzen et al. 2011). This diversity of ecosystems and ethnic groups, and cultures in the country makes ethnobotanical research particularly rich and diverse (Panyadee et al. 2023). Ethnobotanical studies in Thailand have focused on various aspects of the country's human-plant relationship, such as traditional use in agriculture and forestry (Srithi et al. 2017), local medicinal healthcare (Panyadee et al. 2019; Srithi et al. 2012), the cultural

significance of plants (Junsongduang et al. 2018; Panyadee et al. 2018), and food plants (Punchay et al. 2020). However, there are still many parts of Thailand where ethnobotanical knowledge is not well documented, making it crucial to continue research to preserve and understand the country's traditional ecological knowledge (Phumthum and Balslev 2019). Therefore, to address this problem, it is suggested that further extensive ethnobotanical studies be conducted in under-researched provinces to document and preserve traditional ecological knowledge and support conservation and sustainable development in that region.

This objective is to conduct an ethnobotanical study in Chai Nat Province, Thailand, to document traditional plant use. This study is the first publication that focuses on the ethnobotanical knowledge of the Chai Nat Province. The study aims to preserve traditional knowledge and support conservation and sustainable development in the region. Additionally, it aims to uncover new plant uses and inform natural resource management in Chai Nat Province.

MATERIALS AND METHODS

Study area

The ethnobotanical observation was conducted in the community forest at *Ban Khao Raow Tian Tong*, located in Tambon Nern Kham, Nern Kham District, Chai Nat Province, Thailand (N 15000.612' E 099052.963'; N 15000.375' E 099051.047'; N 15001.198' E 099052.327') (Figure 1). The population consists of local Central Thai people. The total area of the community forest is approximately 1,200 hectares, and the natural landscape is a combination of low and hilly areas. The elevation ranges from 89-319 meters above sea level. About 50% of the area is for agricultural use (624 hectares), 10% for residential areas (124 hectares), and the remaining 40% is hilly terrain

(496 hectares). The forest is managed in the form of a community forest, consisting of four hills: *Khao Raow Tian Tong* or *Khao Yao*, located to the north of the village, and three smaller hills to the east and northeast of the village, namely *Khao Ang*, *Khao Motakrua*, and *Khao Moyai*. Three villages jointly manage the total area of the Khao Raow Tian Tong community forest - Ban Khao Raow Tian Tong, Ban Nong Kaen Mahakluai, and Ban Nong Manao.

Ethnobotanical investigation

We first obtained permission from the village head to conduct our ethnobotanical study during 2019-2020. We then selected three key informants with high experience in traditional knowledge by setting up a small meeting in the village. The criteria for the key informants were that they needed to be experienced local healers and were accepted by most villagers. We used a semi-structured interview to gather data from the key informants, conducted during the walk-to-the-woods method. During the survey, the informants were asked about plant names and how they were used. We also took photographs and collected voucher specimens to identify further and confirm the correct plant species name. The data collected during the interviews were recorded in writing and with photographs. Furthermore, the interviewees were allowed to review and confirm the accuracy of the information collected. Before the interview, verbally informed consent was obtained from the key informants. The consent process involved explaining the purpose and methods of the study and ensuring that the informants were aware that they were under no obligation to participate and had the right to withdraw from the study at any time without any consequences. Our methodology allowed us to obtain valuable ethnobotanical knowledge from experienced local healers respectfully and ethically.

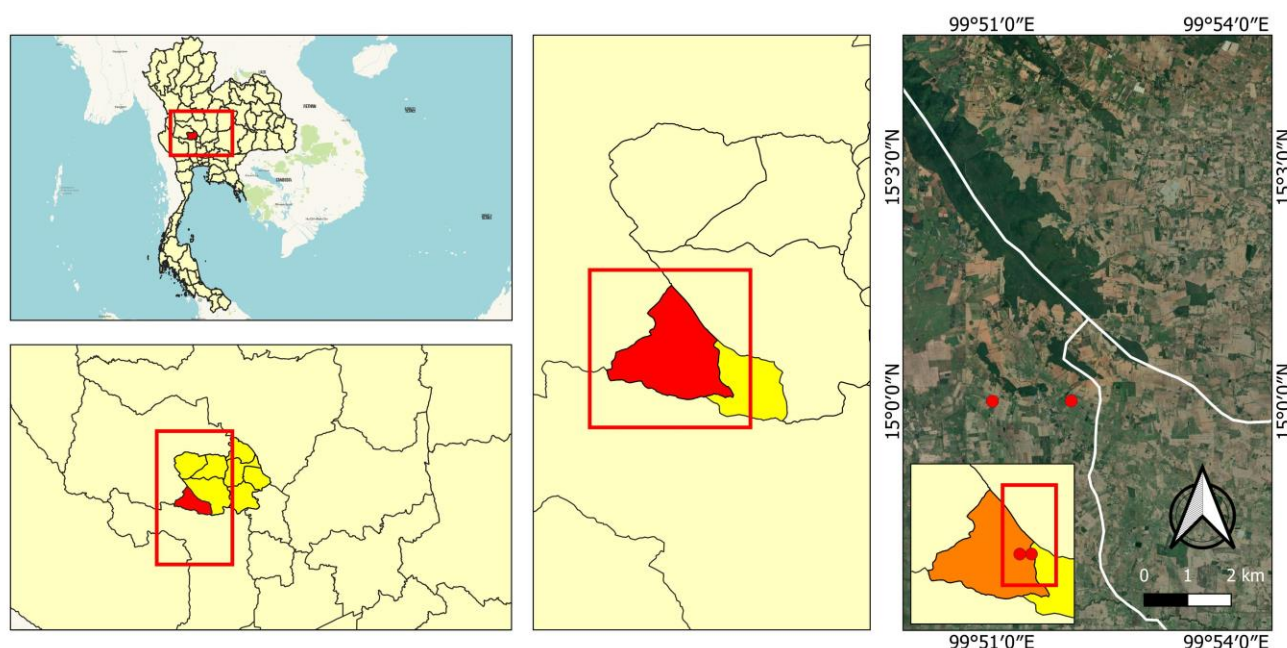


Figure 1. Location of Chai Nat province, central Thailand indicating the community forest (*) at Ban Khao Raow Tian Tong, Tambon Nern Kham, Nern Kham District, Thailand

Plant identification and categorization

One of the authors (WP), a trained botanist with experience identifying plants, carried out the plant identification. The specimens collected during the survey were brought to the Queen Sirikit Botanic Garden (QBG) herbarium. WP used various identification tools such as field guides, taxonomic keys, and comparisons with existing specimens in the herbarium to identify the plants accurately. Once the plants were identified, voucher specimens were prepared and deposited in the herbarium for future reference. Therefore, the photographs taken during the survey were also used as a reference to confirm the identification. Furthermore, the authors would consult with other botanists for confirmation if necessary. This process helped ensure the plants were accurately identified and could be used for further study and conservation.

The scientific names and families of the identified plant species were determined by consulting the Plants of the World Online database (powo.science.kew.org; access date 28 January 2023). Additionally, the reference used for the common Thai names was *Tem Smitinand's Thai Plant Names* (Pooma and Suddee 2014). The categorial use was adapted from the Economic Botany Data Collection Standard (Cook 1995). Nine categories were recognized: Food, Material, Medicines, Animal food, Social uses, Vertebrate poisons, Environmental uses, Food additives, and Non-vertebrate poisons.

RESULTS AND DISCUSSION

Our ethnobotanical study highlighted the significance of community forests in Chai Nat province, Thailand. The extensive research revealed 103 plant species belonging to 92 genera and 49 families, which is a considerable number compared to other studies in the central region of Thailand. For instance, Chaunchom (2011) identified 72 plant species used by Hmong people in the Phetchabun province for various purposes. Next, Jeanwichayakul (2014) reported 39 plant species used for medicinal purposes in Lop Buri Province; and Panyadee et al. (2022) documented 48 plant species used mostly as food in Rayong province. Notably, these studies had different research objectives and scope, which might have influenced the number of plant species documented. However, our comprehensive approach, which included all plant groups and not just medicinal plants, enabled us to comprehend better the relationship between humans and plants and the diverse uses by local communities. That may contribute to the more species documented in our study than in the previous studies.

Our study's results demonstrated the critical role that community forests play in providing a wide variety of plant species used for medicinal, food, and material purposes. That emphasizes the importance of community forests in sustaining local communities' traditional knowledge and practices in utilizing these natural resources (Table 1).

The present study is the first public ethnobotanical study in Chai Nat Province, and it provides significant insights into the relationship between humans and plants in this region. This information is crucial for developing sustainable and effective strategies for the conservation and management

of community forests and for preserving traditional knowledge and practices related to using plant resources.

Notably, twenty-one taxa out of 103 species found in this study were identified only at the genus level, indicating a need for further research to fully document and understand this plant species found in the forest. While none of the taxa discovered in this study are exclusive to Chai Nat province, the findings still offer valuable insights into the local community's specific ethnobotanical relationships and practices. This also highlights the importance of accurately identifying plant species in ethnobotanical studies, as it has implications for the sustainable use and management of these resources (Pei et al. 2020).

Based on the use category, we found that the majority of the plant species (57) were used for medicinal purposes, followed by food (38), materials (17), and other small categories (Figure 2). That suggests the community forests in Chai Nat province are an important source of traditional medicine for the local communities. Furthermore, the number of plant species used for medicinal purposes demonstrates a strong correlation between biodiversity and medicinal use (Phumthum et al. 2018), highlighting the importance of community forests as a source of traditional knowledge and medicinal plants for the local communities.

A diverse range of plant species in the community forests is used for medicinal purposes by local communities. These plants treat various ailments, including cancer, fever, asthma, wounds, hypertension, digestive disorders, etc. (Table 2). One example of these important medicinal plants is *Erythrophleum succirubrum* Gagnep., also known locally as *sak*, an important medicinal plant traditionally used in traditional Thai medicines to treat fever and skin diseases (Chaiyong et al. 2022). Our study found that the heartwood of this plant is consumed as an aqueous decoction to relieve internal heat, while its leaves are crushed and used as an insecticide (Figure 3). Interestingly, the *E. succirubrum* ethanolic leaf extract has been found to possess many bioactive components with cytotoxic properties against the human cholangiocarcinoma cell line. These findings suggest the potential of this plant for developing novel therapeutics for cancer treatment (Chaiyong et al. 2022). Identifying bioactive compounds in *E. succirubrum* highlights the importance of conducting further research to understand the potential medicinal properties of traditional medicinal plants fully.

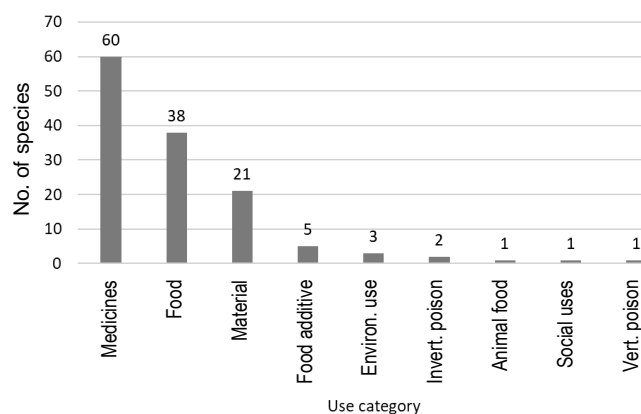


Figure 2. Number of species found in each use category

Another noteworthy plant species in the study was *Stephania oblata* Craib, traditionally consumed as an aqueous decoction to treat cancer and internal injuries (Figure 3). The traditional use of this plant highlights its potential as a source of bioactive compounds with therapeutic properties. Therefore, the ethanolic extract of the plant showed strong antimicrobial activity against several bacterial strains. That includes *Escherichia coli*, *Pseudomonas aeruginosa*, *Staphylococcus epidermidis*, methicillin-resistant *Staphylococcus aureus*, as well as against the fungus *Candida albicans* with MIC values ranging from 0.97 to 1.95 mg/mL compared to the standard antibiotic gentamicin. In addition, the extract showed potent cytotoxicity against a human cholangiocarcinoma cell line (Chaiyong et al. 2021). In Nan Province, the ethnobotanical significance of *S. oblata* has been documented through its traditional uses by the Thai Yuan and Mien people. Notably, the Thai Yuan people have used the tuber of this plant to treat gastritis (Songsangchun 2015), while Mien people have consumed the aqueous decoction of its tuber to treat cancer (Panyaphu 2012). *Maerua siamensis* (Kurz) Pax is another potent and interesting medicinal plant identified in this study (Figure 3). Its leaves and stems are locally utilized for topical benefits, including relieving headaches and toothaches and reducing swelling. In addition, the roots of *M. siamensis* are traditionally used in several anti-inflammatory and pain-relieving preparations in Thai medicine (Nukulkit et al. 2022), and recent research has demonstrated the anti-inflammatory activity of its ethanolic root extract (Theanphong and Somwong 2022). Additionally, previous phytochemical studies have revealed the larvicidal presence of 1H-indole-3 acetonitrile glycosides in the leaves and twigs of *M. siamensis* (Nobsathian et al. 2018).

Furthermore, eight new indole alkaloids were isolated from the roots of *M. siamensis*, and their structures were elucidated based on spectroscopic methods and computational analysis. Among them, maeruanitriles A and B, maeroxime C, and maeruabisindoles B and C were found to inhibit nitric oxide production in LPS-induced RAW 264.7 cells, supporting the traditional use of *M. siamensis* roots for analgesic and anti-inflammatory purposes in Thai medicine (Nukulkit et al. 2022). Therefore, testing for substances that can inhibit the production of nitric oxide is crucial in assessing the tested compounds' possible anti-inflammatory properties. Notably, *M. siamensis* root has also been used to treat genitourinary system disorders by Thai people in Mukdahan Province (Northeast Region) (Khonkayan et al. 2019) and to treat malaria by Thai people in Lop Buri Province (Central Region) (Jeanwichayakul 2014). This further emphasizes the importance and diverse uses of *M. siamensis* across different regions in Thailand.

Moreover, *A. racemosus* roots are consumed as an aqueous decoction to treat gastritis in Chai Nat Province (Figure 3). Interestingly, different uses have been reported in other regions of Thailand. In Chanthaburi Province, *A. racemosus* is rubbed with lime water and used to treat

hemorrhoids (Chuakul et al. 2006). In Phattalung Province, its aqueous decoction is used to strengthen the body by healers (Maneenoon et al. 2015). Similarly, *S. multiflora* roots are consumed as a decoction to promote bone health in Chai Nat Province. On the other hand, in the northeast region, its root is used to treat shingles, and its stem is used to treat colon cancer (Sritubtim et al. 2014). Furthermore, *S. multiflora* is also used as a laxative ingredient and to treat paralysis by local healers in Yasothorn province (Chuakul et al. 2002). *V. pusilla* leaves are utilized in bath decoctions to soothe skin rashes in Chai Nat Province (Figure 3). This study provides insight into the wide variety of traditional medicinal plants employed by local communities in different regions. It underscores continued research significance in comprehending their properties and applications thoroughly. Moreover, the findings support the notion that community forests contain medicinal plants that can improve local residents' primary health care (Kumar et al. 2021). The present study determined that thirty-eight plant species are utilized for food.

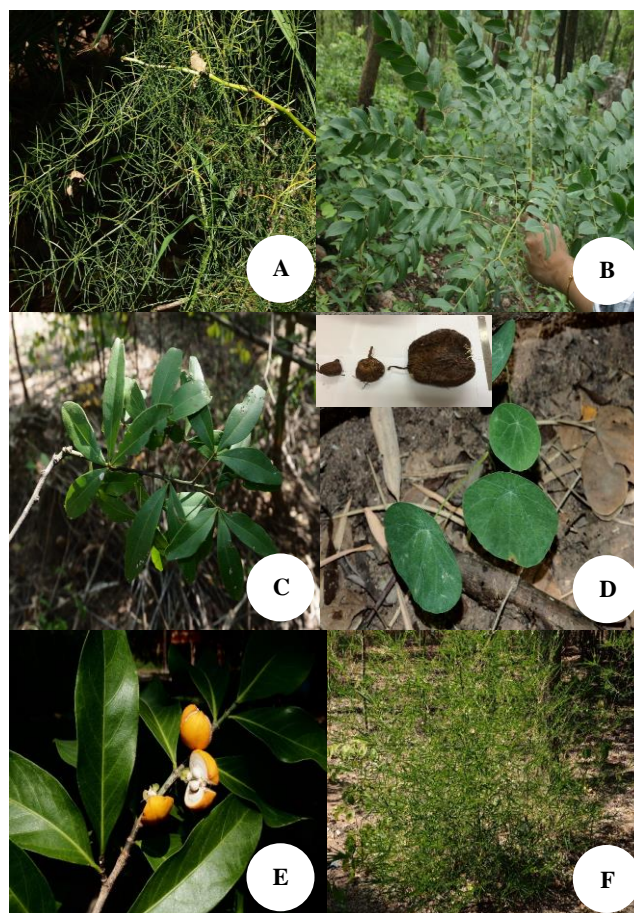


Figure 3. Some traditional medicinal plants: (A) *A. racemosus*; (B) *E. succirubrum* (C) *M. siamensis*; (D) *S. oblata*; (E) *S. multiflora*; (F) *V. pusilla*

Table 1. Usage purposes of plant species found in the Ban Khao Raow Tian Tong village, Tambon Nern Kham, Nern Kham District, Chai Nat province, Thailand community forest

Species	Vernacular name	Thai common name	Family	Use category	Part use
<i>Achyranthes aspera</i> L.	Yha Pan Ngu	Pan Ngu	Amaranthaceae	Medicines	Whole plant: Crushed and used to treat wounds in cattle
<i>Acroceras munroanum</i> (Balansa) Henrard	Yha Bai Phai	Yha Bai Phai	Poaceae	Animal food	Whole plant: Source of food for animals such as cattle
<i>Adenia cardiophylla</i> (Mast.) Engl.	Pak E Noon	-	Passifloraceae	Food	Young fruit: Pickled and consumed as a condiment, often paired with chili paste
				Medicine	Stem: Dried and used to make compresses
<i>Azelia xylocarpa</i> (Kurz) Craib	Ma Kha	Ma Kha Mong	Fabaceae	Material	Wood: Used in construction, specifically for building house
<i>Alangium indochinense</i> W.J.de Wilde & Duyfjes	Pru	Pru	Cornaceae	Medicines	Stem: Used to treat fever, relieve asthma, and possess the diaphoretic property
<i>Albizia lebbbeck</i> (L.) Benth.	Proek	Proek	Fabaceae	Material	Wood: Used in construction, specifically for building house
<i>Albizia lebbekoides</i> (DC.) Benth.	Khang	Khang	Fabaceae	Material	Wood: Used in construction, specifically for building house
<i>Amorphophallus</i> sp.	Buk Ta Go	-	Araceae	Food	Tuber: Used in culinary application
				Medicines	Tuber: Consumed to promote health
<i>Annona squamosa</i> L.	Noi Nha	Noi Nha	Annonaceae	Food	Fruit: Edible and consumed
				Medicines	Leaf: Used as an anti-lice treatment
<i>Antidesma ghaesembilla</i> Gaertn.	Muk Mao	Mao Khai Pa	Phyllanthaceae	Medicines	Leaf: Consumed aqueous decoction to treat paralysis
<i>Argyreia</i> sp.	Kra Dueng Chang	-	Convolvulaceae	Medicines	Whole plant: Consumed aqueous decoction to treat headaches and stomach pain
<i>Asparagus racemosus</i> Willd.	Ton Sam Sib	Chan Din	Asparagaceae	Medicines	Root: Consume aqueous decoction as a treatment for gastritis
<i>Azadirachta indica</i> A.Juss.	Sa Dao	Sa Dao	Meliaceae	Food	Young shoot and flower: Edible and consumed
<i>Barleria strigosa</i> Willd.	Ngon Kai Chae	Sung Ka Ra Nee	Acanthaceae	Medicines	Whole plant: Used to treat itching
<i>Bauhinia acuminata</i> L.	Siao	Ka Long	Fabaceae	Food	Young shoot: Edible and consumed
<i>Bauhinia</i> sp.	Chong Kho	-	Fabaceae	Medicines	Bark: Used as medicine to treat diarrhea
					Root: Used as a carminative
<i>Bauhinia variegata</i> L.	Khing Kho	Siao Dok Khao	Fabaceae	Social uses	Bark: Dried and used for chewing with betel nut
<i>Bombax anceps</i> Pierre	Ngio Pa	Ngio Pa	Malvaceae	Food	Yong seed, Flower: Edible and consumed
				Medicines	Exudate: Used as a tonic
				Material	Fruit: White puffy fiber in fruit is used to stuff the pillow
<i>Breonia chinensis</i> (Lam.) Capuron	Ka Thum	Ka Thum	Rubiaceae	Material	Wood: Used in construction, specifically for building house
<i>Bridelia insulana</i> Hance	Ra Ka	Ma Ka Ton	Phyllanthaceae	Medicines	Stem: Consumed aqueous decoction to detoxify and reduce fever
<i>Buchanania</i> sp.	Ma Muang	-	Anacardiaceae	Material	Bark: Used to dye fabrics
	Hua Mang Won			Food	Fruit: Edible and consumed
				Material	Wood: Used in construction, specifically for building house
<i>Careya arborea</i> Roxb.	Ka Don	Ka Don	Lecythidaceae	Food	Young shoot: Edible and consumed
<i>Casearia grewiaefolia</i> Vent.	Tan Sian, Rang Khai	Kuai Pa	Salicaceae	Material	Wood: Used to produce wickerwork
				Vertebrate poisons	Seed: Used as fish poisoning
<i>Cassia javanica</i> L.	Chai Ya Phruek	Chai Ya Phruek	Fabaceae	Environmental uses	Whole plant: Cultivated for ornamental purpose
<i>Catunaregam tomentosa</i> (Blume ex DC.) Tirveng.	Ta Khed	Ma Khed	Rubiaceae	Medicines	Ripe fruit: Used for hair washing
					Stem: Used to treat diabetic
<i>Celosia argentea</i> L.	Ngon Kai Deang	Ngon Kai Thai	Amaranthaceae	Medicines	Whole plant: Used to treat hypertension

<i>Chromolaena odorata</i> (L.) R.M. King & H. Rob.	Sab Sue	Sab Sue	Asteraceae	Medicines	Leaf: Crushed and applied to a fresh wound to stop bleeding
<i>Clerodendrum</i> sp.	Kra Thao Khao San	-	Lamiaceae	Food	Flower: Edible and consumed
<i>Commelina diffusa</i> Burm.f.	Pak Nok Kao	Phak Plab	Commelinaceae	Food	Young shoot: Edible and consumed
<i>Croton stellatopilosus</i> H. Ohba	Phlao	Phlao Noi	Euphorbiaceae	Medicines	Leaf: Used to treat the digestive disorder Whole plant: Used to make herbal steams
<i>Curcuma</i> sp.	Kra Jeow Khaw	-	Zingiberaceae	Food	Flower: Used in culinary application
<i>Cycas siamensis</i> Miq.	Phrong	-	Cycadaceae	Food	Ripe fruit: Edible and can also be used to prepare the flour
				Environmental uses	Whole plant: Cultivated in general landscaping
<i>Dalbergia nigrescens</i> Kurz	Cha Nuan	Cha Nuan	Fabaceae	Medicines	Stem: Used to treat toothache, and swollen gum
<i>Dioscorea alata</i> L.	Kloi	Kloi	Dioscoreaceae	Food	Tuber: Steamed or boiled for consumption
				Medicines	Tuber: Used as a detoxifying medicine
<i>Dioscorea</i> sp.	Phong Nak	-	Dioscoreaceae	Medicines	Tuber: Consumed aqueous decoction to relieve internal heat
<i>Diospyros ehretioides</i> Wall. ex G. Don	Tab Tao	-	Ebenaceae	Food	Ripe fruit: Edible and consumed
<i>Diospyros mollis</i> Griff.	Ma Kluea	Ma Kluea	Ebenaceae	Medicines	Bark: Used as a food preservative Fruit: Consumed to relieve intestinal parasites Whole plant: Used as a medicine to treat loss of appetite
<i>Diospyros rhodocalyx</i> Kurz	Ta Ko	Ta Ko Na	Ebenaceae	Food	Ripe fruit: Edible and consumed
				Environmental uses	Popular trees for topiary tree
<i>Diospyros</i> sp.	Chan Dam, Mak Kha Moi	-	Ebenaceae	Material	Wood: Used in construction, specifically for building house
				Medicines	Root: Consumed aqueous decoction as a health tonic
<i>Dolichandrone serrulata</i> (Wall. ex DC.) Seem.	Kha Na	Kha Khao	Bignoniaceae	Food	Flower: Used in culinary application
<i>Erythrophleum succirubrum</i> Gagnep.	Sak	Sad	Fabaceae	Medicines	Heartwood: Consumed aqueous decoction to relieve internal heat
				Non-vertebrate poisons	Leaf: Crushed and used as an insecticide
<i>Euonymus</i> sp.	Khang Maeo	-	Celastraceae	Medicines	Stem: Used to treat headaches, toothaches, and inflammation
<i>Eurycoma longifolia</i> Jack	Pa Lai Phuek	Pa Lai Phuek	Simaroubaceae	Medicines	Root: Used as tonic and aphrodisiacs
<i>Flacourtia indica</i> (Burm.f.) Merr.	Ta Khob Pa	Ta Khob Pa	Salicaceae	Medicines	Leaf: Bath aqueous decoction to treat chickenpox
<i>Garuga pinnata</i> Roxb.	Ta Kham	Ta Kham	Burseraceae	Food	Ripe fruit: Edible and consumed
				Medicines	Stem: Support digestive health
<i>Geodorum recurvum</i> (Roxb.) Alston	Lan Thom Pa	Wan Nang Tam	Orchidaceae	Medicines	Tuber: Used as general medicines
<i>Grewia abutilifolia</i> Vent. ex Juss.	Kra Tak	Khao Chee	Malvaceae	Food	Young shoot: Edible and consumed
<i>Grewia eriocarpa</i> Juss.	Por Lai	Pro Kan Thao	Malvaceae	Medicines	Bark: Used to treat toothache
<i>Helicteres angustifolia</i> L.	Kra Chae Chan	Khee Tun	Malvaceae	Medicines	Root: Used as a laxative
<i>Hellenia speciosa</i> (J. Koenig) S.R. Dutta	Ueaing Mhai Na	Ueaing Mhai Na	Costaceae	Food	Young shoot: Used in culinary application
<i>Holarrhena pubescens</i> Wall. ex G. Don	Fa Rang Pha, Mok Man	Mok Yai	Apocynaceae	Food	Fruit: Edible and consumed
				Material	Wood: Used in the creation of household accessories
<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Ke Wa	Som Kob	Rubiaceae	Food additives	Leaf: Possess a sour taste, is edible and consumed
				Medicines	Stem: Used to relieve internal heat and thirst
<i>Hypoxis aurea</i> Lour.	Tan Diao	Yha Dok Kham	Hypoxidaceae	Material	Underground stem: Used to make cosmetics
<i>Jasminum</i> sp.	Tio Nang, Tio Krae	-	Oleaceae	Medicines	Whole plant: Consumed as a tonic
<i>Justicia</i> sp.	Kra Chai Mon	-	Acanthaceae	Medicines	Whole plant: Used to treat cancer and flatulence
<i>Kaempferia roscoeana</i> Wall.	Wan Pro	Pro Pa	Zingiberaceae	Food	Young shoot, Leaf: Used in culinary application
				Medicines	Rhizome: Used as antipyretics and expel gas in the intestine

<i>Lagerstroemia cochinchinensis</i> Laness.	Tio Khiang	Ta Bak Kriab	Lythraceae	Food	Young shoot: Edible and consumed
<i>Lagerstroemia floribunda</i> Jack	Plueai	Ta Bak	Lythraceae	Material	Wood: Used in construction, specifically for building house
<i>Lagerstroemia venusta</i> Wall. ex C.B.Clarke	Tio	Sa Lhao Plueak Bang	Lythraceae	Material	Wood: Used in construction, specifically for building house
<i>Lannea coromandelica</i> (Houtt.) Merr.	Oi Chang	Kuk	Anacardiaceae	Medicines	Bark: Used as a wound dressing Heartwood: Used to prepare a remedy for soothing the throat and relieving thirst
<i>Leonotis nepetifolia</i> (L.) R.Br.	Chat Phra In	Chat Phra In	Lamiaceae	Medicines	Whole plant: Used as a medicine to treat hypertension
<i>Lygodium</i> sp.	Moi Yai Thee	-	Lygodiaceae	Food additives	Root: Used as an ingredient of brewer's yeast
<i>Maerua siamensis</i> (Kurz) Pax	Chaeng	Chaeng	Capparaceae	Medicines	Whole plant: Consumed aqueous decoction to treat drunkenness Leaf, Stem: Used to make compresses to relieve headaches and toothaches and to treat swelling
<i>Melientha suavis</i> Pierre	Pak Wan Pa	Pak Wan Pa	Opiliaceae	Material	Stem: Used as an ingredient of gunpowder
<i>Millettia brandisiana</i> Kurz	Chan	Kra Phee Chan	Fabaceae	Food	Young shoot, Young flower: Used in culinary application
<i>Millingtonia hortensis</i> L.f.	Peeb	Peeb	Bignoniaceae	Medicines	Young shoot: Edible and consumed Root: Used as a lung tonic and to treat tuberculosis, it also has a bronchodilator effect
<i>Morinda coreia</i> Buch.-Ham.	Yor Pa	Yor Pa	Rubiaceae	Medicines	Heartwood: Consumed aqueous decoction as a blood tonic Root: Used to treat diabetic
<i>Murdannia</i> sp.	Hom Pa	-	Commelinaceae	Food	Leaf: Edible and consumed
<i>Paederia</i> sp.	Tod Moo Tod Ma	-	Rubiaceae	Food additives	Whole plant: Used as an ingredient of brewer's yeast
<i>Parinari anamensis</i> Hance	Ma Phok	Ma Phok	Chrysobalanaceae	Medicines	Stem: Used to treat skin disease
<i>Passiflora foetida</i> L.	Kra Tok Rok	Kra Tok Rok	Passifloraceae	Medicines	Leaf: Bath aqueous decoction to treat rashes
<i>Phanera involuclata</i> (Kurz) de Wit	Sa Lang Pan	Sa Lang Pan	Fabaceae	Medicines	Bark: Soaked in water and used to treat fleas and lice
<i>Phanera scandens</i> (L.) Lour. ex Raf.	Ban Dai Ling	Kra Dai Ling	Fabaceae	Medicines	Stem: Used to treat fever, relieve internal heat, and used as anthelmintic
<i>Phyllanthus emblica</i> L.	Ma Kham Pom	Ma Kham Pom	Phyllanthaceae	Medicines	Fruit: Consumed to relieve cough and thirst and expel phlegm
<i>Phyllodium</i> sp.	Ked Pla Chon	-	Fabaceae	Food	Young shoot: Edible and consumed
<i>Pterocarpus indicus</i> Willd.	Pra Du, Khang	Pra Du	Fabaceae	Material	Bark: Soaked in dyed water
<i>Rothea serrata</i> (L.) Steane & Mabb.	Pha Ya Yen	Tree Cha Wa	Lamiaceae	Medicines	Leaf: Used to treat the wound and treat hemorrhoids
<i>Sauropus</i> sp.	Luk Tai Bai	-	Phyllanthaceae	Medicines	Fruit: Consumed aqueous decoction to reduce internal heat
<i>Schleichera oleosa</i> (Lour.) Oken	Ta Kho Pa	Ta Kho	Sapindaceae	Food	Ripe fruit: Possess a sour taste, is edible and consumed
<i>Selaginella</i> sp.	Teen Tuk Kae	-	Selaginellaceae	Food	Young shoot: Edible and consumed
<i>Shorea obtusa</i> Wall. ex Blume	Teng	Teng	Dipterocarpaceae	Medicines	Whole Plant: Used to treat beriberi
<i>Shorea siamensis</i> Miq.	Rung	Rung	Dipterocarpaceae	Material	Wood: Used in construction, specifically for building house
<i>Sida</i> sp.	Yha Khad Mon	-	Malvaceae	Medicines	Wood: Used in construction, specifically for building house
<i>Sindora siamensis</i> Teijsm. ex Miq.	Ma Kha Tae	Ma Kha Tae	Fabaceae	Medicines	Leaf: Used to treat fever and relive hiccups
<i>Siphonodon celastrineus</i> Griff.	Pra Duk	Ma Duk	Fabaceae	Material	Wood: Used in construction, specifically for building house
<i>Smilax glabra</i> Roxb.	Yha Hu Kuang On	-	Celastraceae	Food	Fruit: Edible and consumed
<i>Spondias pinnata</i> (L.f.) Kurz	Ma Kok	-	Smilacaceae	Food	Young shoot: Consumed with chili paste
<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Pan Ngo	Ma Kok	Anacardiaceae	Food	Young shoot, Fruit: Used as a food source
<i>Stemona tuberosa</i> Lour.	Non-Tai Yhak	Pan Ngo Khiao	Verbenaceae	Medicines	Whole plant: Used as a remedy for detoxifying and diaphoretic
		Non-Tai Yhak	Stemonaceae	Non-vertebrate poisons	Root: Used to make insecticide
				Medicines	Whole plant: Used as an herbal remedy for streaming

<i>Stephania oblata</i> Craib	Bua Bok Hua	-	Menispermaceae	Medicines	Tuber: Consumed aqueous to treat cancer and internal injury
<i>Sterculia</i> sp.1	Pra Dong Luead	-	Malvaceae	Medicines	Bark: Consumed aqueous decoction to relieve internal heat
<i>Sterculia</i> sp.2	Pro Daeng	-	Malvaceae	Material	Bark: Used to make rope
<i>Stereospermum neuranthum</i> Kurz	Khae Sai	Khae Sai	Bignoniaceae	Food	Fruit: Used in culinary application
				Medicines	Fruit: Aid in sleep
<i>Suregada multiflora</i> (A.Juss.) Baill.	Ma Duk	Khan Thong	Euphorbiaceae	Food	Fruit: Edible and consumed
		Pa Ya Baht		Medicines	Root: Consumed aqueous decoction to strengthen bones
<i>Tamarindus indica</i> L.	Ma Kham	Ma Kham	Fabaceae	Food	Leaf, Flower, Fruit: Edible and consumed
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Haen	Sa Mo Phi Phek	Combretaceae	Medicines	Fruit: Used to relieve constipation and stomach discomfort
<i>Thyrsostachys siamensis</i> Gamble	Phai Ruak	Phai Ruak	Poaceae	Food	Young shoot: Used in culinary application
<i>Tiliacora triandra</i> (Colebr.) Diels	Ya Nang	Ya Nang	Menispermaceae	Medicines	Leaf: Consumed aqueous decoction to treat cancer
<i>Uvaria dulcis</i> Dunal	Ka Dang Nga Pa	Nom Wua	Annonaceae	Medicines	Flower: Used in perfumery and aromatic medicine
					Leaf: Consumed as a diuretic
<i>Vietnamosasa pusilla</i> (A.Chev. & A.Camus)	Phai Peng	Pek	Poaceae	Medicines	Leaf: Bath aqueous decoction to treat rashes
T.Q.Nguyen					
<i>Vitex limonifolia</i> Wall. ex C.B.Clarke	Sa Wong	Sa Wong	Lamiaceae	Material	Wood: Used in the creation of household accessories
<i>Wrightia arborea</i> (Dennst.) Mabb.	Mok Man	Mok Man	Apocynaceae	Medicines	Fruit: Used to treat tooth decay
<i>Xylia xylocarpa</i> (Roxb.) W.Theob.	Ton Daeng	Daeng	Fabaceae	Material	Wood: Used in construction, specifically for building house
<i>Ziziphus</i> sp.1	Leb Yiao	-	Rhamnaceae	Food	Fruit: Edible and consumed
				Medicines	Fruit: Used to soothe a cough
<i>Ziziphus</i> sp.2	Leb Maeo	-	Rhamnaceae	Food	Fruit: Possess a sour taste, is edible and consumed
<i>Zygostelma benthamii</i> Baill.	Ob Choey Thao	Thao Ob Choey	Apocynaceae	Food	Root: Used in traditional cooking, specifically in preparing "palo curry."

Table 2. Classification and usage of medicinal plant species found in Ban Khao Raow Tian Tong village's community forest, Tambon Nern Kham, Nern Kham District, Chai Nat Province, Thailand

Species	Category	Diseases	Applications	Preparation
<i>Achyranthes aspera</i> L.	Veterinary medicine	Wound	Poultice	Crushed whole plants used to treat wounds in cattle
<i>Adenia cardiophylla</i> (Mast.) Engl.	Muscular-skeletal system	Muscle pain	Compress	Dried chopped stem mixed with other medicinal plants prepared for "Look Pa Khob" or herbal compress ball
<i>Alangium indochinense</i> W.J.de Wilde & Duyfjes	Infections Respiratory system Metabolic system	Fever Asthma Sweating	Oral	Decoction prepared from stem used to treat fever, relieve asthma, and possess the diaphoretic property
<i>Amorphophallus</i> sp.	Nutritional disorders	Overweight	Oral	Cooked tuber was consumed to promote health in a fat person
<i>Annona squamosa</i> L.	Skin disorders	Anti-lice	Poultice	Pounded leaves poulticed on the head for one night as an anti-lice treatment
<i>Antidesma ghaesembilla</i> Gaertn.	Nervous system	Paralysis	Oral	Decoction prepared from leaves used to treat paralysis
<i>Argyreia</i> sp.	Nervous system Digestive system	Headache Stomach pain	Oral	Decoction prepared from the whole plant is used to treat headaches and stomach pain
<i>Asparagus racemosus</i> Willd.	Digestive system	Gastritis	Oral	Decoction prepared from roots used to treat gastritis
<i>Barleria strigosa</i> Willd.	Skin disorders	Itching	Liniment	Pounded whole plant used to treat itching
<i>Bauhinia</i> sp.	Digestive system	Diarrhea	Oral	Decoction prepared from the bark is used to treat diarrhea, and decoction prepared from roots is used as a carminative
<i>Bombax anceps</i> Pierre	Nutritional disorders	Tonic	Oral	Decoction prepared from exudate used as a tonic
<i>Bridelia insulana</i> Hance	Poisoning, Infections	Detoxicant, Fever	Oral	Decoction prepared from stem used to detoxify and reduce fever
<i>Catunaregam tomentosa</i> (Blume ex DC.) Tirveng.	Metabolic system	Diabetic	Oral	Decoction prepared from stem used to treat diabetic
<i>Celosia argentea</i> L.	Circulatory system	Hypertension	Oral	Decoction prepared from the whole plant is used to treat hypertension
<i>Chromolaena odorata</i> (L.) R.M.King & H.Rob.	Skin disorders	Wound	Poultice	Crushed leaves are applied to a fresh wound to stop bleeding
<i>Croton stellatopilosus</i> H.Ohba	Digestive disorder Circulatory system	Gastritis Blood circulation	Oral Herbal steam	Decoction prepared from leaves is used to treat gastritis, and herbal steams from whole-plant decoction are used to stimulate blood circulation
<i>Dalbergia nigrescens</i> Kurz	Digestive system	Toothache Swollen gum	Chew or mouthwashes	Bark or decoction prepared from the bark is used to treat toothache and swollen gum
<i>Dioscorea alata</i> L.	Poisoning	Detoxicant	Oral	Decoction prepared from tuber used as a detoxifying medicine
<i>Dioscorea</i> sp.	Metabolic system	Internal heat	Oral	Decoction prepared from tuber used to relieve internal heat
<i>Diospyros mollis</i> Griff.	Infections Nutrition disorders	Parasitic infections Anorexia	Oral	Fruit consumed to relieve intestinal parasites and decoction prepared from the whole plant used to treat loss of appetite
<i>Diospyros</i> sp.	Nutritional disorders	Tonic	Oral	Decoction prepared from the root is used as a health tonic
<i>Erythrophleum succirubrum</i> Gagnep.	Metabolic system	Internal heat	Oral	Decoction prepared from heartwood is used to relieve internal heat
<i>Euonymus</i> sp.	Nervous system Digestive system Musculo-skeleton system	Headaches Toothaches Inflammation	Oral Mouthwashes	Decoction prepared from the stem is used to treat headaches, inflammation, and toothaches
<i>Eurycoma longifolia</i> Jack	Nutrition disorders Genitourinary system	Tonic Aphrodisiacs	Oral	Decoction prepared from root used as tonic and aphrodisiac
<i>Flacourtia indica</i> (Burm.f.) Merr.	Infections	Chickenpox	Bath	Decoction prepared from leaves used to treat chickenpox
<i>Garuga pinnata</i> Roxb.	Digestive system	Indigestion	Oral	Decoction prepared from stem used as digestive health supporting
<i>Geodorum recurvum</i> (Roxb.) Alston	Infections	Colds	Oral	Decoction prepared from tuber used to treat colds
<i>Grewia eriocarpa</i> Juss.	Digestive system	Toothache	Mouthwashes	Decoction prepared from bark used to treat toothache
<i>Helicteres angustifolia</i> L.	Digestive system	Constipation	Oral	Decoction prepared from roots used as a laxative

<i>Hymenodictyon orixense</i> (Roxb.) Mabb.	Metabolic system	Internal heat	Oral	Decoction prepared from the stem is used to relieve internal heat and thirst
<i>Jasminum</i> sp.	Nutrition disorders	Tonic	Oral	Decoction prepared from the whole plant used as a tonic
<i>Justicia</i> sp.	Neoplasms	Cancer	Oral	Decoction prepared from the whole plant is used to treat cancer and flatulence
	Digestive system	Flatulence		
<i>Kaempferia roscoeana</i> Wall.	Infections	Fever	Oral	Decoction prepared from rhizome used as antipyretics and expel gas in the intestine
	Digestive system	Carminative		
<i>Lannea coromandelica</i> (Houtt.) Merr.	Skin disorders	Wound	Oral	Decoction prepared from the bark is used as a wound dressing, and decoction prepared from heartwood is used to soothe the throat and relieve thirst
	Respiratory system	Feel dry		
<i>Leonotis nepetifolia</i> (L.) R.Br.	Circulatory system	Hypertension	Oral	Decoction prepared from the whole plant is used to treat hypertension
<i>Lygodium</i> sp.	Poisonings	Drunkenness	Oral	Decoction prepared from the whole plant is used to treat drunkenness
<i>Maerua siamensis</i> (Kurz) Pax	Nervous system	Headaches	Compress	Dried chopped leaves and stem prepared for "Look Pa Khob" or herbal compress ball
	Digestive system	Toothaches		
	Abnormalities	Swelling		
<i>Millingtonia hortensis</i> L.f.	Respiratory system	Tuberculosis	Oral	Decoction prepared from root used as a lung tonic and to treat tuberculosis also has a bronchodilator effect
		Bronchodilator		
<i>Morinda coreia</i> Buch.-Ham.	Circulatory system	Blood nourishment	Oral	Decoction prepared from heartwood is used as a blood tonic and to treat diabetic
	Metabolic system	Diabetic		
<i>Parinari anamensis</i> Hance	Skin disorders	Skin disease	Liniment	Pounded whole plants used to treat skin disease
<i>Passiflora foetida</i> L.	Skin disorders	Rashes	Bath	Decoction prepared from leaves used to treat rashes
<i>Phanera involucellata</i> (Kurz) de Wit	Skin disorders	Anti-flea and lice	Liniment	Bark was soaked in water and used to treat fleas and lice
<i>Phanera scandens</i> (L.) Lour. ex Raf.	Infections	Fever, Internal heat	Oral	Decoction prepared from the whole plant is used to treat fever, as anthelmintic, and relieve internal heat
	Metabolic system	Parasitic infections		
<i>Phyllanthus emblica</i> L.	Respiratory system	Cough, Thirst, Phlegm	Oral	The fruit was consumed to relieve cough and thirst and expel phlegm
		Wound		
<i>Rotheca serrata</i> (L.) Steane & Mabb.	Skin disorders	Wound	Poultice	Pounded roots are used to treat the wound and hemorrhoids
	Circulatory system	Hemorrhoids		
<i>Sauropus</i> sp.	Metabolic system	Internal heat	Oral	Decoction prepared from the fruit is used to reduce internal heat
<i>Selaginella</i> sp.	Nutritional disorders	Beriberi	Oral	The shoot was consumed to treat beriberi
<i>Sida</i> sp.	Infections, Respiratory	Fever, Hiccups	Oral	The decoction from leaves used to treat fever and relive hiccups
<i>Stachytarpheta jamaicensis</i> (L.) Vahl	Poisoning	Detoxify	Oral	Decoction prepared from whole the plant is used as a remedy for detoxifying and diaphoretic
	Metabolic system	Sweating		
<i>Stemona tuberosa</i> Lour.	Circulatory system	Blood circulation	Herbal stream	Decoction prepared from the whole plant used as an herbal stream
<i>Stephania oblata</i> Craib	Neoplasms	Cancer	Oral	Decoction prepared from bulb used to treat cancer and internal injury
	Injuries	Internal injury		
<i>Sterculia</i> sp.1	Metabolic system	Internal heat	Oral	Decoction prepared from the bark is used to relieve internal heat
<i>Stereospermum neuranthum</i> Kurz	Mental disorders	Sleep disorders	Oral	The fruit was cooked and consumed to aid in sleep
<i>Suregada multiflora</i> (A.Juss.) Baill.	Muscle-skeleton system	Bones	Oral	Decoction prepared from the root is used to strengthen bones
<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Digestive system	Constipation	Oral	The fruit was consumed to relieve constipation, treat diarrhea, and diuretic
	Genitourinary system	Diarrhea, Diuretic		
<i>Tiliacora triandra</i> (Colebr.) Diels	Neoplasms	Cancer	Oral	Decoction prepared from leaves used to treat cancer
<i>Uvaria dulcis</i> Dunal	Genitourinary system	Diuretic	Oral	Leaves were consumed as a diuretic
<i>Vietnamosasa pusilla</i> (A.Chev. & A.Camus)	Skin disorders	Rashes	Bath	Decoction prepared from leaves used to treat rashes
T.Q.Nguyen				
<i>Wrightia arborea</i> (Dennst.) Mabb.	Digestive system	Tooth decay	Mouthwashes	Decoction prepared from the fruit used to treat tooth decay
<i>Ziziphus</i> sp.1	Respiratory system	Cough	Oral	The fruit was consumed to soothe a cough

During the ethnobotanical study, 38 plant species were identified as being used as a food source by the local communities. In addition, nine species were found to be utilized in traditional cooking. These plants play a significant role in the food system of the local community and are a source of nutrition. The diversity of plant species in the community forests provides the residents with various food options that contribute to their food security (Punchay et al. 2020; Panyadee et al. 2022). The traditional knowledge and practices of the local communities in utilizing these resources demonstrate their significant relationship with the forest and their reliance on it for sustenance.

Preserving these community forests is crucial in maintaining sustainable food systems for the local communities. These forests play a crucial role in the food supply chain by providing the local population with a variety of plant species used in traditional cooking and as a food source. Furthermore, these forests support the conservation of traditional knowledge and practices passed down from generation to generation. The loss of these community forests could result in losing traditional knowledge and practices and an important food source for the local communities. Therefore, it is important to continue protecting these forests and support sustainable food systems that contribute to the health and well-being of the local communities.

Furthermore, it is important to note that these findings are based on the observations and knowledge of the key informants. Therefore, it is important to conduct further research to confirm these plants' traditional uses and medicinal properties continuously. In addition to medicinal applications, some plants in the community forests are also utilized for food, materials, cosmetics, and other purposes. For example, the underground stem of *H. aurea* is used as a cosmetic substance, and *D. rhodocalyx* has multiple uses. Its ripe fruit is consumed as a dessert fruit, while the tree is popular for topiary. Our study highlights the need for conservation efforts to protect and preserve the community forests and the traditional knowledge and diverse uses of the plants they contain.

In conclusion, our study is the first ethnobotanical study in Chai Nat Province, Thailand, revealing the diverse range of plant species in the community forests. The findings highlight the importance of these forests as a source of traditional knowledge and medicinal plants for the local communities. However, it also highlights the need for further research to fully identify and document the plant species found in these forests and understand their traditional uses and potential medicinal properties. This is particularly important because many provinces or communities in Thailand have not yet been studied this way. This erosion of knowledge on medicinal properties can have a significant impact on the health and well-being of local communities, as well as on the conservation of these valuable ecosystems. Therefore, it is important to continue conducting ethnobotanical research to document the traditional knowledge and practices of local communities and continuously support the sustainable management of these resources. This research could also

contribute to global issues such as biodiversity loss and zero hunger by identifying potential food and medicinal resources and providing valuable insights into local communities' traditional knowledge and practices. Further research is necessary to fully understand this plant species' chemical composition and medicinal properties and its potential for developing into new drugs.

ACKNOWLEDGEMENTS

We would like to extend our sincerest gratitude to the villagers for their hospitality and warm welcome during our fieldwork. This study would not have been possible without their support and cooperation. Additionally, we would like to acknowledge the valuable financial support from the National Research Council of Thailand and research grants from Chandrakasem Rajabhat University, Bangkok, Thailand. We are also grateful for the partial support received from Chiang Mai University, Thailand. Their support and resources were instrumental in the successful completion of this study.

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